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**Re-examining Venture Capitalist Certification and Insider Selling
Decisions during the 1990s.**

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Abstract

This paper addresses the validity of certification and insider selling hypotheses within the context of new issues. Comparisons of venture capital backed and non venture-backed issues with similar offering characteristics show that issuers with venture capital affiliation are more underpriced than non venture-backed IPOs and insider selling results in decreased underpricing. These results contradict the findings of previous venture capital certification studies {Barry (1990), Megginson and Weiss (1991), and Lin and Smith (1997)}, but are consistent with recent work that examines grandstanding {Lee and Wahal (2002)} and insider selling decisions during hot market periods {Ljungqvist and Wilhelm (2003)}.

I. Introduction

The topic of venture capitalist involvement with initial public offerings has garnered much attention in contemporary finance research. The bulk of academic studies focus on the venture capitalist's ability to certify issues and reduce underpricing.¹ Barry et al (1990) and Megginson and Weiss (1991) pioneered the study of venture capital certification. The findings of those studies show that venture capitalists are able to credibly certify the quality of their issues through monitoring activities, with the end result being reduced underpricing. Additionally, Lin and Smith (1997) examine the roll of insider selling decisions on initial returns. They find that the selling of lead venture capitalists during the IPO period adversely affects underpricing of issues. Recent works in corporate finance studies have shown reversed results from previous studies. Gompers (1996) examines the phenomenon of grandstanding undertaken by younger venture capitalists in order to showcase financing talents. Ljungqvist and Wilhelm (2003) observe the effects of insider selling decisions on issuer underpricing in the context of bubble markets.

This study focuses on examining the strength of certification and insider selling hypotheses during the 1990s new issues market in the United States. Previous models call for certification by venture capitalists to decrease underpricing and insider selling to heighten underpricing during the first day of trading. The study employs a set of 1786 venture capital backed issues and a set of 1531 non venture capital backed issues with similar offering characteristics from 1991-2001 to test the claims of certification. Additionally 1505 VC-backed issues from 1991-2001 are used to test insider selling

¹ The terms underpricing and initial returns will be used interchangeably throughout the study.

decisions during the IPO period on subsequent initial returns.² The results indicate that the presence of venture capitalists results in increased underpricing for issuers. Increased insider selling significantly decreases underpricing.

Specifically, the paper presents current research that may explain the differing results from previous studies. The grandstanding hypothesis developed by Gompers (1996) may explain systematic underpricing of venture-backed issues during the 1990s. Ljungqvist and Wilhelm (2003) use data from the hot market period of the late 1990s to explore incentives facing insiders' selling decisions during the IPO period. They present evidence of insiders' abilities to minimize underpricing in order to maximize gains from liquidation of holdings.

The paper is organized in the following fashion: Section 2 gives a general overview of the new issues environment in the United States from 1991-2001. Section 3 outlines the literature related to both initial public offerings and venture capital certification. Section 4 describes the methodological approach for testing previous models. Section 5 presents the data used for testing. Section 6 provides the empirical results of the certification and insider selling test. Section 7 concludes.

² Only 1505 issues with venture backing had pertinent information on insider selling during the IPO period.

II. Overview of New Issues in the United States from 1991-2001

The market for Initial Public Offerings in the United States during the period from 1991-2001 shows several underlying trends. The total number of issues tracked by Thomson SDC Global New Issues was 5997 during the time frame. Of that total, 1831 had some form of venture capital backing, with the other 4166 not having pre-IPO relationships with venture capitalists.³ The frequency of issues during the time period shows intense periods of equity offerings, followed by years of calmer activity. The distribution of both venture capital backed and non venture capital backed IPOs gives insight into the concentration of venture capitalists' efforts in a narrow set of industries.

Table 1
Frequency distribution of 5997 public common equity IPOs from 1991-2001, including 1831 venture capital backed new issues and 4166 without venture capital backing.

	Venture Capital Backed Firms	Firms without Venture Capital Backing	Total Issues	Percent of Venture Capital Backed Firms
1991	149	252	401	37.16
1992	197	409	606	32.51
1993	230	587	817	28.15
1994	146	497	643	22.71
1995	180	397	577	31.20
1996	268	606	874	30.66
1997	128	503	631	20.29
1998	63	329	392	16.07
1999	232	308	540	42.96
2000	218	169	387	56.33
2001	20	109	129	15.50
Totals	1831	4166	5997	30.53

³ Firms with private equity backing are not included in the same group as VC backed offerings. Since most private equity investments occur after a LBO or spin-off, these issues are not included with venture capital backed issues. This is done in order to focus on the financing issues surrounding early stage companies.

