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Venture Capitalist Certification in Initial Public Offerings

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ABSTRACT

This paper provides support for the certification role of venture capitalists in initial public offerings. Consistent with the certification hypothesis, a comparison of venture capital backed IPOs with a control sample of nonventure capital backed IPOs from 1983 through 1987 matched as closely as possible by industry and offering size indicates that venture capital backing results in significantly lower initial returns and gross spreads. In effect, the presence of venture capitalists in the issuing firms serves to lower the total costs of going public and to maximize the net proceeds to the offering firm. In addition, we document that venture capitalists retain a significant portion of their holdings in the firm after the IPO.

THE ABILITY OF THIRD-PARTY specialists to certify the value of securities issued by relatively unknown firms in capital markets that are characterized by asymmetric information between corporate insiders and public investors has attracted much academic interest in recent years. Several authors, including James (1990), Blackwell, Marr, and Spivey (1990), and Barry, Muscarella, Peavy, and Vetsuypens (1991) have developed and tested models based at least in part on the formal certification hypothesis presented in Booth and Smith (1986). A related body of work, represented by DeAngelo (1981), Beatty and Ritter (1986), Titman and Trueman (1986), Johnson and Miller (1988), Carter (1990), Simon (1990), and Carter and Manaster (1990) has examined how investment bankers and auditors help resolve the asymmetric information inherent in the initial public offering (IPO) process.

In this paper we examine whether the presence of venture capitalists, as investors in a firm going public, can certify that the offering price of the issue reflects all available and relevant inside information. We hypothesize that venture capitalists can perform this function; that it will be an economically

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valuable function; and that the certification provided by venture capitalists will be both a partial subsititute for and a complement to the certification provided by prestigious auditors and investment bankers. We employ a matched pairs methodology where a sample of venture capital (VC) backed IPOs is matched by industry and offering size with a qualitatively equivalent set of non-VC backed IPOs, to focus as clearly as possible on the question of whether venture capital certification occurs and is valuable. Our results strongly indicate that the presence of venture capitalists in offering firms maximizes the fraction of the proceeds of the IPO, net of underpricing and direct costs, which accrues to the issuing firm.

Specifically, we document that VC backing reduces the mean and median degree of IPO underpricing and that such backing significantly reduces the underwriting spread charged by the investment banker handling the issue. Further support for the venture capitalist certification hypothesis is provided by our finding that VC backed issuers are able to attract more prestigious auditors and underwriters than non-VC backed issuers. In addition, VC backed issuers also elicit greater interest from institutional investors during the IPO and are able to go public at a younger age than other firms. Finally, the credibility of venture capitalists' information is enhanced by the fact that they are major shareholders prior to the IPO and retain significant portions of their holdings after the offer.

This study is organized as follows. In Section I, a general model of venture capital certification is provided. The sample selection criteria and descriptive statistics are presented in Section II. In Section III, the comparison of underwriter and auditor quality and the level of institutional shareholdings between VC and non-VC backed firms is examined. Empirical tests of the certification hypothesis are presented in Section IV. The pre- and post-IPO ownership structure of venture capitalists in the issuing firm is documented in Section V. Section VI concludes the study.

I. Certification by Venture Capitalists

Third party certification has value whenever securities are being issued in capital markets where insiders of the issuing firm and outside investors have different information sets concerning the value of the offering firm. Corporate insiders have an incentive to conceal (or at least delay the revelation of) adverse information because doing so will allow them to sell securities at a higher price. Rational outside investors understand these incentives and will only offer a low average price for the securities offered unless they can be credibly assured that the offering price already reflects all relevant private information. This informationally induced standoff can lead to market failure of the type described by Akerlof (1970) unless the information asymmetry can be reduced.

Although Allen and Faulhaber (1989), Grinblatt and Huang (1989), and Welch (1989), have presented signalling models which predict that corporate insiders can unilaterally convey their private information, there are several

factors which make first-party statements and actions suspect. For one thing, Gale and Stiglitz (1989) show that IPO signalling models break down when insiders are allowed to sell equity more than once. More fundamentally, insiders have everything to gain and very little to lose from signalling falsely at the time of an IPO. They sell securities only infrequently and thus would only be "punished" far in the future if at all. Their gain, however, would be immediate and possibly quite large. While disclosure regulation will surely discourage flagrant lying and material omissions [see Tinic (1988)], it is unlikely to be completely effective in forcing disclosure of all relevant information. Therefore, in the absence of effective signalling mechanisms in IPOs, outside investors are likely to be convinced that accurate information disclosure has occurred only if a third party, with reputational capital at stake, has asserted such and will be adversely and materially affected if that assertion proves false.

