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Does VC Reputation Affect Function of Lockup Agreement?

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Abstract:

Instead of perceiving lockup agreement and VC-backing as exogenous variables, this paper employs the VC-backed IPO data and takes a closer examination on the specific effect of VC reputation, which impacts the choice of lockup length and return and volume abnormality around lockup expiry. Contrary to the commitment hypothesis proposed by previous literatures, the data suggests that less VC-backed companies tend to choose a longer lockup agreement as a compensation device and those companies backed by more reputable VC experience less negative abnormal return and less abnormal volume around lockup expiry.

Keywords: Lockup agreement; VC reputation; Abnormal return and volume

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Dedicated to my parents and my beloved Karen

Does VC Reputation Affect Function of Lockup Agreement?

Chapter 1: Introduction

Lockup period refers to an abstention period of time when insiders are restricted from selling their personally owned shares in particular initial public offering (IPO) and seasoned equity offerings (SEO). As a restriction of the “selling ability” of existing shareholders, such agreement prevents prospective investors from being harmed since the incumbent shareholders such as management team, venture capitalists and investment banks have superior insider information over outsiders. Using this mechanism, it is more likely that interests of both sides are properly aligned.

There are several motivations underlying the lockup period arising from previous scholars’ research. Brav and Gompers (2003) propose the lockup agreement as a “signaling solution to an adverse selection problem, a commitment solution to a moral hazard problem and a rent extraction mechanism by powerful underwriters.” Moreover, there are other explanations to the lockup agreement including downward-sloping demand curves, underwriter compensation and boilerplates. Different researches support one of these alternative explanations to the existence of lockup agreement.

As an important source of external financing, venture capital (VC) plays actively in the IPO market, especially for the growth companies such as biotechnology and high-tech industry. They are adding values by selecting investments and negotiation deals, allocating effort efficiently and monitoring and advising portfolio companies. *Reputation* is a valuable asset to provide firms with competitive advantages (Kreps and Wilson, 1982, Milgrom and Roberts 1982) and a crucial success driver for this industry since VC, as a specialized and successful industry (Gompers et al. 2006) face a large number of competitions among them. However, the measure to define the "Reputation" is still vague and not standardized.

When examining the VC effect on IPOs, most literatures do not differentiate the reputation effect of VCs. Rather, they treat VC-backing and Non VC-backing as an important factor and look at different effects of it. Acting as a certification to the entrepreneurial firms they are investing, treating all VCs equally is not plausible since large, reputable VCs obviously make a more significant impact on a successful IPO and post-IPO performance.

This paper extends the conventional discussion on VC-backing IPOs to a more specific and detailed angle, which sheds lights on the VC reputation effect on the choice of lockup agreement and the price and volume abnormality around lockup

agreement expiry. More specifically, this paper contributes in the following aspects.

Firstly, rather than treating both lockup agreement and VC-related variables as dummy variable taking either 1 or 0, which is common in previous literatures, I treat VC reputation as measurable and use continuous variables as its proxy. By this way, I look further the relationship between VC reputation and lockup length.

Secondly, aside from the lockup length determinant of *VC-backing*, I provide empirical evidence that VC reputation could also affect the length of lockup agreement, employing both probit and logit regressions. Furthermore, the positive relationship between VC reputation and lockup length substantiates the signaling and commitment device hypothesis.

Thirdly, I separate the VC reputations into two different groups and using two reputation candidates to proxy for VC reputation respectively. In addition, I find the asset under management (AUM) and other syndication investment intensity variables are more robust and reliable proxies for VC reputations.

Fourthly, with regard to the abnormal return and volume around lockup expiry, previous literatures have documented more negative abnormal return for VC-backing IPOs. Within the VC-backed group, I found firms backed by more reputable venture

capital funds tend to have less negative abnormal return and abnormal volume.

The paper is organized as the following: Chapter 2 will briefly review previous literatures concentrating on lockup agreement and venture capital and their roles in prior, at and post IPO period; Chapter 3 discussed the data source and development of two major hypothesis; Chapter 4 provides the descriptive analysis and reputation candidate validation process; Chapter 5 sheds lights on the relationship between VC reputations and lockup agreements, using various tests; Chapter 6 discussed the stock return and volume abnormality with the existence of VC reputation in addition to VC-backing; Chapter 7 extends the discussion and concludes the paper.

Chapter 2: Literature Review

2.1 Lockup Agreement

2.1.1 Function of Lockup Agreement

The function lockup agreement generally falls into three categories, signaling, commitment and alternatives such as downward-sloping demand curves and underwriter compensation which has intrigued extensive body of literatures focusing on this topic.

Leland and Pyle (1977) show that to solve the adverse selection problem, information

asymmetry attenuation can be accomplished by investing in their own firms and "abstaining from selling secondary shares", insiders of high-quality firms signal information to potential investors who in turn use the information to more accurately value the business.

Gale and Stiglitz (1989) show that insiders could immediately sell their overvalued shares after fooling investors. Furthermore, Welch (1989) and Chemmanur (1993) solved the problem by adding a second exogenous selling date in the form of a follow-on SEO. In their models, it's costly for low-quality firm insiders to mimic high quality firms and "true value of the firms will be revealed" before the exogenous sell date- SEO. Moreover, Ibbotson and Ritter (1995) suggest that lockups add value since "any negative information being withheld is likely to be divulged before the shares can be sold, reducing the benefit of withholding the information."

Brav and Gompers (2003) perceived the lockup agreement as a commitment device to alleviate the moral hazard problem existing in the insiders. Referring to hidden action after the contract is formalized, moral hazard is prevalent in the insiders since they could "shirk, consume perquisites, engage in entrenchment activities, or avoid risky but profitable projects at the expense of outside investors who are unable to monitor insiders' behavior". Thus, lockup periods functions as a temporary contract or commitment, imposing restriction of selling ability to insiders and forcing managers

who own shares to bear some of the burden of shirking and consumption to alleviate intensity of moral hazard.

The distinguishing characteristics differentiating signaling from commitment explanation are the timing and nature of the information asymmetry. From insiders' perspective, they possess "more information of their quality" prior to IPO with the signaling explanation and "more information of their effort" post-IPO with the commitment explanation.

For downward sloping demand curve explanation, insiders use the lockup device to manipulate the supply of the stocks (by intentionally restricting the sale of shares). When facing a downward sloping demand curve, they could obtain a higher price for the IPO. Consequently, insiders benefit from a higher price for secondary shares and a higher price for primary shares. This explanation fails since it ignores two important presumptions to the validation of it: inadequate substitute and inefficient market. Under the situation where stocks are almost homogenous except for some "unique stocks", there are adequate substitute stocks which would easily replace the current stocks. Moreover, if the lockup agreement is known to the public, this information would be impounded into the efficient price of the stock. If this information is not reflected in the current price, investors and arbitragers could profit by shorting the high-priced shares prior to expiry and buying back at a lower price. The empirical

evidence found by Field and Hanka (2001) also eliminate the possible downward sloping curve explanation.

2.1.2 Lockup agreement and IPO underpricing

IPO underpricing is a prevailing phenomenon as documented by various researchers and literatures, with different hypotheses focusing on aspects of the relationships among investors, issuers and investment bankers that take firms public. There are three main hypotheses centering around the underpricing phenomenon, which are strategic underpricing hypothesis (Aggarwal et al. (2001)), the wealth loss minimization hypothesis (Habib and Ljungqvist (2001)) and the prospect theory model (Loughran and Ritter (2002)). Underpricing mainly functions as a mechanism to provide liquidity and more share retentions by pre-IPO owners generally strengthen underpricing phenomenon more substantially.

By affecting the liquidity, the same magnitude of underpricing may lead to a larger number of investors following the stock, and the trading will be more active. The relation between IPO underpricing and liquidity will be stronger when there is lockup. On the other hand, if lockup reduces liquidity, the effect of lockup on the relationship between underpricing and liquidity will not be predictable and the relation between share retention and underpricing will depend on empirical results.

2.1.3 Price effect around lockup expiry

Many previous literatures have focused on the price effect around lockup period initiated by the pioneering work of Field and Hanka (2001), Bradley et al. (2001) and Ofek and Richardson (2000). In their researches, there exists a significant increase in trading volume and price drop after the lockup agreement expires. To lend a more extensive insight, Field and Hanka (2001) proposed several potential reasons to explain the negative abnormal returns around lockup expirations from 5 perspectives. Firstly, the negative abnormal return may be resulted from an increase in the proportion of trades at the bid by the insiders. Secondly, the company with lockup agreement may face price pressures from insider sell orders around lockup expiration. Thirdly, it could be explained by increased transaction costs caused by insider trades. Fourthly, downward sloping demand curve for stocks and permanent price drops may explain the negative abnormal return. Lastly, there is a consistent worse-than-expected insider sale upon lockup expiration.