Table 1 shows no single underlying trend in IPO volume during the 1990s. New issues were at an all time high during 1993 and 1996.⁴ The low peaks for IPOs occurred in 1998, 1999, and 2001. The hot IPO issue periods followed bull market years.⁵ Total IPOs during 1993 and 1996 were 817 and 874, respectively. Market returns for 1992 and 1995 were 4.46% and 34.1%, respectively. The market returns for the years preceding the low point for the total number of new issues (1998, 1999, 2001) were 31.5%, 26.6%, and 10.0%, respectively. Financing of firms with venture capital backing was heavily concentrated in the latter part of the sample period. Venture capital backed new issues, measured as a percentage of all new issues, peaked during 1999 and 2000. These periods were preceded by hot market years. The returns on the market index during 1998 and 1999 were 26.66% and 19.52%, respectively. Lerner (1994) argues that venture capitalists can accurately time the sale of new issues to coincide with hot markets. However, the low points for VC backed issues also follow years of strong market performance. The market returns preceding cool periods of VC backed issues were 20.26% and 31%, respectively.

The largest number of offerings involved high technology firms (1395), followed by financial services (845), healthcare (777), consumer products and services (574), and industrials (493). Table 2 shows the entire breakdown of IPOs by industry. Barry (1990)

⁴ Note: This overview only addresses the total number of new issues. It does not take into account total issue size. The late 1990s saw several very large issues.

⁵ All information on market returns is taken from Yahoo! Finance, using the S&P 500 Index as the “market” and December 2nd as end of fiscal year for calculations purposes.

suggests that venture capital firms concentrate their resources in a narrow set of industries.⁶ Indeed VC backed offerings during the period were most noticeably

Table 2
Industry distribution of 5996 IPOs between 1991-2001, including 1831 venture capital backed issues and 5996 issues without venture capital backing.

	Firms without Venture Capital Backing	Venture Capital Backed Firms	Total Issues	Percent of Industry Issues with VC Backing	Percent of Total VC Issues
High Technology	686	709	1395	0.508	0.387
Healthcare	373	404	777	0.520	0.221
Financials	803	42	845	0.050	0.023
Consumer Products and Svcs.	402	172	574	0.300	0.094
Materials	193	39	232	0.168	0.021
Industrials	400	93	493	0.189	0.051
Consumer Staples	204	34	238	0.143	0.019
Retail	267	92	359	0.256	0.050
Energy and Power	187	35	222	0.158	0.019
Media and Entertainment	273	60	333	0.180	0.033
Telecommunications	218	148	366	0.404	0.081
Real Estate	157	3	160	0.019	0.002
Government and Agencies	2	0	2	0.000	0.000
Total	4165	1831	5996		1

Note: The total of all new issues differs from the total listed in Table X due the lack of industry information on the issue that was excluded from this list. All information was obtained from the SDC database.

concentrated in high technology and healthcare. VCs were involved with 50.8% of high tech issues and 52.0% of all healthcare issues. High technology, healthcare, and telecommunications comprise 68.9% off all venture-backed offers. Industries bereft of VC involvement include financial services, real estate, energy, consumer staples, and governmental agencies.

In summary, venture capital backed issues represented 30.5% of all new issues during the 1991-2001 period. Periods of intense venture capital involvement were preceded by years with large returns for the market index. Venture capital backed firms

⁶ The authors' work shows that the largest industries with VC involvement include computer equipment, electronic components, and business services. The author used SIC codes to indicate issuer industry.

concentrated resources in high technology and healthcare companies, while shying away from financials, consumer staples, and energy.

III. Initial Public Offerings

The phenomenon of systematic underpricing has been a focal point of research in initial public offerings for quite some time. Much of the literature focuses on informational asymmetries facing investors, issuers, and third parties.⁷ Most of these studies attribute underpricing to adverse selection, principal-agent models, or signaling of firm quality. In this study I will only focus on an empirical implication of the Winner's Curse. The outcome of the Winner's Curse is that uninformed investors only receive allotments of shares in offerings that are overpriced (Rock, 1986). On average, the "winner" ends up receiving negative average returns.⁸ The author shows that some action is needed to induce uninformed investors to stay in the primary market. The end result is systematic underpricing of every issue in order to keep the uninformed investors from refusing to participate in the primary market of new issues. However, underpricing is very costly to issuers, since this is a net transfer of wealth from existing shareholders to new shareholders. Rock (1986) now goes on to show how the logic of deliberate underpricing eventually leads to the classic free rider problem. In order to ensure the future participation of uninformed investors, every issuer will have to deliberately underprice their own shares. No one issuer will face enough incentive to leave money on

⁷ Notably public auditors, underwriters, and venture capital firms.

⁸ The underlying assumptions calls for both the underwriter and issuer to have information of the value of the shares, but are not able to credibly signal this to the market. Some investors are informed, while most remain uninformed as to the true value of the shares that are being offered. During an offering of attractively priced shares informed investors bid, along with the uninformed investors. The uninformed investors are crowded out and do not receive their total amount of bids during attractively priced offerings. In offerings that are not priced attractively, the informed investors refrain from bidding, with all of the shares going to the uninformed investors. On average, the uninformed investors only receive shares in overpriced companies.

the table in order to let future issuers benefit from this incremental cost faced by the current firm. Issuers are one-time players in an initial public offering game, while investors and third parties are repeat-players. Investment banks do face incentives to bring high quality issues to market, mainly through future business from issuers and increased market share from investors {see Nanda and Yun, 1997}.