Specifically, for third-party certification to be believable for outside investors, three tests must be met. First, the certifying agent must have reputational capital at stake which would be forfeited by certifying as fairly priced an issue which was actually over-valued. Second, the value of the agent's reputational capital must be greater than the largest possible one-time wealth transfer or side payment which could be obtained by certifying falsely. Third, it must be costly for the issuing firm to purchase the services of (lease the reputational capital of) the certifying agent, and this cost must be an increasing function of the scope and potential importance of the information asymmetry regarding intrinsic firm value.

There are strong a priori reasons to believe that all three of these tests are met by venture capitalists and that the certification they can provide will have value in an IPO. First, as the *Venture Capital Journal* (VCJ) (1988) makes clear, many of the more established venture capitalists bring companies in their portfolio to market on an ongoing basis as well as participating, over time, in a stream of direct equity investments in entrepreneurial firms. In our sample, 53 venture capitalists bring more than five firms public from 1983 to 1987. Venture capitalists, therefore, have a very strong incentive to establish a trustworthy reputation in order to retain access to the IPO market on favorable terms. Furthermore, the greater a venture capital fund's perceived access to the IPO market the more attractive it will be to entrepreneurs, thus assuring a continuing deal flow. Finally, a reputation for competence and honesty will allow venture capitalists to establish enduring relationships with pension fund managers and other institutional investors who are vitally important as investors in venture capital funds and as purchasers of shares in IPOs.

Support for the second criterion, that the value of venture capitalists' reputational capital must exceed the maximum possible benefit from certifying falsely, is provided by Sahlman (1990). He documents that (1) successful venture capitalists are able to achieve very high returns on relatively modest capital outlays; (2) these returns are directly related to the age and historical performance of the VC fund, as well as to the size of its investment portfolio;

(3) successful VC fund managers are able to establish profitable "follow-on" funds and are also able to achieve an enhanced deal flow from entrepreneurs; and (4) the VC fund manager market is a relatively small, tight-knit, and efficient labor market where individual performance is constantly monitored and valued. Therefore, the investment in reputational capital by venture capitalists allows them to remain competitive in the venture capital industry as well as the capital markets.

In addition to venture capitalists' investment in reputational capital, they also are large shareholders in the issuing firm. One way in which they might profit from false certification and take advantage of the high price is to sell shares in the IPO. Retention by venture capitalists of their holdings after the offer, therefore, can act as a bonding mechanism for credible certification.

The final criterion for third-parity certification to be successful or economically valuable is that the services of the certifying agent must be costly for the issuing firm to obtain and the cost structure must be such that a separating equilibrium is achieved between high and low information quality firms. Venture capitalists certainly appear to meet this test since the bundle of services they provide—including financial capital, managerial and technical expertise, enhanced access to other financial specialists as well as certification when the firm ultimately goes public—is both very costly and very difficult to obtain. For example, Morris (1987), Gartner (1988), and Sahlman (1990) all demonstrate that venture capitalists expect to earn a compound annual return of from 25 to over 50 percent (depending upon the stage of the investment) on their investments in private companies. Therefore, entrepreneurs typically hand over large holdings of equity in exchange for relatively small cash infusions.

Nor is this the only cost of VC investment for entrepreneurs. In addition to very high required rates of return, venture capitalists invariably structure their investments in such a way that most of the business and financial risk is shifted to the entrepreneur. As described in Golder (1987), Testa (1987), and Sahlman (1988, 1990), venture capitalists employ rather draconian features in their capital investments, including (1) the use of staged investment under which the venture capitalist retains the right to cancel (cease funding) an entrepreneur's venture; (2) the use of convertible preferred stock as an investment vehicle, which gives the venture capitalist both a claim senior to that of the entrepreneur and an enforceable nexus of security covenants;[1] and (3) the retention by the venture capitalist of the option to replace the entrepreneur as manager unless key investment objectives are met.

The cost and stringency of VC investment, as well as the sheer difficulty in obtaining it (venture capitalists typically fund less than one percent of all the proposals they receive), implies that only those firms which would benefit most from the services venture capitalists provide will be willing and able to accept such participation. While the role of venture capitalists in the firm is

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[1]Megginson and Mull (1991) find that 41.9% of the VC backed firms have convertible preferred stock in their capital structure compared to 12.6% of non-VC backed firms.

obviously not limited to their activity at the IPO, one of the services that entrepreneurial firms purchase with VC funding is easier access to capital markets and the ability of venture capitalists to reduce asymmetrical information in the offering process. Logic suggests that growth options which are characterized by both greater information asymmetry and uncertainty are more likely to be associated with new entrepreneurial firms than with older, more established companies. Therefore, the certification function of venture capitalists should be most attractive to relatively young, rapidly growing, research and development-intensive companies. This being the case, we expect such firms to make greater use of VC than do other firms.[2]