Discussing the price abnormality around lockup expiry, there are more literatures focusing on the short sale constraints and their impact on price efficiency. Ofek and Richardson (2003) argue that “short sale constraints and heterogeneous market beliefs may lead to optimistically-biased Internet stocks”. They found out that Internet stocks are more over-priced when lockup agreement exists and prices of them drops more significantly compared with non-Internet stocks. They also attributed the internet

bubble to the unprecedented lockup expiration and insider selling.

As a general phenomenon prevailing both in Internet and non-Internet stocks, Geczy, Musto and Reed (2002) show that “the negative price impact of lockup expiration is significant even for IPO stocks that are cheap and easy to borrow”. Consequently, the behavior of pre-expiration buying of IPO stocks remains to be explained when there is clear information about future price drop.

Insider trading has been perceived as an important factor to explain the price effect around lockup expiry, especially for new and young IPO stocks. The information advantage is persistent among the corporate insiders, underwriters, and venture capitalists who back up these IPOs are more likely to trade on this precious private information. As discussed above, lockup agreement is introduced as a commitment scheme (Brav and Gompers (2003)) to alleviate the moral hazard problem corporate insider’s hidden action on the private insiders. They found out that lockup agreement is more prevalent in the firms with more severe information asymmetry. To a more specific level, Cao, Field and Hanka (2003) have shed some light on the effect of market liquidity provided by insider trading upon lockup expiration. They have shown that spread and depth, which are two measures of market liquidity, do not deteriorate after the lockup expiration.

2.2 Venture Capital

2.2.1 Function of Venture Capital

As a crucial financing source for small and medium-sized firms, especially technology and bio-tech companies, VCs are playing a more and more important role to bring companies to public. They pool money from various sources, normally from institutional investors such as pension funds, insurance companies, endowments, foundation and banks, leveraging on their comparative advantage to select growing companies who have a potential to succeed (to go public or be acquired by other companies). As noted in Gompers and Lerner (1999), the dominating structure for VCs is limited partnership and itself as the general partner in it. Moreover, they normally charge annual management fee plus the profit they make from successful portfolio company investment.

After securing investment from their limited partners, VCs actively participate into young and growing companies, particularly with strong interest in technology and bio-tech companies. (Fenn et al. 1997). As an investor who usually represents certain voice in the board room, VCs closely monitor the management of the companies. They normally provide financing source, valuable advice and guidance on the development and management of the growing companies. Since entrepreneurs in these small ventures are normally with less experience, VCs are bringing “value-added” into the day-to-day operations. Moreover, to ensure their own return on

capital injected, they negotiate complex terms, control right representation and its monitoring and advisory role in the growing companies.

Control right, board representation and other involvement of VCs are negotiated and pre-determined before VCs make their investment. Although VCs provide advice through their representation in the board room, they are not closely involved into the daily operations of the business venture they put stake on. However, they still performing their monitoring role through many channels, Lerner (1995) found out that VC representation in the board increases significantly around the time of CEO turnover while other shareholders remain the same. VCs; stockholdings in a firm determine the extent of their incentives to influence the firm's financial reporting. When VCs holdings are low, they have limited influence on management's disclosure decisions, and the private wealth benefits from stock sales are also limited. As suggested in Kahn and Winton (1998), higher VC holdings represent a higher ability of VCs to secure their private benefits. Through the proxy voting rights of board of directors, VCs also have "the power to make decisive influence on the composition of management team." (Kaplan and Stromberg 2003) Moreover, compared to non-VC backed companies, VC-backed companies have a more active monitoring function from their VC investors.

2.2.2 VC Reputations

Reputation is an important characteristic in determining the terms of contracts, which easily change the investor or entrepreneur's incentive. There is a prevailing consensus that contractual relationships that are based partly on the reputations of the parties can generate higher returns for the parties. It could be demonstrated in the following aspects. Firstly, the preference of venture capitalists to raise funds from institutions demonstrates that the cost of dealing with individual investors is expected to be higher. Secondly, the ability of established entrepreneurs to raise capital more easily than first-time entrepreneur and indicates that investors rely on the experience of the entrepreneur and demonstrated commitment as an element of the negotiation. Thirdly, the more reputable venture capitalists are able to charge higher management fees since investors are anticipating more superior performance from those more reputable venture capitalists.

Another reason that venture capital firm is willing to invest in reputation is that, portfolio companies' human capital is specific to venture capitalists, the company benefits by developing a reputation for not selling shares publicly in IPOs that are overpriced. Compared with a not-so-reputable venture capitalist, it would be more capable to sell shares and deal with its internal resources with less concern about negative market reaction. However, venture capital funds may seek to build a reputation which is not in the best alignment of interest of the companies in which

they invest. This is also supported by Gompers' (1996) "grandstanding" hypothesis.

In most of previous literatures, they do not differentiate different characteristics VCs possess, such as VC quality and reputations. Rather, they perceive VCs as uniform group and regard VC backup as an exogenous variable. However, as revealed by Hsu (2004), entrepreneurs address intensively on the VC reputation and are three times more willing to accept offerings from VCs with higher reputation. Moreover, they even could accept a 10% to 14% discount on their business valuation if the offer comes from a more reputable VCs.

There are no consistent measures to determine the VC reputation accurately since it is usually a subjective assessment rather than objective. However, within the industry, peer VCs are more likely to assess their competitors' reputation since deal syndication is a normal practice among VCs. (Lerner 1994). This is an indication that interactions among industry insiders would provide valuable information about certain VC through its past deal experience and track of record. Moreover, through syndicating with reputable VCs, the information and resources are more efficiently allocated which could help portfolio companies create more value. (Hochberg et al. 2006)

As discussed, VC reputation is a subjective measure which would not gain consensus among different investors. However, in earlier studies, many literatures select a

variety of different measures to proxy for VC reputation. As mentioned in Megginson and Weiss (1991), they proxy for underwriter reputation by the market share of completed IPOs. Gompers and Lerner (1999) proposed that capital under management as the proxy for VC reputation. Moreover, VC firm age (Gompers (1996) and Lee and Wahal (2004)), number of IPOs VC backed (Lee and Wahal (2004)) are also used to measure the VC reputation.

2.2.3 VC Certification and IPO

As proposed by Megginson and Weiss (1991), VC certification hypothesis is formulated to capture the valuable certification role of venture capitalists in the process of IPO. It generally assumes that the agent has reputational capital at stake with an intrinsic value greater than the possible one-off gain obtained from certifying falsely about the value of issuing firm. It is assumed that it is costly for the issuing firm to get access to the certifying agent and benefit from its reputational capital.

VC investment is a repeated game and reputation is accumulated through their successful investment track of record. Thus, with more experience and successful investment history, VCs are more likely to raise future investment into it. Gompers (1996) noticed a “grandstanding” phenomenon which is prevailing in young VCs. As investors with less experience and investment history, young venture capital firms tend to grandstand and signal their ability to potential investors. They also tend to

bring their portfolio companies to public earlier than older VCs as an action to establish reputation and raise new capital injection. The proposition of "grandstanding" is largely related to reputation concern and many literatures have supported this hypothesis. As Lee and Wahal (2004) mentioned, flow of capital into a VC firm is positively related to VC age and the number of IPOs done by the firm. Reputation concern also deters VCs from behaving opportunistically.

Furthermore, more reputable VCs are associated with greater post-IPO involvement and stronger corporate governance. Gompers and Lerner (1998), and Field and Hanka (2001) report that VCs frequently keep a portion of their equity stake after the lockup period expires. Baker and Gompers (2003) report that VC backed IPO firms have more independent in their board rooms and less powerful CEOs. Hochberg (2005) finds VC-backed IPO firms are "less likely to have a dual CEO-chairman of the board of directors."

2.2.4 VC reputation and post-IPO performance

Following Ivanov et al. (2008), measuring VC reputation with various variables, more reputable VC is associated with stronger post-IPO performance, frequency of later IPOs and higher acquisition premium, which are all indicators that reputation really adds value to the pos-IPO stage through various ways.

For instance, Andrade et al. (2001) found out that takeover premium is the US is over 30% and it is more significant for the M&A deals with more reputable VCs, with a higher frequency and higher average takeover premium paid. This could be explained by the conjecture that higher ranked VCs would strengthen their investment into the portfolio companies more effectively, by promoting more frequent acquisitions and negotiations with potential buyers.

Moreover, VC's private network plays an important role in the post-IPO stage to explain the more superior performance of companies backed by more reputable VCs. As documented by Hellmann and Puri (2002), and Hochberg et al. (2007b), VCs' own networks are highly leveraged to help the portfolio companies develop. They find that after VCs invest in the firm, more experienced executives, lawyers, accountants and investment bankers are gathered to help the companies to succeed. (Gorman and Sahlman (1989)). Furthermore, with a more influential network, VCs would achieve greater success, which would be indicated by the proportion of portfolio companies that have gone to IPOs. (Hochberg et al. (2007b)). Ivanov et al. (2008) also document that companies backed by more reputable VCs tend to have more highly-ranked financial intermediaries, lead underwriters, law firms, auditors and larger VC syndicates around IPOs.