One of the more popular proxies for uncertainty are offering characteristics of the issuer and certification of the issuer by third parties. Much effort has been concentrated in the effect of third parties on ex-ante uncertainty. Underwriters and venture capital firms may also signal firm quality through repeatedly participating in high quality offerings. Issuers can hire reputable auditors in order to reduce underpricing {see (Balvers et al., 1988) and (Beatty, 1989)}. A pre-IPO equity investment undertaken by a venture capital fund may additionally result in less ex-ante uncertainty {see (Barry et al., 1990), (Megginson and Weiss, 1991), and (Lin and Smith, 1997)}. Empirical research on the role of venture capital firms in the pricing of initial public offerings continues to remain as a research hotspot and warrants sufficient room for further investigation.

A. Venture Capital

The Venture Capital industry is an amalgam of limited partners, general partners, early stage companies, and, of course, money. VC firms provide sources of capital to risky ventures when more traditional forms of financing, namely banks and retail investors, are unavailable. Unlike mutual funds, venture capital funds are closed-end and not open to retail investors. The legal entity of choice for any venture capital firm is the limited liability corporation. The management team of any venture capital firm serves as general partners. The managing partners of any venture capital firm typically bring a

myriad of knowledge and expertise in a certain industry to the table. Savvy acumen is needed, since venture capitalists play a large role in development and strategic decision making for portfolio companies. This is where the venture capital firm differs from traditional money managers or investment funds. Venture capitalists take an active role in management of the company. They take seats on the board of directors and use their contacts in the specific industry in order to develop a client base and streamline operations. From an economic standpoint, a venture capitalist seeks to “add-value” to the firms in his or her portfolio.

There are three distinct stages to any venture capital investment. The cycle starts with the raising of capital that is invested in entrepreneurial ventures. Capital is usually provided by sophisticated investors such as wealthy individuals, institutional investors, and university endowment funds. The second stage of the cycle is the financing and active management of the funded venture. The venture capitalist takes an active role in managing the enterprise, monitoring performance, and partaking in any other value-added activities. The fund typically provides some form of staged financing to the enterprise. This is done in order to avert any agency problems faced between the principal (venture capitalist) and agent (entrepreneur) (Sahlman, 1990). The general partner in the fund must be compensated for both his active involvement in the company and the opportunity costs of not investing in other risky ventures. The final stage involves the process of unwinding investment in the business. The most common strategy used to liquidate the venture capitalists position is an initial public offering of the company’s shares on an

exchange (Gladstone, 1989).⁹ However, according to Barry (1990), companies often retain partial ownership in the issuer after the first day of trading on public markets in order to signal quality of the monitoring efforts. There is no clear-cut rule in the investment community as to the ability of venture capitalists to time issues. However Lerner (1994) asserts that seasoned venture capital professionals possess and employ their abilities to take issues public in peak market conditions.

B. Venture Capitalist Certification Models

The role of certification provided by Venture capitalists through reputation capital and monitoring efforts has been a major area of research in Initial Public offerings in the past fifteen years. The first study to analyze the role of venture capitalists in bringing new issues to the market was undertaken by Barry et al (1990). The authors of this body of work find that venture capitalists specialize in a narrow set of industries and are able to bring in better underwriters to the issuing process. They also hold significant positions in firms after the issuance on the primary market. This disagrees with Gladstone's (1989) view that the IPO is an exit vehicle for VC firms. Finally, Barry states that the reputation and monitoring role undertaken by venture capitalists is recognized by the markets, resulting in lower underpricing. An interesting caveat to this study is the fact that VC-backed issues do not have significantly lower initial returns than non-VC backed issues. However, the author noted that this is most probably due to the method of data collection of the firms that did not have relationships with venture capitalists pre-IPO.¹⁰ For the

⁹Gladstone (1989) outlines other forms of venture capital exits include sale of shares to other companies, share repurchases by company, reorganization of the company, liquidation of the company's assets, or a private placement to another investor or a consortium.

¹⁰ The authors used ads in the Wall Street Journal for non-venture capital backed firms. This sample may be biased towards large firms.

entire study the authors used a sample of 433 venture-backed and 1123 non venture-backed issues in the United States from 1978-1987.

Another study by Megginson and Weiss (1991) shows that the certification role provided by VC firms results in lower underpricing. A treatment of means test and OLS regression both provide statistical evidence that VC-backed firms are subject to lower initial first-day returns than issuers without venture capital backing. The authors also show that venture capitalists can attract higher quality auditors and underwriters than non-VC backed firms.¹¹ Additionally, venture capitalists refrain from selling after the IPO, this is consistent with Barry's (1990) findings. For the data set the authors used 320 VC-backed issues and a matched set of 320 non VC-backed issues from the US market in 1983-1987. The data was matched to include issues from similar industries with similar offerings amounts.¹²

A third study provides convincing evidence for the reputation of venture capital firms in the role of pricing initial public offerings. Lin and Smith (1997) state that venture capitalists participate in relationships with younger issuers. These findings are consistent with Megginson and Weiss (1991). However, Lin and Smith's findings show that VC-backed issuers are less profitable and have fewer assets than issuers without venture capital backing. The authors find that venture capitalists' marginal level of productivity diminishes as the age of the firm increases. Their evidence shows that they reduce equity positions in firms in order to redeploy their services to other firms. This disagrees with

¹¹ Megginson and Weiss (1991) argue that VCs develop reputations with underwriters and auditors. They continue to state that since venture capitalists have their reputation capital on the line, then they have incentive to reveal truthful information to the auditors and underwriters. This reduces the costs (due diligence and information gathering) to the auditors and underwriters. Therein lies the ability to attract higher quality third party players.