The model of VC certification in IPOs developed above yields three testable hypotheses. First, since the ongoing nature of venture capitalists involved with firms going public builds relationships with all participants in the offering process, VC backed IPOs should have higher quality underwriters and auditors as well as a larger institutional following than comparable non-VC backed firms. Second, the ability of venture capitalists to reduce the information asymmetry associated with a firm involved in the offering process should result in a reduction of both the underpricing associated with the issue as well as the costs of underwriter, legal, auditor, and other miscellaneous expenses. If venture capitalists are able to convey credible information about the firm, the compensation to investors, underwriters, and auditors will be reduced since their cost of acquiring information about the company (personally certifying the issue) will be lowered. Finally, an additional bonding mechanism that ensures that venture capitalists' certification is credible is the level of their capital investment in the firm both before and after the offer. Venture capitalists who retain significant holdings in the firm give up the opportunity to profit from false certification. Therefore, we hypothesize that venture capitalists will not be selling a large portion of their shares in the IPO.

II. Sample Selection Criteria

In order to test the certification role of venture capitalists in the IPO market, we match a sample of 320 VC backed firms with 320 non-VC backed firms in the same industry as closely as possible by offering size.

The universe of 2,644 firm commitment IPOs issued from January 1983 through September 1987 from which the matched sample is constructed is obtained from Investment Dealer's Digest Corporate Database (IDD). After eliminating financial institutions, S&Ls, reverse LBOs, and firms whose first day trading price is unavailable from *Standard and Poor's Daily Stock Price Record: Over-the-Counter*, the remaining sample consists of 1,833 offers.[3]

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[2] Mull (1990) documents that venture capitalists do in fact concentrate their investments in rapidly growing industries and VC backed firms are able to grow faster, use less debt, and invest significantly more in R&D than do non-VC backed firms.

[3] This sample excludes, by definition, closed-end funds since they trade either on the NYSE or the AMEX.

Initially, 390 VC backed offers issued from January 1983 through September 1987 were identified in the *Venture Capital Journal* which reports IPOs of VC backed firms with offering amounts of $3 million or more and offer prices of at least $5. In order to be included in our sample, the VC backed firm must be contained in the screened IDD sample and must also have an offering prospectus available from Bechtel Information Service. Furthermore, any VC backed firm that is either misclassified as having venture capital participation from the prospectus or has other confounding events at the time of the IPO, such as an acquisition, is also eliminated.[4]

Given that venture capital activity and the level of returns on the first trading day (see Ritter (1984)) tends to be clustered by industry, we match the sample of VC backed firms as closely as possible by offering amount to non-VC backed firms in the same three-digit SIC classification.[5] The final sample consists of 320 VC backed and 320 non-VC backed firms.[6] Table I documents the concentration of VC backed IPOs in certain industries. The majority of the sample falls within 11 separate industries with a large concentration in the high technology area. In addition, as shown in Table II, there are no apparent differences in the number of offerings in each year between VC backed and non-VC backed firms.

Table III reports the differences in offering and firm characteristics for VC versus non-VC backed IPOs using a standard *t*-test as well as a van der Waerden nonparametric test. Even though firms within the same industry are matched as closely as possible on the offering amount, VC backed IPOs, on average, have higher offering amounts ($19.7 million versus $13.2 million) and offer prices ($11.18 versus $10.16) than non-VC backed IPOs. In fact, the majority of IPOs with the largest offering amounts in specific industries tend to be VC backed firms.

A comparison of the preceding year's revenue of the VC sample and the control sample indicates that the sample is well matched in terms of operating revenues. VC backed IPOs have $37.1 million in revenue reported for the previous year while non-VC backed offers have a slightly higher revenue of

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[4] We define an inside shareholder (listed in the prospectus) as a venture capitalist if (1) the prospectus notes define him as such or (2) the shareholder is clearly a company and has the word "venture," "capital" or "investment company" in its title.

[5] In our matching criteria, we attempted to follow the same offering characteristics as the *Venture Capital Journal* (price $\geq$ $5 and amount offered $\geq$ $3 million). Due to the large concentration of VC backed firms in the Office, Computing & Accounting Machines industry as well as the Electronic Components & Accessories industry, we included 18 non-VC backed IPOs that had either prices less than $5 or offering amounts less than $3 million. If we exclude these smaller firms from the control sample our results do not change.