However, these studies have not differentiated among VCs with different reputations,

and there is not a reliable reputation measure with respect to this problem. Consequently, I am trying to find a proper reputation measure which leads to a larger abnormal negative return around lock-up period.

2.3 Lockup and VC Reputation

With regard to the determinant of length of lockup agreement, venture backing has been tested to be an important factor while it is employed as a mechanism to eliminate information asymmetry. As illustrated by the previous literatures, most of the researches are concentrating on the parallel development of the function of lockup agreement and VC reputation in the pre or post-IPO stage of certain companies. Moreover, they are mostly treated as exogenous variables rather than dependent variables per se. However, contrary to the “grandstanding” hypothesis which motivates the less reputable VCs to bring companies to IPO, they may use longer lockup agreement as their device to compensate for their lack of reputation. Consequently, more reputable VCs tend to use longer period of lockup agreement. More discussions shedding specific light to more detailed VC reputation measures will elaborated in the following sections. The general functions of lockup agreement and venture capitalists are shown in Figure 1.

[Insert Figure 1 Here]

Chapter 3: Data and Hypotheses Development

3.1 Data Collection

To lend a more specific angle to the specific function of VC reputation, I collect 1998 to 2007 IPO data from Securities Data Company (SDC) database and its subsection VentureXpert database for the VC-related information such as VC incorporation date, asset under management, portfolio companies, investment round and amount, number of firms invested in certain company and IPO-related information such as cusip, industry, IPO date, IPO proceeds, lockup days, lockup expiry date, so on and so forth. The major difference between this data collection and those in previous literatures is that the data I use in this paper are all VC-backed IPOs rather than an overall IPO data. As a convention, the IPO data exclude closed-end funds, REITs and ADRs. Stock return and trading volume data are obtained from CRSP. Moreover, for a specific test, I need the company incorporation date, which could be obtained from Jay Ritter's website (http://bear.cba.ufl.edu/ritter/ipodata.htm). The descriptive analysis VC-backed IPOs are discussed in more detail in Chapter 4.

3.2 Reputation Candidates

Although reputation *per se* is subjective and difficult to evaluate, they could be generally categorized into two groups which are firm-related *prior deal experience*

and *syndication investment intensity*. These are two intuitive indicators: for the former measure, from the entrepreneurs' perspective, VC's past performance, representing their expertise and track of record in the industry, is crucial to guide them through the potential problems and towards a successful destination. This is also supported by survey result of Hsu (2004); for the latter category, VCs tend to syndicate their investment to enhance their rate of return by mimicking the investment practice of larger or more successful peers. This is supported by evidence provided in Gale and Stiglitz (1989) and Lerner (1994). In previous researches, there are several candidate proxies, which are capital under management and total investment, VC firm age, IPO market share.

VC Firm Age

VC firm age, which is calculated as the length between firm IPO date and the time backing VC was incorporated, has been perceived to be an important reputation proxy, Following Gompers (1996) and Lee and Wahal (2004), with a longer track of record and business operation, VCs accumulate their experience and expertise and commits less mistakes. Moreover, with a longer *Age*, it is more likely for certain VC to survive in the competitive industry, which is also an indication of higher reputation.

Asset Under Management

This measure calibrates certain VC's capability to raise fund and invest their money.

Basically, it is straightforward to assume that more reputable VCs are more likely to attract more fund injections. Consequently, *VC AUM* might be an indirect measure of its reputation.

Syndication Investment Intensity

As proposed by Wongsunwai (2008), syndication investment intensity has been employed to be an indirect measure of VC's reputation. Since more reputable VCs tend to have more resources and networking to invest in certain companies, they will syndicate with others and have a higher average investment (AVGINV) or average round investment (RNDINV) in their portfolio companies.

3.3 Control Variables

To concentrate on the reputational effect of VCs, I control for other characteristics which are prevailing in the IPO market. As supported by Carter, Dark and Singh (1998), natural logarithm of IPO gross proceeds (*Ln Size*) is an important characteristic in the IPO market, indicating a less risky investment with more established and geographically diversified firms.

Moreover, as argued by Ritter (1984), issuer age *per se* is also an important control variable since older companies tend to "have more tangible assets and collateral, a more developed management team and longer standing customer relationships."

Furthermore, they are able to tackle the difficulties they face and risks they have by hand. The data could be available from Jay Ritter's IPO data website and control variable is measured in its natural logarithm form *Ln Age*.

The number of VC co-investors, which is a proxy for the VC networking the issuers face would be another control variable. As the company is backed by more venture capitalists, it tends to have a better networking and value-added certifications. This information is also directly available from SDC database and termed as *Ln Co-investor.*

As noted by more extensive literatures such as Loughran and Ritter (2004) and Gompers et al. (2006), information technology firms are singled out due to their high reliance on the venture capitalists as financing resource and their inherent characteristics (high technological risk and high growth rate). Consequently, I would label those information technology firms with an indicator 1 and those who are not with 0.

The detailed description of VC reputation candidates and control variables are documented in Table 1.

[Insert Table 1 Here]

3.4 Hypothesis Development

H1: *Ceteris paribus*, less reputable VCs tend to have longer lockup days as a compensation device.

There is a prevailing conflict between the relationship of VC reputation and lockup length, with diverging perspectives from VC investors and entrepreneurs. However, to test the signaling and commitment device argument for lockup agreement, I would expect the VC reputation is negatively related to lockup length since entrepreneurs need compensate less reputable VCs with longer commitment from them.

H2: *Ceteris paribus*, around lockup expiry, more reputable VCs experience less negative abnormal returns and less trading volumes.

Since VCs are certifying the portfolio companies' quality, in addition to providing financing channels and networking to them. Thus, they will monitor more closely on the portfolio companies' business and be involved into their operations. Consequently, they will experience less negative abnormal return when they face the selling pressure around lock-in expiry.

Chapter 4: Descriptive Analysis

4.1 Overall VC-backing IPO Market

Going to public, or “Harvesting” in the VC terminology is the final stage of the entrepreneurial investment process and has been a critical component of VC investment practice. Conducting a certification role in the IPO market, it is more prevalent to observe an upward trend for young and growing companies backed by venture capitalists. There are over 900 VC-backed IPO during period of 1998 to 2007 and the IPO proceeds from these IPOs are depicted in Figure 2. It depicts a huge increase in IPO volume from 1998 with 3782 million to 1999 with 20871 million by transaction volume. This booming market persists for two years throughout to 2000 with a record IPO proceeds high of 25619 million, when the internet bubble bursts. Through the year 2000, the average time between venture capital investment and harvest was decreasing and harvest valuations were increasing. Consequently, new capital commitments grew rapidly and even the well-established venture capitals cannot meet the demand fast enough. This is also consistent with the fact that venture capitalists are in favor of the information technology sector and act as the driving force to bring technology companies public. However, with the increasing difficulty to find attractive investments and investors, this market began to consolidate in the year of 2001 and faced a market decline afterwards. After the IPO market crash in the

Internet Bubble, VC-backing IPO market recovers steadily to around 11000 million in 2004 and 10326 million in 2007.

[Insert Figure 2 Here]

4.2 Lockup Days

The length of lockup days is argued to be “typically” 180 days in Barlett (1995) and 75% of the lockup agreement are reported to have 180 days of restricted period for the companies who have lockup provisions. However, for the VC-backed IPOs from 1998 to 2007, the lockup days are more diverse as depicted in Table 2.

[Insert Table 2 Here]

Panel A presents the descriptive statistics on the various lockup days while “180 days” phenomenon still dominates the length, taking account about 58% of all the firms who report to have lockup agreement. Moreover, many of the companies are reported to have no lockup contracts with 0 days of restricted period and over 42% IPOs are reporting a “90 days” or shorter period of lockup days. Only about 0.57% of VC-backing IPOs report lockup days which are longer than 180 days.

To facilitate our further analysis, I label the firms with a “180 days” or larger with a

dummy 1 and call them “Standard Lockup”. Controlling for the firms with a lockup length greater than 180 days, I label those firms with shorter period of lockup agreement with 0 and call them “Short Lockup”. The basic statistic is presented in Panel B of Table 2.

4.3 Reputation Candidates

The reputation candidates are separated into two groups: *Prior experience* which includes *VCAGE* and *Asset Under Management* (AUM) variables; *Syndication investment intensity* which includes *AVGINV* and *RNDINV* variables.