¹²Every effort was made to exclude financial institutions, offerings less than \$5 in price, and issues with total offering amounts less than \$3 million.

both Barry (1991) and Megginson and Weiss (1991). However, Lin and Smith use a 3-year horizon to measure ownership levels, whereas the other authors use immediate post-IPO data. Finally, the authors show that the selling decisions of reputable lead venture capitalists influences the level of underpricing. When reputable lead investors elect not to sell during the IPO, underpricing is significantly lower than when reputable insiders choose to sell equity stakes.

All of the certification studies used data from new issues listed on US capital markets. Studies done with data from other countries show much different results and may provide startling evidence against the certification hypothesis of venture capital firms. A recent body of work by Hamao et al (2000) analyzes new public issues in Japanese markets to test the strength of the certification model.¹³ The results of the study are in stark contrast to the evidence that has been presented by Barry (1990), Megginson and Weiss (1991), and Lin and Smith (1997). Hamao (2000) finds that venture capital firms in Japan do not take an active monitoring role in portfolio companies¹⁴, hold smaller equity stakes in the invested firms, and do not face a heavy high technology bias when choosing companies for equity commitments. Additionally, Hamao (2000) finds that underpricing is significantly greater for venture-backed new issues. However, when the authors control certain variables¹⁵, the amount of underpricing is significantly

¹³ Much of the differences between the results of Barry (1990), Megginson and Weiss (1991), and Lin and Smith (1997) in relationship to the findings of Hamao (2000) may be attributed to structural organization of the venture capital industry in Japan. In the Japanese market, venture capital firms are not organized as partnerships. Instead, they are owned by banks, securities firms, and underwriters.

¹⁴ The reason that venture capital firms do not take an active monitoring role in the portfolio companies is due to legal and statutory rules. These rules were changed after 1995.

¹⁵ The controlled variables in the regression include: age (ln), amount of IPO proceeds (ln), market return of the OTC index from the first day of auction to the first day of trading, book equity to market value equity based on lower limit of bids (ln), and time period dummy variables.

decreased for firms with venture capital backing. Initial returns are significantly higher for VC-backed companies when the lead underwriter owns the venture capital firm.

A recent study on returns of US issues during the bubble period of the 1990s shines new light onto venture capitalists' effects on new issue pricing. Ljungqvist and Wilhelm (2003) show that runaway underpricing during 1999 and 2000 can be explained by incentives faced by firms involved with the issues. While this study does not strictly focus on certification roles of venture capitalists, it does uncover new information on the relationship between insider selling decisions and underpricing. The results of the study show that increases in venture capital and insider selling during the issue period tend to reduce underpricing. This study uses data from 1996-2000. It is one of the first studies to analyze the role of VC's during the hot market area of the last decade ending in 2000. Perhaps future findings might reveal a differing role of venture capitalists in hot markets.

IV. Analytical Framework

Asymmetric information is an underlying theme within modern IPO framework. Inside investors have incentive to hide or delay disclosure of material information that could hurt the price of the offering. Rational investors recognize this by submitting lower average offers for the prices of these securities. Only credible certification from a third party will prevent a market failure similar to that of the lemon car model. Enter venture capitalists.

Venture capital firms engage in costly activities that can add a sense of certification to the involved issuer. VCs face extreme risk-to-reward ratios, since they usually invest in emerging companies that are clustered within certain industries. The venture capitalist provides funding to the entrepreneurial venture in a series of rounds,

usually connected to different stages in the life of the business. However venture capitalists are more than just silent partners that use private businesses as an investment vehicle. Like leverage-buyout and private equity firms, they are heavily involved in the operational and strategic facets of an organization. VCs line-up suppliers, sit on the board of directors, and formulate business plans. They help “add-value” to their portfolio companies. Indeed, most venture capitalists have held operational and management positions within the industries that they cover. Since venture capitalists are heavily involved with the development of their respective issuers, they are able to credibly certify the financial status of the issuers.

Venture capitalists are repeat players in the new issues market. They seek to add value to emerging technological ventures in order to reap the rewards of selling shares in open and liquid markets. Since VCs have to repeatedly face the same investors in capital markets, they need to develop relationships with these investors. Venture capital firms face strong incentives to invest in activities that lead to a favorable image amongst capital market participants, namely investors. The main ‘investment’ is avoiding the one-time gains of bringing overvalued companies public. Megginson and Weiss (1991) show that these one-time gains destroy part of the firm’s reputation capital. Venture capitalists seek to develop a reputation for selling high quality issues. Lin and Smith (1997) show that reputable firms forego participating in the sales of overpriced issues.