[6] As a sensitivity test to the choice of control sample selection, we compared the results using the matched sample to the results utilizing all of the 496 non-VC backed firms that are in the same industries as the VC backed sample and met the *Venture Capital Journal* criteria. Our results using the sample of all non-VC backed firms in the same industries do not materially differ. This screen, however, tends to overrepresent some industries which have a low percentage of VC backed firms but a large number of IPOs and underrepresents the industries mentioned in the previous footnote.

Table I

SIC Classification For Venture Capital and Non-Venture Capital Backed IPOs

SIC classification and percentage of the total sample in each industry for the matched sample of 320 VC backed and 320 non-VC backed IPOs issued from January 1983 through September 1987 as identified from Investment Dealer's Digest Corporate Database and the *Venture Capital Journal.*

SIC Code	Classification	Number of IPOs	Percentage of IPOs
283	Drugs	30	4.7%
357	Office, Computing & Accounting Machines	154	24.1%
366	Communication Equipment	30	4.7%
367	Electronic Components & Accessories	48	7.5%
382	Measuring & Controlling Instruments	12	1.9%
384	Surgical, Medical & Dental Instruments & Supplies	26	4.0%
581	Eating and Drinking Places	14	2.2%
599	Retail Stores Not Elsewhere Classified	10	1.6%
737	Computer and Data Processing Services	70	10.9%
739	Miscellaneous Business Services (Biotech and Pharmaceutical Engineering)	52	8.1%
808	Outpatient Care Facilities	10	1.6%
	Other	184	28.7%
	TOTAL	640	100.0%

Table II

Number of VC Backed and Non-VC Backed IPOs By Year

Year	Venture Capital Backed	Non-Venture Capital Backed
1983	104 (32.5%)	137 (42.8%)
1984	47 (14.7%)	42 (13.1%)
1985	36 (11.2%)	44 (13.8%)
1986	78 (24.4%)	58 (18.1%)
1987	55 (17.2%)	39 (12.2%)
TOTAL	320	320

Table III

Tests of Differences in Sample Descriptive Statistics for VC Backed and Non-VC Backed IPOs[a]

Tests of differences in offering characteristics using a difference in means test and a van der Waerden normal scores test for the sample of 320 VC backed and 320 non-VC backed IPOs matched as closely as possible by industry and offering size. Source: Investment Dealer's Digest Corporate Database and the offering prospectus.

Variable	Venture Capital Backed	Non-Venture Capital Backed	Difference in Means t-stat	van der Waerden Z score
Amount offered	$19.7m	$13.2m	5.20*	6.38*
	[15.0m]	[9.2m]		
Offering price	$11.18	$10.16	2.83*	3.41*
	[10.50]	[10.00]		
Preceding year's revenue	$37.1m	$39.4m	−0.33	1.49
	[16.2m]	[13.0m]		
Book value of assets	$23.9m	$27.2m	−0.76	3.90*
	[12.9m]	[7.6m]		
Growth in EPS per year	76.8%	65.5%	1.28	0.98
	[61.1%]	[42.1%]		
Total debt as a percentage of the book value of assets	31.3%	31.9%	−0.11	−2.61*
	[16.0%]	[21.5%]		
Book value of common equity as a percentage of the book value of assets	41.7%	28.1%	3.02*	3.70*
	[44.8%]	[34.2%]		
Years from incorporation date to offer date	8.6 yrs	12.2 yrs	−3.70*	−2.30**
	[5.3]	[8.1]		

[a]Medians in brackets.
*Significant at the 0.01 level.
**Significant at the 0.05 level.

$39.4 million. This difference is insignificant using either a *t*-test or the van der Waerden test. The average book value of assets is insignificantly different between VC backed firms ($23.9 million) and non-VC backed IPOs ($27.2 million). The median, however, is larger for VC backed issues.

The mean and median yearly growth in earnings per share does not significantly differ between the two samples, with VC backed firms having a somewhat higher average growth rate in earnings per share (EPS) of 76.8% than non-VC backed offers with an average of 65.5%. In addition, the average proportion of the book value of debt as a percentage of the book value of equity is not significantly different (31.3% for VC backed firms versus 31.9% for non-VC backed firms). The median level of debt, however, is significantly higher for non-VC firms. Furthermore, VC backed firms have a significantly higher ratio of the book value of common equity to the book value of assets than non-VC firms (41.7% versus 28.1%) under both tests.