As depicted in Table 3, the venture capital funds have a relatively short history with a mean age less than two decades, reflecting a young and booming industry. Although the form of venture capital has been existing for centuries long, its active role as a financing source only stems from 1970s as noted by Smith and Smith (2004). However, although VCs’ ages do not differ much due to the short history of the overall industry, their asset under management (AUM) differs extensively, ranging from the minimum 0.6 million to 81100 millions, with a mean of 2895.9 million. This indicates that the AUM variable is highly skewed, reflecting the fact that the capability of raising funds and investment diverge among different venture capital funds, irrelevant of their firm age. Calculated in thousands, the syndication investment intensity variable, measured by VC’s average investment and average round

investment also differs largely among various firms. This is consistent with their capability to invest.

4.4 Control variables

IPO size, approximated by its IPO proceeds from going to public is reported in the control variable section in Table 3. It is reported to have an average 90 million IPO proceeds and the median size is about 67.5 million. Moreover, with respect to the issuing firm age, measuring by the difference between their founding date and IPO date, they have a mean length of 35 years. On average, issuing firms has a longer history than their VC investors, with an average 20 years of history. Regarding the networking ability, measured by the number of firms backing each IPO, I would observe an extensive syndication in the VC-backed IPOs, with 10 VC funds backing one IPO on average. This is consistent with previous findings that VCs, especially smaller and less reputable tend to follow larger and more reputable VCs in respective investment in portfolio companies.

[Insert Table 3 Here]

4.5 Validating the Reputation Candidates

The pair-wise correlations of different reputation variables are reported in Table 4.

[Insert Table 4 Here]

As argued in the previous sections, the variables within either group are more closely related to each other while the variables across the group demonstrate a lower relationship with each other. This is consistent with the original conjecture that reputation candidates are divided into *prior experience* and *syndication investment intensity*. For instance, the correlation coefficient is reported to be 0.85 between RNDINV and AVGINV while it is 0.01 between AVGINV and VCAGE or -0.14 between RNDINV and VCAGE. This correlation fact substantiates the expected grouping objectives. Furthermore, the correlation between AUM and both indicators of deal-specific variables is positive and highly significant, which is consistent with expectation that larger VCs tend to have a more substantial investment.

4.6 Reputation Candidate and Control Variables

Shedding a more profound light onto the relationship between reputation candidates and control variables, we would examine the partial effect of each control variable on the respective reputation candidate. The equation to estimate is shown as the following equation and the results of the estimation are reported in Table 5.:

$$REPUTATION_t = \beta_0 + \beta_1 LNSIZE_t + \beta_2 LNAGE_t + \beta_3 TECHdUMMY_t + \beta_4 COINV_t + \varepsilon_t \quad (1)$$

where *REPUTATION* variable captures all the four candidates and β_0 represents a vector of fixed year effect.

[Insert Table 5 Here]

Measuring by VCAGE, AUM, AVGINV and RNDINV, the IPO size is positively related to reputation candidates except for VCAGE, which follows the expectation that larger IPOs are backed by more reputable venture capitalists, either stemming from their greater networking or better track of record in bringing companies to public. Company age seems has no significant relationship with all reputation candidate due to the fact that company age and VC age are independent of themselves. Moreover, more reputable VCs tend to be more frequent in information technology industry since the correlation coefficient between *Techdummy* and reputation candidates are positive, which is consistent with the result documented by Ivanov et al. (2008).This also make sense since many reputable VCs are investing heavily in the information technology sector, exemplifying by the case of Sequoia's investment in Google, so on the so forth. COINV, measuring the scale of syndication investment is negatively correlated to reputation candidates, indicating that more reputable VCs tend to syndicate with fewer co-investors compared with less reputable VCs. This strengthens the argument that due to lack of experience and capability, less reputable VCs tend to herd their investment with larger and more reputable VCs.

Chapter 5: Testing for relationship between VC reputation and length of lockup

5.1 Pre-contractual and post-contractual Costs

As discussed in the section 1, lockup agreement is used as a signaling or commitment device when venture capitalists and entrepreneurs agree on their respective contracts. More specifically, it helps to alleviate the precontractual and postcontractual information costs.

From VC investor's perspective, precontractual costs are associated with negotiating a contract and arise before they make commitment and investment, due to the diverse information the outsiders (venture capitalists) and insiders (entrepreneurs) possess. This prevailing information asymmetry means that private information could be precious and difficult to be observed, which results into a severe adverse selection problem. Thus, venture capitalists need lockup agreement to differentiate the proper entrepreneurs from the overly optimistic ones since companies owners who are confident about their ventures would choose to take the lockup contract while the overly optimistic ones would be less willing to. As a commitment device, lockup agreement solves the moral hazard problem and attenuates the postcontractual costs. After the financial contract has been entered and the investment has been made, both

parties' incentives change. The parties may act in different ways that are not consistent with their original intentions. Incentive problems arise when contracts are incomplete and when parties cannot monitor performance perfectly. Consequently, lockup agreement helps venture capitalists to restrict entrepreneurs' ability to sell shares. As a result of this, more reputable VCs tend to use longer lockup agreement to screen out the proper entrepreneurs and resolve the moral hazard problem.

However, the information asymmetry exists in a bilateral way. From the entrepreneurs' perspective, they are usually not aware of the reasons underlying venture capitalists' interests in their companies. For example, the investor would be only seeking to assess it as a competitive threat and keep it from reaching the market. Moreover, in the postcontractual period, the entrepreneurs may want the venture capitalists to secure their commitment to the firm. In such a case, less reputable VC investors would be required to commit longer with certain venture and compensate for their less proven track of record.

The divergence in the perspective from both contractual sides raise the key question that whether more reputable venture capital funds tend to choose longer lockup period. If so, it supports the signaling and commitment hypothesis proposed from VC's perspective. If not, it supports the other way round. The answer to this key question depends on the empirical test.

5.2 Empirical test

Univariate test:

As a starting point, I test the relationship between reputation candidate and lockup variables using a univariate simple regression model as exemplified by the following equation.

$$LKPDAY_t = \beta_0 + \beta_1 REPUTATION_t + \varepsilon_t \quad (2)$$

Where LKPDAY represents the continuous variable lockup days and REPUTATION represents respective reputation candidate. The simple regression result is reported in Table 6. To adjust for heteroskadesticity and autocorrelation, I also employed Newey-West test and get the adjusted t-statistic which is also reported in the same Table.

Table 6: Univariate Simple Regression Analysis

	VC Age	*AUM*	*Avg Inv*	*Rnd Inv*
OLS	-7.03771	-2.84682	-5.82935	-4.99081
	1.02199	0.64081	1.38709	1.31018
t-statistic	-6.89	-4.44	-4.20	-3.81
NW adjusted	6.01***	-4.13***	-3.94***	-3.48***

However, since the lockup days have a tendency to concentrate around 180 days, I further separate the whole sample into group with lockup days equal or larger to 180 days (labeled with 1 in LKPFLG variable) and those with lockup days less than 180 days (labeled with 0). The simple *linear probability* equation to be tested is as following and the estimation result is reported in Table 7. Moreover, employing probit and logistic models, I also report the result in the same table.

$$LKPFLG_t = \beta_0 + \beta_1 REPUTATION_t + \varepsilon_t \quad (3)$$

Table 7: Univariate Linear Probability, Probit and Logit Model Analysis

	VC Age	*AUM*	*Avg Inv*	*Rnd Inv*
Probit	-0.079***	-0.036***	-0.077***	-0.068***
	0.015	0.009	0.020	0.019
Logit	-0.127***	-0.058***	-0.123***	-0.110***
	0.023	0.015	0.032	0.030
LP	0.031***	-0.014***	-0.030***	-0.027***
	0.006	0.004	0.008	0.007

Multivariate Test:

Controlling for deal or company-specific characteristics such as the IPO size, company age, information technology dummy and number of co-investors backing those IPOs, I would report a multivariate regression employing the simple OLS, linear probability, probit and logit model. The equations to be estimated are shown as the following and the detailed results are reported as in Table 8 and Table 9.

$$LKPDAY_t = \beta_0 + \beta_1 REPUTATION_t + \beta_2 LNSIZE + \beta_3 LNAGE + \beta_4 TECHdUMMY + \beta_5 COINV + \varepsilon_t \quad (4)$$

$$LKPFLG_t = \beta_0 + \beta_1 REPUTATION_t + \beta_2 LNSIZE + \beta_3 LNAGE + \beta_4 TECHdUMMY + \beta_5 COINV + \varepsilon_t \quad (5)$$

[Insert Table 8 Here]

[Insert Table 9 Here]

Explanations:

Firstly, employing simple OLS regression estimation, linear probability, probit and logit models, reputation candidates are negatively correlated with lockup days or lockup flag which is set manually. This relationship indicates that more reputable venture capital funds tend to have on a shorter period of lockup days, either in the continuous variable case or binary choice case. For instance, as shown in Table 9

Panel B, with one unit change in asset under management, the probability of the lockup agreement becomes equal or larger than 180 days decreases by 2.3%. If the modeled as logistic, the marginal effect decreases by 80% to 4.1%. This negative relationship does not support the signaling and commitment arguments discussed above and conforms to our Hypothesis 1 from the entrepreneurs' perspective.