Venture capital firms must eventually liquidate their holdings in the entrepreneurial ventures once they gain listing on a public exchange. VCs do not derive their competitive advantage or value-added services from monitoring the operations of established business. Their marginal productivity is highest when they are involved with

emerging companies. The services of venture capitalists are put to better use while engaging in monitoring activities of new firms, rather than just holding directorship positions with publicly traded companies. However, the selling decisions of venture capitalists during the IPO phase do not go unnoticed by capital market participants. Any selling during the offering can be negatively perceived and endanger the reputation capital of the VC. Lin and Smith (1997) argue that venture capital firms balance their selling decisions with the opportunity cost of not transferring their monitoring services and investment capital to other ventures. Ultimately, the selling decisions of venture capitalists during the new issue offering period have important ramifications for both the venture capitalist and issuers.

In summary, previous models show that the monitoring role (of venture capitalists) is noticed by capital markets participants and the selling decisions of venture capitalists and insiders can affect the pricing of new issues. These models yield two testable hypotheses:

- 1) Since venture capitalists certify the quality of their issues, then firms that are backed by venture capital investors should face lower underpricing than firms without venture capital backing.
- 2) The relative liquidation of insider holdings during the IPO process should adversely affect the pricing of the issue. Therefore, for issues where venture capitalists substantially reduce their holdings during the IPO process, the level of underpricing should increase.

V. Data Selection

For this study I used a set of 1786 venture capital backed issues and 1531 issues without venture capital financing from the period January 1, 1991 through December 31, 2001 with primary listings on exchanges in the United States.¹⁶ The issues are closely matched on the basis of industry and offering amount. All of the primary data was obtained from Thomson SDC Platinum Global New Issues database. For the entire period (1/1/1991-12/31/01) SDC contained a total of 5997 new issues listed on U.S. markets. Of that set, 1831 were identified as having venture capital backing. This entire set of new issues proved too unwieldy for the testable hypotheses.

Table 3
Industry distribution of 3317 IPOs between 1991-2001, including 1786 venture capital backed issues and 1531 issues without venture capital backing.

Industry	Non-VC		VC Backed	
	Number	% of Total	Number	% of Total
High Technology	543	0.355	709	0.397
Healthcare	330	0.216	404	0.226
Materials	38	0.025	39	0.022
Industrials	90	0.059	93	0.052
Consumer Prod.	171	0.112	172	0.096
Consumer Staples	32	0.021	34	0.019
Telecommunications	142	0.093	148	0.083
Retail	90	0.059	92	0.052
Energy and Power	35	0.023	35	0.020
Media and Ent.	60	0.039	60	0.034
Total	1531		1786	

Note: Financial services issues were excluded, along with offers under 5 million and offers over 400 million.

Since venture capital backed firms' first day returns tend to be clustered by industry (see Ritter (1984)), matching the samples by both offering size and industry would provide better results for testing the hypotheses. First, all IPOs that were classified

¹⁶ This includes the American Stock Exchange, Nasdaq, Nasdaq Small Cap Markets, New York Stock Exchange, and OTC traded issues.

as either financial services or real estate firms by the T-F Macro Industry list on SDC Global New Issues were eliminated.¹⁷ Secondly, only issues within the amount offered range of \$5 million to \$400 million were included. Finally, a set of 1786 VC-backed and 1531 non VC-backed issues with similar offering amounts and industry affiliations were used to perform the testing. Table 3 shows distribution of issues by industry and Table 4 shows the frequency distribution of IPOs by offer amount. For the testing on underpricing and selling decisions, 1505 VC-backed firms with available insider selling data were used (these firms were taken out of the previous set of 1786 VC-backed issues).

Table 4
Distribution of offering amounts for 1531 IPOs without venture-backing and 1786 IPOs with venture-backing from 1991-2001, excluding financial services issues and those with offering amounts less than 5 million and greater than 400 million. All offer amounts in millions.

Percentile	Non-VC	VC
10th	15	15.8
20th	20	21.38
30th	25	25
40th	30	30
50th	35	33
60th	41.9	40
70th	50.1	48.92
80th	63.7	60
90th	87.5	82.5

¹⁷ This follows the basic procedure used by Megginson and Weiss (1991). That study included a sample of 320 non VC-backed and VC-backed issues listed on US markets between 1983-1987. Both sets were matched closely by industry and offering amount. All

VI. Empirical Results

A. Venture Capitalist Certification

1. Regression Analysis

Tests of the venture capital certification hypothesis and its application to first day returns are presented in Table 5. I examined the following variables and their relationship to the first day returns of new issues:

(1) *Venture Capital Dummy Variable (VC)*.

Initial returns of VC backed firms (VC=1) should be lower than the returns of non VC-backed issues (VC=0). Since capital markets take into account the monitoring role of venture capital firms, there should be a negative and significant relationship between (VC) and first day returns.

(2) *Issue offering amount (AMOUNT)*.

Controlling for size allows for a better relative measure of VC backing.

(3) *Industry Dummy Variables (IND1, IND2, IND3, IND4)*.

The High Technology (IND1=1), healthcare (IND2=1), personal/business products and services (IND3=1), media (IND4=1), energy (IND5=1), retail (IND6=1), and materials (IND7=1) industries have been included in order to separate the effect of issuer industry on initial returns from that of venture capital certification.