Muscarella and Vetsuypens (1989) document a statistically significant negative relationship between the age of the firm and the corresponding

initial return. They attribute their findings to the higher amount of publicly available information associated with older firms. In our sample, VC backed firms are younger in age than their non-VC backed counterparts. The average number of years from the incorporation date to the offer date is 8.6 years for VC backed IPOs and 12.2 years for non-VC IPOs, and these differences are significant under both tests. The difference in ages between the two samples supports the role of venture capitalists in reducing information asymmetry. Venture capital participation and the associated certification allow the firm to go to the public market sooner than non-VC backed companies.[7]

III. Underwriters, Auditors, and Institutional Holdings

As the firm approaches the public offering for the first time, it has the task of hiring underwriters and auditors to manage the issue as well as to certify the information in the prospectus. After the preliminary prospectus is filed with the SEC, the management of the firm travels with the underwriter on a "road show" to provide information as well as to generate interest with institutional investors for the IPO. In general, searching for underwriters and auditors is both costly and time-consuming for firms wishing to go public. For the VC backed firms, however, it is likely that the venture capitalist has been involved with other IPOs in the past and will have built relationships with underwriters, auditors, and institutional shareholders. Furthermore, each of these participants can infer information concerning the IPO from their prior experience with the venture capitalist. Because venture capitalists have reputational capital at stake in both their ability to maintain access to the public capital markets and to attract entrepreneurial firms for investment in the future, they have an incentive to reveal information truthfully about the new issue. This being the case, VC backed firms should attract higher quality underwriters and auditors since it both lowers these participants' cost of due diligence and protects their own reputational capital. The venture capitalists' association with high quality underwriters, in turn, will increase their ability to place the issue with institutional managers.

A. Frequency of Underwriter Use By Venture Capitalists

An assumption of the certification role of venture capitalists is that they build valuable relationships with underwriters that would be forfeited if they certified falsely. Table IV shows that many of the venture capitalists in the sample are frequent participants in the IPO market. As mentioned previously, 53 of the venture capitalists in our sample bring five or more issues to

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[7]Admittedly, the differences in the financial and operating characteristics at the time of the IPO between the two samples cannot be solely attributed to the presence of venture capitalists. From the information publicly available about the control firms, we are unable to determine if the non-VC backed companies attempted to obtain venture capital financing and were turned down or simply did not need that type of capital.

Table IV

Frequency of Board Participation, Percentage of Issues That the Venture Capitalist is the Lead and Underwriter Selection for Venture Capitalists Who Brought 8 or More Issues to Market

Number of issues brought to market from 1983 to 1987 for the venture capitalist, percentage of those issues for which the venture capitalist was the lead and the most frequent underwriters used by the venture capitalist.

Venture Capitalist	Number of Issues Brought to Market	Percentage of issues the VC is on the Board of Directors	Percentage of issues the VC is the lead[a]	Most Frequent Underwriters[b]
Kleiner, Perkins, Caufield & Byers	22	50%	27%	Robertson, Colman (9)
				Morgan Stanley (7)
Hambrecht & Quist Venture Partners	21	67%	38%	Hambrecht & Quist (14)
Citicorp Venture Capital	15	40%	40%	Alex. Brown (4)
Mayfield Funds	15	80%	33%	Robertson, Colman (9)
TR Berkeley Funds	14	0%	7%	Robertson, Colman (6)
				Alex. Brown (5)
Venrock Associates	14	86%	21%	Robertson, Colman (5)
				Morgan Stanley (6)
Greylock Partners	13	77%	23%	Hambrecht & Quist (8)
				Morgan Stanley (5)
Merrill, Pickard, Anderson & Eyre	13	39%	0%	Morgan Stanley (6)
				Robertson, Colman (5)
Oak Investment Partners	13	69%	23%	Alex. Brown (7)
Advent Funds	11	82%	73%	L. F. Rothschild (3)
TA Associates	11	55%	45%	L. F. Rothschild (3)
Bessemer Venture Partners	10	70%	40%	Robertson, Coleman (3)
				L. F. Rothschild (3)

Table IV—*Continued*

Venture Capitalist	Number of Issues Brought to Market	Percentage of issues the VC is on the Board of Directors	Percentage of issues the VC is the lead[a]	Most Frequent Underwriters[b]
JH Whitney & Co.	10	80%	30%	Alex. Brown (5) Morgan Stanley (5)
New Enterprise Associates	10	90%	20%	Alex. Brown (5) Robertson, Colman (5)
Continental Illinois Venture Corp	9	22%	22%	Alex. Brown (3)
Charles River Partnership	9	44%	44%	Hambrecht & Quist (3) Robertson, Colman (3)
Sequoia Capital	9	67%	0%	Hambrecht & Quist (4)
Norwest Growth Fund	8	63%	38%	Alex. Brown (2)
Technology Venture Investors	8	100%	62%	Alex. Brown (4)
Venad Funds	8	100%	50%	Robertson, Colman (4)

[a] Lead is defined as the venture capitalist with the largest stake in the issuing firm.
[b] Only the two most frequent underwriters are included in this category. For venture capitalists that have only one underwriter listed, it was not possible to make a distinction for the second most frequent investment banker. There are 31 additional venture capitalists that are involved in at least 5 offerings.

market over the time period from 1983 to 1987. Furthermore, many venture capitalists, such as Kleiner, Perkins, Caufield, and Byers, are involved in more than 10 issues during these 5 years. In many cases, the venture capitalist uses the same underwriter for more than one issue.[8] Out of the 15 IPOs issued with Mayfield Fund as one of the venture capitalists, nine are underwritten by Robertson, Coleman.