Moreover, *VCAGE* seems not to be a consistent and reliable reputation candidate since its values are only significant under OLS estimation in stead of all the testing models I employ. Compared with the robustness of other reputation candidates throughout various regressions, VCAGE performs badly. Although VC firm age could partially reflect the knowledge and experience accumulation as required by entrepreneurs, the knowledge per se could be easily spilled over due to the frequent movement of venture capitalists within this industry. Even with a relatively young VC, they could establish better reputation via successful deals accomplished with the help of experienced venture capitalists. Consequently, it is the venture capitalists who are building the reputation for certain VC, rather than the VC *per se*.

Furthermore, adjusted for heteroskadesticity and autocorrelation with Newey-West test, I get the downward-adjusted t-statistics. The down-ward adjustment does not change the significance of each prediction, which strengthens our original expectation.

Chapter 6: Reputation Candidates and Price and Volume Reaction around Lockup Expiry

The price and volume reaction around lockup agreement expiry has attracted extensive body of literatures shedding lights on this topic. With respect to the venture capitalist-related issues, Bradley et al. (2001) find that VC-backed US IPOs are associated with significantly more negative abnormal returns at the lock-in expiry. Field and Hanka (2001), Brav and Gompers (2003) and Brau et al. (2004) also reported the similar patter for VC-backed US IPOs. Moreover, in the EU context, Espenlaub et al. (2003), Bessler and Kurth (2003) and Bertoni et al. (2002) documented the similar more negative abnormal returns for VC-backed IPOs. However, Angenendt et al. (2005) do not support these findings with French data. However, in all of these literatures, they treat VC as a dummy variable and are only interested in VC-banking or non VC-backing. However, with continuous reputation candidate variables in hand, I am more interested in looking specifically into how the cumulative average abnormal return (CAAR) and abnormal volume (AV) will behave in response to VC backings with different reputation.

6.1 CAAR and AV Calculations

Following Brav and Gompers (2003), I calculate abnormal returns for each IPO

beginning on 10 days prior to lockup expiry through to 10 days after the expiry date (t-10, t+10) and it is defined as the difference between the IPO firm's buy-and-hold return and the benchmark buy-and-hold return. As documented by Michaely, Thaler and Womack (1995), I used the market value weighted index as the benchmark buy-and-hold return. Moreover, the equation to calculate the cumulative average abnormal return (CAAR) is shown as the following:

$$CAAR_{t_1,t_2} = \frac{1}{N}\sum_{i=1}^{N} CAR_{i,t_1,t_2} = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=t1}^{t2} AR_{i,t} \quad (6)$$

To test the significance of CAAR, the t-statistic is calculated in the following equation:

$$t_{CAAR} = \frac{\frac{1}{N}\sum_{i=1}^{N} CAR_i}{s(CAR)/\sqrt{N}} \quad (7)$$

where the numerator is the CAAR and s(CAR) is the standard deviation of the sample's CARs, which is based on the test statistic proposed by Barber and Lyon (1997).

To calculate the daily abnormal volume, I follow Field and Hanka (2001) to calculate the mean daily trading volume per firm during t-50 and t-6 and compute the difference between the trading volume on the event day and the mean. Moreover, the daily average abnormal trading volume (DAAV) is calculated using the following equation:

$$DAAV_{t_1,t_2} = \frac{1}{N}\sum_{i=1}^{N} DAV_{i,t_1,t_2} = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{1}{(1+t_2-t_1)}\sum_{t=t_1}^{t_2}\left(\frac{V_{i,t}}{\frac{1}{45}\sum_{-50}^{-6} V_{i,t}} - 1\right)\right) \quad (8)$$

Following the t-statistic calculated in the CAAR, the t-statistic is also employed to test the significance of DAAV.

$$t_{DAAV} = \frac{\frac{1}{N}\sum_{i=1}^{N} DAV_i}{s(DAV)/\sqrt{N}} \quad (9)$$

6.2 Venture Reputation

To get a more specific view on the reputational effect on the return and volume abnormality around lockup expiry, I divide the whole sample into two groups: above-median sample and below-median sample, comparing the extent to which their abnormal return and volume exist. Moreover, the t-statistic given in equation (6) and (8) are used to test the significance of each return and volume. The results are shown in Table 10 and Table 11.

[Insert Table 10 Here]

Taking the VC reputation AUM for example, for the above-median group, it has a negative -2.39% abnormal return around lockup expiry while the below-median group has a -4.09% of negative abnormal return which is larger than the former group.

Moreover, these two CAARs are all significant under 5% significance level. This pattern, which shows more firms backed by more reputable VCs tend to have less negative abnormal return, is prevalent among all the four VC reputation candidates we are examining except for VC age.

Regarding the abnormal volume which is the DAAV measure I am proposing here, more reputable VCs tend to have some effect on it since abnormal volume tend to be less for those who are backed by more reputable VCs than those by less reputable ones. For instance, The abnormal volume increases from 35% to 57% if I measure VC reputation using AUM, implying that above-median group experience less abnormality in volume than the below-median group.

[Insert Table 11 Here]

To provide more insight into the reputational effect, we further divide the sample into four quartiles based on each reputation candidate. I evaluate the abnormal return and abnormal volume following the methodology developed above and tests their significance. The results are shown in Table 12. The statistics I get conform to the original expectation that with more reputable VCs' backing, issuer firms tend to have a less negative abnormal return and less abnormal volume, which puts extra weight on the support of Hypothesis 2.

[Insert Table 12 Here]

Chapter 7: Discussion and Conclusions

7.1 Discussion

In this paper, I just shed some specific lights on the relationship of VC reputations and lockup agreement at two spot time, contract design and lockup expiry. However, the mechanism that how exactly the VC reputations are affecting the lockup length and the less negative abnormal return still remains a question. The venture capitalists' role in monitoring and enhancing better corporate governance might be a plausible explanation to this question. Consequently, looking into the specific role of venture capitalist, such as sitting on the board, monitoring day-to-day operations and improving financial reporting quality would help to explain the reputation effect *en route to* the post-IPO period.

Although venture capitals are not directly involved into the daily operation, they are affecting the corporate governance practice by monitoring the behavior of entrepreneurs and management team. Lerner (1995) shows that the VC's presentation in the board room is higher when the CEO turnover is more frequent, while the number of outsiders remains the same. Consequently, it is the indirect monitoring which takes effect rather than direct monitoring. Researchers find that, compared to companies with no VC involvement, "those with direct monitoring by VCs make less

use of accounting and stock based measures as explicit performance criteria in CEO compensation contracts". As discussed previously, control right is pre-determined between VCs and portfolio companies prior to signing the contract. By making hiring decisions on senior management team, venture capitalists are exerting their influence and make the company more transparent (Kaplan and Stromberg 2003). As a result of this, information asymmetry is better settles under more active indirect monitoring, which is more prevalent in more reputable VCs.

The characteristics of board and financial reporting quality of companies are also affected by venture capitalists' reputation and presence. VC-backed companies, especially companies backed by more reputable VCs, tend to have more independence, which could be measured by the proportion of independent VC directors in the board. Hochberg (2005) reports that VC-backed IPO companies have "more independent boards, audit and compensation committees, and a higher likelihood of separating the roles of CEO and chairman of the board, higher stock market reaction to the announcement of poison pill adoption, as well as lower earnings management in the year of the IPO". Other researchers also relate the less abnormal return to better corporate governance.

Moreover, the reputation candidates I am using here are "objective" since they are directly observable. However, more "subjective" reputation measure, such as

reputation quality score could be developed to get a comprehensive understanding of the reputation effect and be used as an overall proxy. In fact, some researchers have already delved into the development of VC quality score and yielded insightful results.

7.2 Conclusions

In this paper, I revolve the traditional method treating lockup agreement and VC-backing as two exogenous variables and take a closer look at the VC reputation effect on lockup agreement and the return and volume abnormality.

The analysis conforms to the two major hypotheses I raised, which are the positive relationship between less reputable VC-backing and longer lockup agreement and less negative return abnormality and abnormal volume for more reputable VC-backing companies. These two empirical results strengthen the conjecture that reputation functions as a mechanism to alleviate the information asymmetry to some extent.

However, this is just the first step to connect reputation effect during prior and post-IPO period, more researches on the intermediate function of reputation could be done, such as its role in strengthening corporate governance. It would be interesting to discuss reputation effect throughout the whole IPO timeline.