(4) *Issue year dummy variables (YEAR1, YEAR2, YEAR3, YEAR4, YEAR5)*.

Dummy variables are used in order to control for IPO and market activity within certain yearly trading sessions. Hot market periods, especially 1995-1999¹⁸, (YEAR5=1, YEAR6=1, YEAR7=1, YEAR8=1, YEAR9=1) were a boon for IPO first day returns. Therefore, those variables should be positively related to initial returns. Issues during bear markets (YEAR00=1, YEAR01=1) should have a negative correlation to initial returns, however, these could have either a significant or insignificant value. The issue dummy variables during other years (YEAR2=1, YEAR3=1, YEAR4=1) should have an insignificant relationship with initial returns.

¹⁸ The yearly returns for the S&P 500 during the 'hot market' periods of 1995-1999 were 34.1%, 20.26%, 31%, 26.66%, and 19.52%, respectively. The returns for the 'bear market' years of 2000 and 2001 were -10.01% and -13.04%, respectively. The returns for the remaining years 1991-1994 were 21.12%, 4.46%, 7.05%, and -1.5%, respectively. All yearly returns were calculated using December 2nd as year-end. All data was obtained from Yahoo Finance.

Table 5 outlines the results of the statistical analyses of the effects of venture capital backing, offer amount, year of issue, and industry on underpricing of both venture-backed and non VC issues. The results show a reversal of the trends from prior

Table 5
OLS Regression results from Day 1 Returns (R1) against VC backing (TYPE), offering amount (OFFER), Year of Issue Indicators (YEAR1, YEAR2, YEAR3, YEAR4, YEAR5), and Industry of Issuer Indicators (TYPE1, TYPE2, TYPE3, TYPE4, TYPE5, TYPE6) for the sample of 1786 VC backed firms and 1531 firms without venture capital backing.

$$R_i = \alpha_0 + \alpha_1 TYPE + \alpha_2 OFFER + \alpha_3 YEAR1 + \alpha_4 YEAR2 + \alpha_5 YEAR3 + \alpha_6 YEAR4 + \alpha_7 YEAR5 + \alpha_8 IND1 + \alpha_9 IND2 + \alpha_{10} IND3 + \alpha_{11} IND4 + \alpha_{12} IND5 + \alpha_{12} IND6 + \varepsilon_i$$

Dependent Var.:	{1}	{2}	{3}	{4}
INTERCEPT	0.249 {16.575}	0.192 {9.980}	0.185 {8.121}	0.106 {0.033}
TYPE	0.077 {3.733}	0.079 {3.859}	0.067 {3.357}	0.058 {2.943}
OFFER		0.001 {4.745}	0.001 {2.904}	0.001 {2.629}
YEAR1			-0.005 {-0.143}	-0.017 {-0.495}
YEAR2			-0.098 {-3.491}	-0.091 {-3.291}
YEAR3			-0.124 {-3.778}	-0.130 {-4.009}
YEAR4			-0.029 {-0.687}	-0.058 {-1.381}
YEAR5			0.522 {17.192}	0.460 {15.016}
IND1				0.203 {6.575}
IND2				0.004 {0.114}
IND3				-0.005 {-0.103}
IND4				-0.087 {-1.278}
IND5				0.197 {4.734}
IND6				0.046 {1.162}

Adjusted R Squared	0.004	0.010	0.117	0.143
R1=	Percentage return from offer price to closing price on first day of trading.			
HOLD=	Percentage decrease in insider holdings during the IPO period.			
AMOUNT=	Offering amount in millions.			
YEAR=	Indicator (dummy) variables for various issue years (YEAR1 1995=1, non=0; YEAR2 1996=1, non=0; YEAR3 1997=1, non=0; YEAR4 1998=1, non=0; YEAR5 1999=1, non=0).			
IND=	Indicator (dummy) variables for various industries. (IND1 High Technology=1,non=0; IND2 Healthcare=1,non=0; IND3 Retail=0, non=1; IND4 Materials=1, non=0; IND5 Telecommunications=1, non=0).			
All values significant at the .05 level.				

VC certification studies. Ultimately, the findings question the prior results of Barry (1990), Megginson and Weiss (1991), and Lin and Smith (1997).

The most marked departure from previous work is the positive and significant coefficient attached to the venture capital indicator. This signifies that the presence of venture capitalists in the sample positively affected initial returns. The value remains significant after controlling for offer amount, year of issue, and industry of issuer. A treatment of means test reiterates these results.¹⁹ This completely contradicts the findings of Barry (1990), Megginson and Weiss (1991) and Lin and Smith (1997), all of whom outline reduced underpricing through certification. However, the results are consistent with Lee and Wahal (2002). One explanation for systematic underpricing of venture-backed issues could possibly be widespread grandstanding. Gompers (1996) hypothesizes that young venture capital firms often face problems in raising capital for their funds, since their capabilities have not been demonstrated. In order to signal their abilities, they bring firms public at a younger age in order to showcase their talents in financing startups. Since these firms are brought to market at an earlier age, there is more surrounding uncertainty towards the issuer's prospects resulting in more underpricing than normal. The author's tests show that companies brought to market by younger VCs

¹⁹ The difference in mean initial returns between VC-backed and non-VC issues (.0774) is significant at the .05 level, showing that VC-backed issues have higher initial returns than non venture-backed issues. (t-stat: -7.66).