Also documented in Table IV is the board participation of venture capitalists in the offering firm. The more active venture capitalists frequently have seats on the board of directors as well as acting as lead venture capitalists.[9] Given their active participation in the operations of the issuing firm, venture capitalists are likely to influence the choice of underwriter as well as reduce the amount of information asymmetry regarding the firm by certifying the value of the issue to the underwriter.

B. Underwriter and Auditor Quality

We measure the quality of each underwriter as the percentage of the total dollar amount brought to market of all 2,644 offers ($70.3 billion) classified as IPOs in Investment Dealers' Digest Corporate Database from January 1983 through September 1987. If the issuing firm has more than one lead underwriter indicated in the IDD database, the average of the lead underwriters' market share is used as the measure of quality. In measuring the quality of the underwriter we are assuming that the greater the average market share of the lead underwriters, the higher is the quality.[10]

Table V presents the results on underwriter and auditor quality. On average, VC backed firms go public with underwriters who have a significantly greater percentage of the IPO market than do underwriters of non-VC backed firms (4.4% versus 3.0%). Furthermore, underwriters in VC backed firms are also involved in more offers (62) than underwriters in non-VC backed firms (53). These results indicate that VC backed firms are under-

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[8]Note that many of the firms in the VC backed sample have both a syndicate of venture capitalists involved in the company as well as an underwriting syndicate involved in the offering. For this reason, there is some double counting in the number of issues brought to market by each venture capitalist as well as in the frequency of underwriting.

[9]We define the venture capitalist as the lead if he holds the largest stake of all venture capitalists in the issuing firm.

[10]Simon (1990) also uses this method in computing underwriter reputation. A comparison of our method using the market share of the underwriter as a measure of quality and the rankings calculated by Carter and Manaster (1990) is presented in Appendix A. We choose to use our method for two reasons. First, the Carter and Manaster sample ends in the year this sample begins. If we were to use the Carter and Manaster rankings, we would be assuming that the reputational capital of investment bankers does not change over time. However, this may not be the case as evidenced by the results of Beatty and Ritter (1986) and the recent decline of some firms in the investment banking community, most notably Drexel Burnham Lambert. Second, using the market share of the underwriter rather than a ranking results in cardinal rather than ordinal values. A comparison of our measure of quality with those of Carter and Manaster results in a high degree of positive correlation between the two.

Table V

Tests of Differences in Mean Institutional Holdings, Average Market Share of Lead Underwriters and Auditor Quality for VC Backed and Non-VC Backed IPOs[a]

Tests of differences in institutional holdings from *Spectrum 3: Institutional Holdings* at the end of the first quarter following the offer date, the lead underwriters' market share and auditor quality for the sample of 320 VC backed and 320 non-VC backed IPOs matched by industry and size using a difference in means test and a van der Waerden normal scores test. The market share of each lead underwriter is computed using the full 2,644 IPOs in the IDD sample from 1983 to 1987. The total dollar amount of IPOs that are brought to market over the time period for each lead underwriter is divided by the total dollar amount of all IPOs issued ($70.3 billion). The market shares of all lead underwriters for a particular IPO are then averaged. The differences in the frequency of use of Big Eight auditors is tested using a chi-square test.

Variable	Venture Capital Backed	Non-Venture Capital Backed	Difference in Means *t*-stat	van der Waerden *Z*-score
Average market share of lead underwriters	4.4% [3.4%]	3.0% [0.8%]	4.30*	6.02*
Average number of IPOs brought to market by lead underwriter	62 [60]	53 [38]	2.56*	2.98*
				Chi-Square
Number of IPOs using a big eight auditor	267 (83%)	219 (64%)		19.89*
Average institutional holdings as a percentage of the amount offered for the quarter-end following the offer date	42.3% [39.5%]	22.2% [14.3%]	9.02*	9.35*
Average number of institutional managers	10.2 [8.0]	5.4 [4.0]	8.09*	8.72*

[a] Percentage of firms in parentheses. Medians in brackets.
*Significant at the 0.01 level.

written by higher quality underwriters than their non-VC backed counterparts.