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Figure 1: The Parallel Theoretical Development of Lockup and VC Reputation

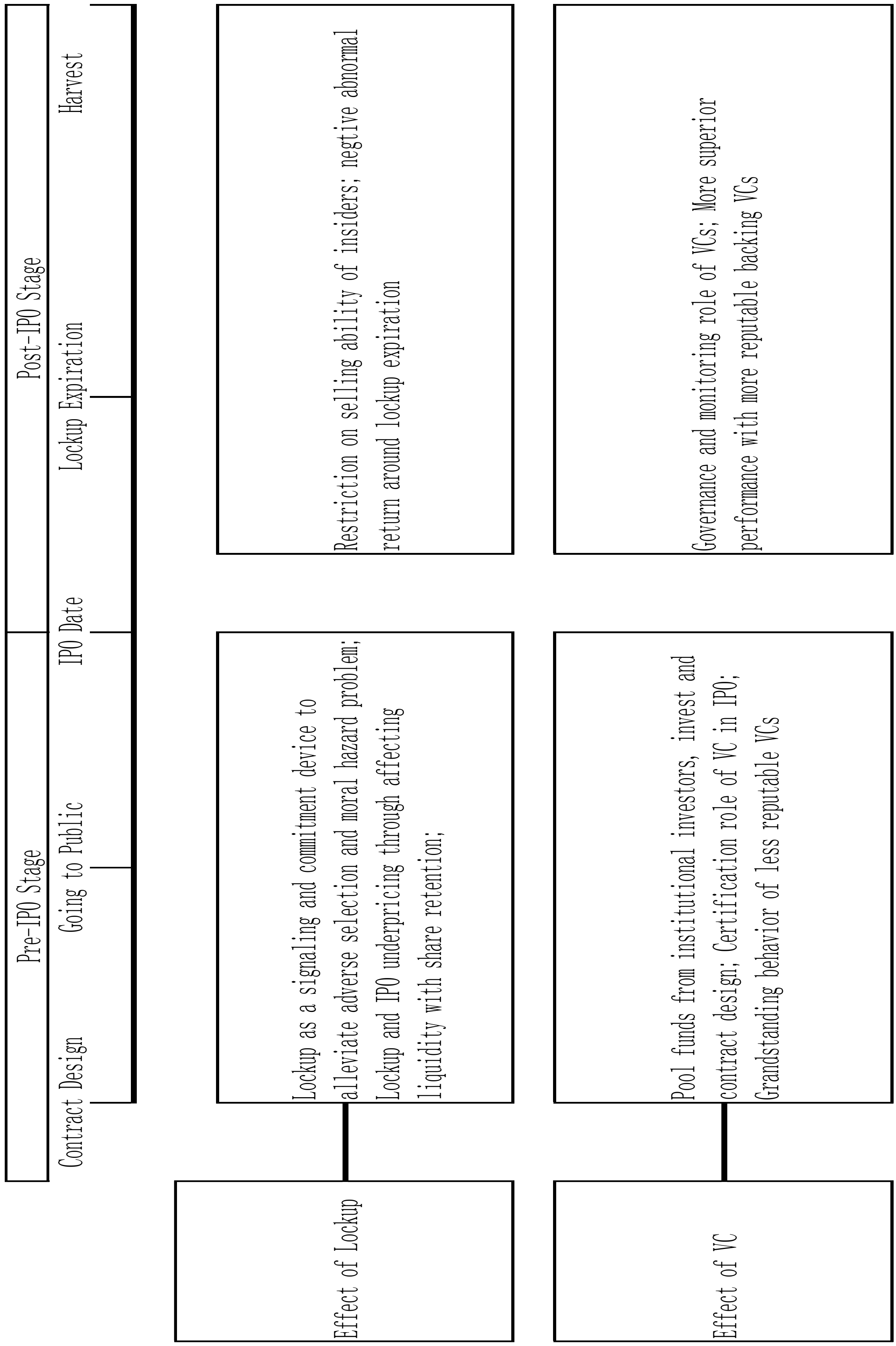

Figure 2: Overall VC-backed IPO Market

Data source on IPO size are from SDC Global New Issues during the period 1998 to 2007, with VC-banking flag to be yes, which means we are not comparing VC-backing or non VC-backing IPO market in this paper. Rather, we are taking a more profound insight into the VC-backing IPO market and delve into the relationship within VC-backing IPOs. The IPO size is calculated from *IPO proceeds*, as documented by SDC database. All figures are quoted in millions and we exclude all issues that are REITs, ADRs or other non-conventional IPOs. Moreover, we exclude IPOs with offer price less than $5 following the convention of IPO literature. Finally, the data are limited to US market only.

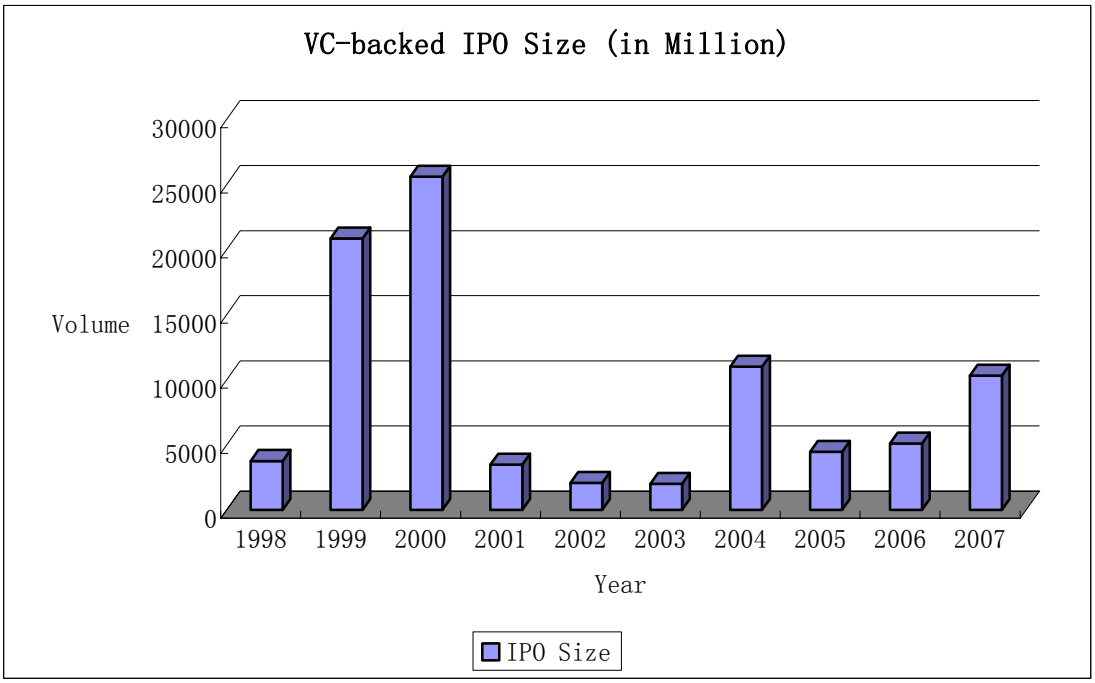

Table 1: Descriptions on Reputation Candidates, Lockup Days and Control Variables

Reputation Candidates	Description
Prior Experience	Prior experience is approximated by VC age and asset under management. VC age is calculated by the difference between VC's incorporation date to IPO date and AUM data is directly accessible from SDC database.
Investment Intensity	It captures the deal-specific aspect which could be approximated by average investment and average round investment which are indirect implication on VCs' reputation

Control Variable	Description
Ln Size	The natural log of the size of the IPO, which is approximated by the proceeds from the IPO. Data is available from SDC.
Ln Age	The natural log of the issuers' age, which is calculated as the difference between its incorporation date and IPO date. Moreover, incorporation date data is available from Jay Ritter's IPO website
Techdummy	Dummy variable taking value 1 if the industry sector for a certain issuing company is in technology and 0 if not.
COINV	The number of co-investors in the initial public offerings which is a proxy for the networking effect the issuers have.

Table 2: Simple Statistics on Lockup Days

Lockup days data are documented in SDC database and we exclude those IPOs who report a missing value in lockup days. Moreover, we use a new variable lockup flag (LKPFLG) to label 1 to IPOs with a lockup agreement equal or longer than 180 days while label 0 to IPOs with a lockup agreement shorter than 180 days. The percentage of raw data and LKPFLG data are presented in Panel A and Panel B respectively.

Panel A:

Lockup Days	LKPFLG	Frequency	Percentage
Others	0	3365	42.83
180 Days or larger	1	4491	57.17

Panel B:

LKPDAY	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	2914	37.09	2914	37.09
15	20	0.25	2934	37.35
45	7	0.09	2941	37.44
60	4	0.05	2945	37.49
80	6	0.08	2951	37.56
90	333	4.24	3284	41.8
100	12	0.15	3296	41.96
120	6	0.08	3302	42.03
150	14	0.18	3316	42.21
180	4491	57.17	7807	99.38
181	4	0.05	7811	99.43
270	6	0.08	7817	99.5
360	19	0.24	7836	99.75
365	9	0.11	7845	99.86
540	11	0.14	7856	100

Table 3: Descriptive Analysis on Reputation Candidates, Lockup Variables and Control Variables

The reputation candidates generally fall into two groups: firm-specific prior experience and deal-specific syndication investment intensity. Within each group, we use two candidates, VC age (VCAGE) and asset under management (AUM) for prior experience; average investment (AVGINV) and average round investment (RNDINV) by VCs for investment intensity. The control variables include IPO size (SIZE), issuing company age (AGE), information technology dummy (TECHDUMMY) and number of firms who are investing in the same IPO (COINV). We report the mean, median, standard deviation and the rang under 90% confidence interval. The more detailed discussion on min and max of each variables are singled out in the main text.