(those less than 3 years old) are, on average, younger and subject to higher initial returns. Perhaps the 1990s saw an influx of venture capital firms eager to bring new ideas to the market (internet concerns) and saw grandstanding as the only plausible way to establish a track record, with the result being widespread underpricing of venture capital backed issues. Additionally, the author states that positive performance of new issues provides more incentives for grandstanding. The work of Lee and Wahal (2002) attributes increasing initial returns for venture-backed firms to a variant of the grandstanding hypothesis.

The issuer's offering amount significantly affects underpricing in the sample, differing from Lin and Smith (1997). Year of issue and industry influenced firm underpricing. The indicators for 1996 and 1997 were negative and significant. Three other indicator variables provide some insight into the underpricing of issues during the test period. The coefficient on the control variable for issues in 1999 is positive and significant.²⁰ In their study, Ljungqvist and Wilhelm (2003) state that the rampant underpricing of the late 90s may be attributed to the difficulty of valuing new economy issues.²¹ Additionally, the indicator variable for high tech and telecommunications companies is positive and significant. This could suggest that these companies are subject to greater first day returns than other industries. Since many of the companies in Ljungqvists's (2003) valuation problem are internet firms, this result pays credence to the authors' study.

²⁰ The coefficient remains significant when controlling for issuer industry. See Table 5 for complete results of the OLS Regression on initial returns.

²¹ The authors conclude that certain omitted variables in their tests may explain the level of underpricing in the bubble markets of the late 1990s. They explain that the issuers during this period chose an IPO as a means to raise capital for operational activities. This is different from the reasons that firms choose to go public in prior markets. As a result, investors may find it more difficult to value such issues.

Tests of the sample indicate that the certification effect of venture capitalists disappears during the period of the 1990s. This goes directly against the previous studies on initial public offerings and venture capital involvement. One possible explanation for the higher initial returns of VC-backed issues could be extensive grandstanding during the 1990s.

B. Underpricing and Insider Selling Decisions

1. Regression Analysis

Tests of the selling decisions of venture capitalists during the IPO period and subsequent effects on first day returns are presented in Table 6. I examined the following variables and their relationship to the first day returns of new issues:

- (1) *Reduction in insider holdings during IPO period (SELL).*
The percentage reduction of insider holdings during the IPO period. This variable analyzes the relationship between the selling decisions of venture capitalists and the subsequent effect on initial returns. Lin and Smith (1997) show that initial underpricing is reduced when reputable lead managers refrain from selling. Therefore, there should be a negative relationship between (SELL) and initial returns.
- (2) *Offer amount of issuer, in millions of dollars (OFFER).*
Controlling for size allows for a better relative measure of VC backing.
- (3) *Industry Dummy Variables (IND1, IND2, IND3, IND4).*
The High Technology (IND1=1), healthcare (IND2=1), personal/business products and services (IND3=1), media (IND4=1), energy (IND5=1), retail (IND6=1), and materials (IND7=1) industries have been included in order to separate the effect of issuer industry on initial returns from that of venture capital certification.
- (4) *Issue year dummy variables (YEAR1, YEAR2, YEAR3, YEAR4, YEAR5).*
Dummy variables are used in order to control for IPO and market activity within certain yearly trading sessions. Hot market periods, especially

1995-1999²², (YEAR5=1, YEAR6=1, YEAR7=1, YEAR8=1, YEAR9=1) were a boon for IPO first day returns. Therefore, those variables should be positively related to initial returns.

Table 6 shows results that diverge from previous studies that document the relationship between insider selling and initial returns of new offerings. These results generally differ from the work of Lin and Smith (1997) in the area of venture capital selling decisions. However, the results show similarities to the recent findings of Ljungqvist and Wilhelm (2003).

In all of the regression tests, the coefficient on the insider selling variable is positive and significant. This shows that for issues with a higher level of reduction of insider holdings, underpricing is actually reduced. Additionally, the coefficient decreases as more control variables are added, suggesting that underpricing is dependent upon a larger amount of factors than just insider selling decisions. Regardless of controlling for hot market periods and industry of issuer, a larger amount of insider selling significantly decreases the amount of underpricing. This is in stark contrast to previous studies in the selling decisions of venture capitalists. Lin and Smith (1997) show that underpricing is reduced when the lead venture capitalist refrains from liquidating its equity position in the issue. As previously noted, the results are consistent with tests of issues from the hot market period of the 1990s. The Ljungqvist and Wilhelm (2003) empirical tests identify the fact that insider (especially Venture Capital) selling reduces underpricing in hot

²² The yearly returns for the S&P 500 during the 'hot market' periods of 1995-1999 were 34.1%, 20.26%, 31%, 26.66%, and 19.52%, respectively. The returns for the 'bear market' years of 2000 and 2001 were -10.01% and -13.04%, respectively. The returns for the remaining years 1991-1994 were 21.12%, 4.46%, 7.05%, and -1.5%, respectively. All yearly returns were calculated using December 2nd as year-end. All data was obtained from Yahoo Finance.