In a similar fashion, we hypothesize that venture capitalists are able to attract higher quality auditors by reducing the asymmetry of information between the issuing firm and the auditor. In this case, auditor quality is measured by whether or not the firm uses a "Big Eight" accounting firm.[11] Eighty-three percent of VC backed firms and 64% of the non-VC backed firms use Big Eight auditors at the IPO indicating that VC backed IPOs are able to attract higher quality auditors than non-VC backed firms.

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[11] The Big Eight accounting firms are: Arthur Andersen, Arthur Young, Coopers & Lybrand, Deloitte Haskins & Sells, Ernst & Whinney, Peat Marwick Main & Co., Price Waterhouse, and Touche Ross & Co. Mergers within this group after 1987 reduced the Big Eight to the "Big Six."

C. The Level of Institutional Holdings

In addition to attracting higher quality auditors and underwriters in the IPO, we hypothesize that the presence of venture capitalists and the quality of the investment banker will be used to elicit institutional interest. If both venture capitalists and underwriters certify the offer price, then the cost of acquiring information by institutional shareholders will decline. This being the case, we expect VC backed firms to have higher fractions of their shares held by institutions than non-VC backed companies.

Data on institutional holdings are available on a quarterly basis and are collected from *Spectrum 3: 13(f) Institutional Stock Holdings Survey* which reports the number of shares held by institutional managers who control $100 million or more in equity. As shown in Table V, the average percentage of IPOs held by institutions at the end of the first quarter of the offer is significantly higher for VC backed IPOs than for non-VC backed IPOs using both a differences in means test and the van der Waerden normal scores test. Institutions hold, on average, 42.3% of the offer in VC backed firms as compared to 22.2% of the amount offered in non-VC backed firms. In addition, the average number of institutional managers who hold shares in the VC backed firm is 10.2 compared to 5.4 for non-VC backed firms.[12]

In summary, our results indicate that VC backed firms have higher quality underwriters and auditors as well as a larger institutional following than do non-VC backed offers. We attribute these findings to the ability of venture capitalists to certify the quality of the firm by their historical investment in reputational capital, as well as to their capacity to build and maintain relationships with underwriters, auditors, and institutional managers through their ongoing involvement in other IPOs.

IV. Tests of Venture Capitalist Certification

Two testable implications of the certification hypothesis as it pertains to venture capitalists are that the level of underpricing and the amount of compensation to underwriters (and others) will be less for VC backed firms than non-VC backed firms. If venture capitalists are able to reduce the information asymmetry between both potential investors and underwriters, the level of compensation to these participants for acquiring information will be lowered. This being the case, initial returns and gross spreads for VC backed firms should be lower than for non-VC backed IPOs.

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[12] In order to measure the relative influence of VC participation and the size of both the offer and firm on institutional investment, Tobit regressions are run using the percentage of institutional holdings as the dependent variable and a dummy variable for whether the firm was VC backed, the log of amount offered, and the book value of assets as independent variables. Each of the three independent variables is positively related to institutional holdings and significant at the 1% level. These results indicate that institutional holdings are related to whether or not the firm has VC backing as well as the size of the offering amount and the assets of the firm.

A. *Differences in Initial Returns, Underwriter Compensation, and the Costs of Going Public*

Table VI provides evidence in support of the hypothesis that VC backed IPOs have lower initial returns, gross spreads, and miscellaneous offering expenses than non-VC backed offers. Initial returns are calculated as the first closing or bid price recorded in *Standard and Poor's Daily Stock Price Record: Over-the-Counter* minus the offer price divided by the offer price. Underwriter compensation is defined as the gross spread as a percentage of the offer price. Miscellaneous offering expenses include such expenditures as auditor, legal, printing, and registration fees and are also measured as a percentage of the offer price.

Consistent with the certification hypothesis, as indicated by the results in Panel A of Table VI, the average intitial return for VC backed IPOs is 7.1% compared to 11.9% for the matched sample of non-VC backed IPOs, and the difference in initial returns is statistically significant under both tests. A comparison of the number of issues that have positive returns yields no apparent differences between the control sample and the VC backed IPOs. On average, 61.2% of VC backed firms and 60.3% of non-VC backed issues experience positive returns on the first trading day.