Variable	Mean	Median	Std Dev	Lower 90% CL for Mean	Upper 90% CL for Mean
Reputation Variable					
Prior Experience					
VCAGE	19.1	16.55	14.27	18.84	19.37
AUM (in millions)	2895.9	750	6916.99	2738.82	3052.98
Syndication Investment Intensity					
AVGINV (in thousands)	7319.56	5381.8	11134.7	7112.86	7526.26
RNDINV (in thousands)	4489.83	3126.5	8254.1	4336.6	4643.05
Lockup Variable					
LKPDAY	109.74	180	88.58	108.1	111.38
Control Variable					
SIZE	91.07	67.5	124.49	88.76	93.38
AGE	35.72	34.77	2.48	35.67	35.78
TECHDUMMY	0.66	1	0.47	0.65	0.67
COINV	10.9	10	5.12	10.89	11.08

Table 4: Correlation Analysis for Reputation Candidates

The correlation analysis is conducted for the four VC reputation candidates we are using. The correlation is reported with Pearson correlation coefficient and Spearman correlation coefficient.

Pearson Correlation Coefficients				
	VCAGE	**AUM**	**AVGINV**	**RNDINV**
VCAGE	1.00			
AUM	0.12	1.00		
AVGINV	-0.01	0.36	1.00	
RNDINV	-0.04	0.32	0.95	1.00

Spearman Correlation Coefficients				
	VCAGE	**AUM**	**AVGINV**	**RNDINV**
VCAGE	1.00			
AUM	0.30	1.00		
AVGINV	0.01	0.59	1.00	
RNDINV	-0.14	0.38	0.85	1.00

Table 5: Reputation Candidate and Control Variable Characteristics

This table reports the relationship between various control variables and reputation candidates we employ. The basis equation to test their relationship is

$$REPUTATION_t = \beta_0 + \beta_1 LNSIZE + \beta_2 LNAGE + \beta_3 TECHdUMMY + \beta_4 COINV + \varepsilon_t$$

where β_0 represents a vector of fixed year effect while β_1 to β_4 represents the partial effect of different control variables. Dependent Variable REPUTATION includes the prior experience candidate and syndication investment intensity candidate, which are the four reputation candidates we are assessing

Reputation Variables	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*	*Adjusted R-square*
Prior Experience					
VC Age	-0.05**	1.20***	0.10***	-0.01***	13.90%
	(0.02)	(0.23)	(0.03)	(0.00)	
Asset Under Management	0.18***	-1.54***	0.19**	-0.03***	10.50%
	(0.06)	(0.53)	(0.08)	(0.01)	
Syndication Investment Intensity					
Average Investment	0.13***	-0.16	0.04*	-0.01***	18.40%
	(0.02)	(0.16)	(0.02)	(0.00)	
Average Round Investment	0.15***	0.05	0.01	-0.01***	22.50%
	(0.02)	(0.17)	(0.02)	(0.00)	

*, **, ***, denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

Table 6: Univariate Simple Regression Analysis

The univariate model looks at the relationship between the reputation variables and LKPDAY, excluding various control variables. The regression is depicted as the following equation employing all the reputation candidates:

$$LKPDAY_t = \beta_0 + \beta_1 REPUTATION_t + \varepsilon_t$$

t-statistic and the adjusted t-statistic after applying Newey-West test are reported in the table to correct for heteroskadesticity and autocorrelation problems. The significance is marked with asterisk.

	VC Age	*AUM*	*Avg Inv*	*Rnd Inv*
OLS	-7.03771	-2.84682	-5.82935	-4.99081
	1.02199	0.64081	1.38709	1.31018
t-statistic	-6.89	-4.44	-4.20	-3.81
NW adjusted	6.01***	-4.13***	-3.94***	-3.48***

*, **, *** , denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

Table 7: Univariate Linear Probability, Probit and Logit Model Analysis

The univariate model looks at the relationship between the reputation variables and LKPFLG where linear probability, probit and logit estimation is exploited respectively. The regression is depicted as in the following equation:

$$LKPFLG_t = \beta_0 + \beta_1 REPUTATION_t + \varepsilon_t$$

where LKPFLG takes 1 if the lockup days is equal or larger than 180 days while 0 if the lockup days is less than 180 days. The residual term is assumed to follow probit and logistic distributions.

	VC Age	*AUM*	*Avg Inv*	*Rnd Inv*
Probit	-0.079***	-0.036***	-0.077***	-0.068***
	0.015	0.009	0.020	0.019
Logit	-0.127***	-0.058***	-0.123***	-0.110***
	0.023	0.015	0.032	0.030
LP	0.031***	-0.014***	-0.030***	-0.027***
	0.006	0.004	0.008	0.007

All results are significant under various significance levels.

Table 8: Multivariate Simple Regression Analysis

The multivariate model looks at the relationship between the reputation variables and LKPFLG, controlling the effect of various control variables. The regression is depicted as the following equation employing all the reputation candidates:

$$LKPDAY_t = \beta_0 + \beta_1 REPUTATION + \beta_2 LNSIZE + \beta_3 LNAGE + \beta_4 TECHdUMMY + \beta_5 COINV + \varepsilon_t$$

Panel A

	VC Age	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*	*Adj-R*
OLS	0.56	-36.56	563.29	2.78	-1.55	0.22
	(1.08)	(1.91)	(18.37)	(2.66)	(0.22)	
t-statistic	0.52	-19.14	30.66	1.04	-7.00	
NW-adjusted	0.44	-9.53	19.51	0.53	-3.91	

Panel B

	AUM	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*	*Adj-R*
OLS	-1.64	-37.22	574.33	4.38	-1.45	0.23
	(0.70)	(2.33)	(22.44)	(3.23)	(0.27)	
t-statistic	-2.34	-16.00	25.59	1.35	-5.42	
NW-adjusted	-2.19**	-8.10	16.26	0.70	-3.17	

Panel C

	AVRINV	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*	*Adj-R*
OLS	-3.61	-35.84	563.45	2.96	-1.57	0.22
	(1.55)	(1.91)	(18.28)	(2.64)	(0.22)	
t-statistic	-2.33	-18.73	30.82	1.12	-7.12	
NW-adjusted	-2.22**	-9.36	19.67	0.57	-4.00	

Panel D

	RNDINV	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*	*Adj-R*
OLS	-3.32	-35.82	564.21	3.15	-1.57	0.22
	(1.46)	(1.92)	(18.28)	(2.64)	(0.22)	
t-statistic	-2.27	-18.70	30.86	1.19	-7.13	
NW-adjusted	-2.10**	-9.35	19.71	0.61	-4.01	

*, **, ***, denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

Table 9: Multivariate Linear Probability, Probit and Logit Analysis

The multivariate model looks at the relationship between the reputation variables and LKPFLG, controlling the effect of various control variables. The regression is depicted as the following equation:

$$LKPFLG_t = \beta_0 + \beta_1 REPUTATION + \beta_2 LNSIZE + \beta_3 LNAGE + \beta_4 TECHdUMMY + \beta_5 COINV + \varepsilon_t$$

where LKPFLG takes 1 if the lockup days is equal or larger than 180 days while 0 if the lockup days is less than 180 days. The residual term is assumed to follow probit and logistic distributions.