markets. The logic behind reduced underpricing and greater liquidation of insider holdings rests with the incentives faced by insiders. The author assumes that venture capitalists and insiders are able to influence the offering price of shares. Since

Table 6

Results of OLS Regressions of First Day Returns (R1) against the Decrease in Insiders' Holdings (HOLD), the Offering Amount of the Issuer (AMOUNT), Year of Issue Indicators (YEAR1, YEAR2, YEAR3, YEAR4, YEAR5), and Issuer Industry Indicators (IND1, IND2, IND3, IND4, IND5)

For the sample of 1505 VC Backed Initial Public Offerings during the period 1/1/1991-12/31-2001.

$$R_i = \alpha_0 + \alpha_1 \text{HOLD} + \alpha_2 \text{AMOUNT} + \alpha_3 \text{YEAR1} + \alpha_4 \text{YEAR2} + \alpha_5 \text{YEAR3} + \alpha_6 \text{YEAR4} + \alpha_7 \text{YEAR5} + \alpha_8 \text{IND1} + \alpha_9 \text{IND2} + \alpha_{10} \text{IND3} + \alpha_{11} \text{IND4} + \alpha_{12} \text{IND5} + \varepsilon_i$$

Regression	INTERCEPT	HOLD	AMOUNT	YEAR1	YEAR2	YEAR3	YEAR4	YEAR5	IND1	IND2	IND3	IND4	IND5	R2
{1}	0.5612 [18.702]	0.8512 [9.002]												0.0512
{2}	0.4567 [12.294]	0.7937 [8.3812]	0.0020 [4.7062]											0.0649
{3}	0.3753 [9.7402]	0.6100 [6.9122]	0.0010 [2.6618]	0.0292 [.5793]	-0.0980 [-2.2371]	-0.0955 [-1.6817]	0.0342 [.4283]	0.6761 [14.8486]						0.2063
{4}	0.2902 [5.9196]	0.5319 [6.0129]	0.0011 [2.9275]	0.0114 [0.2295]	-0.0950 [-2.2748]	-0.1203 [-1.8189]	0.0033 [0.0420]	0.6205 [13.4932]	0.1721 [4.3934]	-0.0328 [-0.7270]	-0.0222 [-0.3138]	-0.1000 [-0.9707]	0.0961 [1.6455]	0.2262

R1= Percentage return from offer price to closing price on first day of trading.
HOLD= Percentage decrease in insider holdings during the IPO period.
AMOUNT= Offering amount in millions.
YEAR= Indicator (dummy) variables for various issue years (YEAR1 1995=1, non=0; YEAR2 1996=1, non=0; YEAR3 1997=1, non=0; YEAR4 1998=1, non=0; YEAR5 1999=1, non=0).
IND= Indicator (dummy) variables for various industries. (IND1 High Technology=1, non=0; IND2 Healthcare=1, non=0; IND3 Retail=0, non=1; IND4 Materials=1, non=0; IND5 Telecommunications=1, non=0).
All values significant at the .05 level.

underpricing is costly to insiders (transfer of wealth from existing to new shareholders), venture capitalists have an incentive to increase the offering price when they plan to cash out their holdings during the IPO period. Thus, insider selling results in reduced underpricing.

The offering amount of firms is significant and affects the amount of initial returns for new issues. In all three equations the coefficient on amount offered is positive and significant. This differs from Megginson and Weiss (1991), who show that offering amounts of companies do not significantly affect initial returns. As in the underpricing analysis, the indicators for 1999 and high technology were significant and positive.

The results from the ordinary least squares regression show that the selling decisions positively affect underpricing. In other words, when venture capitalists choose to sell a larger amount of holdings in the issuer during the IPO period, underpricing is lowered when controlling for year of issue, offering amount, and industry of the issuer. The departure from previous studies can be explained by a recent analysis of underpricing in the bubble market of the late 1990s.

VII. Conclusions

The results of this paper provide evidence that the certification models may not hold up under the hot market conditions of the 1990s. Tests on both non venture-backed and venture-backed offerings with similar characteristics show that underpricing increases with the presence of venture capitalists. These results are upheld when controlling for certain factors such as offering amount, industry affiliation, and year of offering. Positive market performance and increases in incentives for grandstanding by

younger venture capital firms may explain some of the increase in initial returns for venture-backed firms during the last decade. The grandstanding hypothesis has garnered the attention of academics in recent years and should remain a bountiful source of future study. More research in the area of increased capital infusions to venture capital funds through grandstanding is needed in order to plausibly explain for the amount of underpricing facing venture-backed issues in the 1990s.

The insider selling hypothesis which predicts that increased lead venture capitalist selling results in increased underpricing also does not hold up under the data from the 1990s. Conversely, firms with increased venture capital selling during the IPO period realized lower underpricing. Venture capitalists and other insiders can influence the offering price of their issues and have incentive to price the issues higher when liquidating their holdings, thus reducing costly underpricing occurring in the primary market.

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