Panel A

	VC Age	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*
Probit	-0.0051	0.4248***	-7.9606***	-0.0017	0.0174***
	(0.0176)	(0.0322)	(0.3435)	(0.0437)	(0.0037)
Logit	-0.00902	-0.7448***	13.6086***	0.0244	-0.0317***
	(0.0287)	(0.0554)	(0.6192)	(0.0723)	(0.00612)
LP	0.00201	-0.15094	2.64732***	0.00023035	-0.00636***
	(0.00615)	(0.01091)	(0.10493)	(0.01519)	(0.00126)

Panel B

	AUM	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*
Probit	-0.0233***	0.4387***	-8.2302***	-0.0042	0.0173***
	(0.0115)	(0.0397)	(0.4254)	(0.0534)	(0.0045)
Logit	-0.0409***	-0.7639***	14.0454***	0.0231	-0.0315***
	(0.019)	(0.0681)	(0.7667)	(0.0883)	(0.00747)
LP	-0.00847**	-0.15343***	2.70246***	0.00069178	-0.00631***
	(0.00398)	(0.01326)	(0.12794)	(0.01843)	(0.00152)

Panel C

	Avg Inv	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*
Probit	-0.0517***	0.4149***	-7.954***	-0.0051	0.0178***
	(0.0255)	(0.0322)	(0.3417)	(0.0434)	(0.0037)
Logit	-0.0883***	-0.7274***	13.5908***	0.0303	0.0324***
	(0.0421)	(0.0553)	(0.6159)	(0.0717)	(0.00609)
LP	-0.01867**	-0.1477***	2.64631***	0.00144	-0.00649***
	(0.00885)	(0.01093)	(0.10437)	(0.01508)	(0.00126)

Panel D

	Rnd Inv	*Ln Size*	*Ln Age*	*Techdummy*	*Coinvestor*
Probit	-0.0487***	0.4144***	-7.9657***	-0.0079	0.0178***
	(0.024)	(0.0322)	(0.3418)	(0.0434)	(0.0037)
Logit	-0.0835***	0.7265***	13.6125***	0.0348	-0.0325***
	(0.0396)	(0.0553)	(0.6162)	(0.0717)	(0.00609)
LP	-0.01764**	-0.14753***	2.65023***	0.00238	-0.00651***
	(0.00834)	(0.01093)	(0.10436)	(0.01508)	(0.00126)

*, **, ***, denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

Table 10: CAAR for IPOs with Higher and Lower Reputation

The CAAR is calculated as the equation (6) and the associated t-statistic is shown in equation (7).

Panel A					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
VC AGE>Median	-1.73%	-1.29%	-2.07%	-3.62%*	-5.21%
t-statistic	-0.56	-0.90	-1.05	-1.59	-1.38
VC AGE<Median	-1.94%	-2.33%	-4.30%***	-3.48%*	-6.79%*
t-statistic	-0.87	-1.35	-2.35	-1.78	-1.75
Panel B					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
AUM>Median	-1.71%	-3.41%*	-2.39%**	-3.54%*	-6.27%***
t-statistic	-0.56	-1.83	-1.95	-1.62	-2.63
AUM<Median	-2.07%*	-3.25%*	-4.09%***	-4.31%	-7.87%***
t-statistic	-1.67	-1.76	-2.44	-1.06	-2.49
Panel C					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
AVGINV>Median	-2.86%	-2.64%**	-4.40%***	-0.45%	-1.76%
t-statistic	-0.74	-2.04	-2.40	-0.36	-0.52
AVGINV<Median	-3.29%*	-2.47%*	-6.82%***	-2.09%	-3.71%
t-statistic	-1.47	-1.36	-3.61	-0.89	-1.32
Panel D					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
RNDINV>Median	-3.80%*	-1.45%	-6.60%**	-2.50%*	-1.77%
t-statistic	-1.87	-0.76	-2.68	-1.28	-0.57
RNDINV<Median	-4.67%***	-1.33%	-7.80%***	-2.37%	-1.89%
t-statistic	-2.44	-0.43	-2.54	-0.95	-0.63

*, **, ***, denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

Table 11: DAAV for IPOs with Higher and Lower Reputation

The DAAV is calculated as the equation (8) and the associated t-statistic is shown in equation (9).

Panel A					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
VC AGE>Median	17%*	21%**	33%*	27%***	18%
t-statistic	1.32	2.18	1.86	2.47	1.07
VC AGE<Median	22%	34%**	30%	51%*	17%*
t-statistic	0.91	2.06	1.09	1.58	1.41

Panel B					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
AUM>Median	11%	25%*	35%***	49%*	21%*
t-statistic	0.38	1.63	2.73	1.52	1.31
AUM<Median	8%	36%***	57%***	33%*	31%*
t-statistic	0.75	2.14	2.67	1.82	1.45

Panel C					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
AVGINV>Median	19%	17%	26%**	16%***	35%
t-statistic	1.36	0.92	2.33	3.35	1.04
AVGINV<Median	21%	32%*	31%***	24%	29%
t-statistic	1.57	1.80	3.54	2.47	0.76

Panel D					
	[-10,-1]	[-5,-1]	[-1,1]	[1,5]	[5,10]
RNDINV>Median	7%	13%*	18%**	14%***	17%
t-statistic	2.17	1.57	1.98	3.21	1.06
RNDINV<Median	5%	19%*	27%**	20%***	37%**
t-statistic	1.03	1.46	2.14	2.51	2.32

*, **, ***, denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

Table 12: CAAR and DAAV for IPOs with Quartile Reputation

The CAAR is calculated as the equation (6) and the associated t-statistic is shown in equation (7). The DAAV is calculated as the equation (8) and the associated t-statistic is shown in equation (9).

Panel A

VC AGE	[-1,1]	[-1,1]
1st Quartile	-4.14%	31%
2nd Quartile	-5.47%**	40%*
3rd Quartile	-4.65%***	24%**
4th Quartile	-4.88%*	27%*

Panel B

AUM	[-1,1]	[-1,1]
1st Quartile	-2.17%**	24%**
2nd Quartile	-2.37%*	45%***
3rd Quartile	-4.29%**	59%***
4th Quartile	-5.54%***	52%***

Panel C

AVGINV	[-1,1]	[-1,1]
1st Quartile	-3.25%***	18%*
2nd Quartile	-5.10%***	29%*
3rd Quartile	-6.82%***	35%***
4th Quartile	-5.10%***	37%**

Panel D

RNDINV	[-1,1]	[-1,1]
1st Quartile	-5.60%*	17%**
2nd Quartile	-7.10%***	21%***
3rd Quartile	-6.73%***	25%**
4th Quartile	-7.28%**	30%***

*, **, *** , denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

Appendix A: Typical Lockup Agreements

Example 1:

> All of our officers, directors, and substantially all of our stockholders have signed Lock-Up Agreements under which they agreed not to transfer or dispose of, directly or indirectly, any shares of common stock or any securities convertible into or exercisable or exchangeable for shares of common stock, for a period of 180 days after the date of this prospectus. Transfers or dispositions can be made sooner with the prior written consent of Goldman, Sachs & Co.

Example 2:

> **The Selling Securityholders agree that, without your (the investment bank's) prior written consent, the Selling Securityholders will not, directly or indirectly, sell, offer, contract to sell, make any short sale, pledge or otherwise dispose of any shares of Common Stock or any securities convertible into or exercisable for or any rights to purchase or acquire Common Stock for a period of 180 days following the commencement of the public offering of the Stock by the Underwriters.**

Appendix B: Robustness Check with Different Divisions

CAAR and DAAV for IPOs with Different Divisions

The CAAR is calculated as the equation (6) and the associated t-statistic is shown in equation (7). The DAAV is calculated as the equation (8) and the associated t-statistic is shown in equation (9).

Panel A

VC AGE	[-1,1]	[-1,1]
1st Division	-2.36%	11%**
2nd Division	-3.07%**	9%*
3rd Division	-1.67%	13%
Panel B		
AUM	[-1,1]	[-1,1]
1st Division	-4.53%**	26%***
2nd Division	-5.81%*	31%***
3rd Division	-6.47%***	44%***
Panel C		
AVGINV	[-1,1]	[-1,1]
1st Division	-3.25%*	17%
2nd Division	-3.36%**	38%***
3rd Division	-5.27%***	31%***
Panel D		
RNDINV	[-1,1]	[-1,1]
1st Division	-4.90%***	20%*
2nd Division	-6.38%***	41%***
3rd Division	-6.03%***	47%***

*, **, ***, denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.

The CAAR is calculated as the equation (6) and the associated t-statistic is shown in equation (7). The DAAV is calculated as the equation (8) and the associated t-statistic is shown in equation (9).

Panel A

VC AGE	[-1,1]	[-1,1]
1st Quintile	-1.93%	5%
2nd Quintile	-2.04%**	12%**
3rd Quintile	-1.84%**	8%
4th Quintile	-1.57%	7%
5th Quintile	-2.51%***	11%*

Panel B

AUM	[-1,1]	[-1,1]
1st Quintile	-2.39%*	18%**
2nd Quintile	-3.61%***	20%*
3rd Quintile	-4.51%***	31%***
4th Quintile	-3.28%***	15%*
5th Quintile	-4.79%***	34%***

Panel C

AVGINV	[-1,1]	[-1,1]
1st Quintile	-3.00%***	10%
2nd Quintile	-4.18%***	27%***
3rd Quintile	-4.01%	24%**
4th Quintile	-3.87%***	22%**
5th Quintile	-5.60%***	42%***

Panel D

RNDINV	[-1,1]	[-1,1]
1st Quintile	-2.09%	7%
2nd Quintile	-5.13%***	35%***
3rd Quintile	-7.32%***	40%***
4th Quintile	-7.68%***	43%***
5th Quintile	-5.12%***	33%***

*, **, ***, denote coefficient estimates significantly different from zero at the 10%, 5% and 1 % significance levels respectively.