The significant difference in first trading day returns using a matched sample contrasts with the results found in the study by Barry et al. (1991) which finds no significant differences in underpricing for VC backed IPOs versus a sample of non-VC backed firms offered from 1983 through 1987 that are announced in *The Wall Street Journal*. In order to compare our findings with theirs, we construct a control sample of all non-VC backed IPOs from IDD that have offering amounts of $3 million or more and offer prices of at least $5. This control sample results in 991 firms.[13] Using all IPOs that meet the *VCJ* criteria as a control sample replicates as closely as possible the non-VC sample of Barry et al. In Panel B of Table VI, we find comparable insignificant differences in initial returns to VC backed (7.1%) and non-VC backed firms (7.6%). We attribute the differences in initial returns between our sample and theirs to their construction of the non-VC backed sample and corresponding lack of an adequate industry control. While we cannot determine the number of firms in the Barry et al. sample that are in industries without venture capital participation, approximately 50% of the non-VC firms that replicate their study which meet the *VCJ* criteria are in industries with no venture capital participation whatsoever.

Also presented in Table VI is the average compensation, or gross spread, as a percentage of the offer price, paid to underwriters by the matched sample of

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[13]While the number of firms in our control sample is identical to the number of firms in Barry et al., the average offer size for our non-VC control sample is smaller at $16 million with a median of $9.4 million. As in the Barry et al. study, however, the difference in means for offering amount between VC backed issues and the full sample of non-VC backed IPOs is insignificant.

Table VI

Tests of Differences in Initial Returns and Offering Expenses for VC Backed and Non-VC Backed IPOs

Tests of differences in initial return using a difference in means test and a van der Waerden normal scores test for (1) the sample of all (991) non-VC IPOs with offer prices > = $5 and amount offered > = $3 million and the 320 VC backed firms and (2) for the matched sample of 320 VC backed and 320 non-VC backed issues matched by industry and offering size. Also presented are differences in offering expenses and total proceeds (excluding overallotment). Initial returns are defined as the first trading day close or bid price recorded in *Standard and Poor's Daily Stock Price Record: Over the Counter* minus the offer price divided by the offer price.

	Venture Capital Backed	Non-Venture Captital Backed	Difference in Means t-stat	van der Waerden Z Score
Panel A: Comparison of the Matched Sample of VC Backed and Non-VC Backed IPOs				
Number of firms	320	320		
Mean initial return	7.1%	11.9%	− 3.62*	− 1.87**
	[2.5%]	[3.6%]		
Percentage of IPOs with positive initial returns	61.2%	60.3%		
Average gross spread as as a percentage of the offer price	7.4%	8.2%	− 7.82*	− 6.14*
	[7.1%]	[7.3%]		
Average of miscellaneous offering expenses as a percentage of the offer price[a]	3.6%	4.3%	− 3.50*	− 3.11*
	[3.0%]	[3.6%]		
Ratio of net proceeds to the offering amount[b]	0.89	0.87	7.28*	6.44*
	[0.90]	[0.88]		
Ratio of net proceeds to the first trading day amount[b,c]	0.84	0.80	4.97*	4.02*
	[0.86]	[0.83]		
Panel B: Comparison of VC Backed IPOs and All Non-VC Backed Firms with Price ≥ $5 and Amount Offered ≥ $3 million				
Number of firms	320	991		
Mean initial return	7.1%	7.6%	− 0.52	− 0.86
	[2.5%]	[1.6%]		

[a]Miscellaneous offering expenses include such expenditures as auditor, legal, printing, and registration fees.
[b]Net proceeds is defined as the offering amount minus underwriter fees and miscellaneous offering expenses.
[c]The first trading day amount is calculated as the number of shares offered multiplied by the first trading day price.
*Significant at the 0.01 level.
**Significant at the 0.05 level.

VC backed and non-VC backed firms. The gross spread consists of underwriting, selling, and managing fees. Inherent in the gross spread is the cost of due diligence as well as the potential probability of subsequent liability due to material omissions in the prospectus (Tinic (1988)). The presence of

venture capitalists lowers the underwriter compensation, for example, by lowering the underwriters' cost of due diligence. The process of acquiring information about the firm as part of the due diligence process will be easier if the venture capitalist has a reputation for having fairly represented information to the underwriter about firms in prior IPOs. Furthermore, venture capitalists may be more efficient in disseminating information than owners in a non-VC backed firm because unlike other firms issuing equity for the first time, they have prior experience in going public. As hypothesized, the compensation paid to the underwriter as a percentage of the offer price is significantly lower for VC backed firms (7.4%) than for non-VC backed IPOs (8.2%).

The percentage of miscellaneous offering expenses paid as auditor, legal, printing, and registration fees is related to the level of underwriter compensation in VC and non-VC backed firms. Using a similar argument as that for underwriter compensation, we expect that continuing relationships of venture capitalists with other participants such as auditors and attorneys will also lower the expenses of obtaining legal counsel, auditing services, and printing. As expected, the average of miscellaneous expenses as a percentage of the offer price is significantly lower for VC backed firms (3.6%) than non-VC backed firms (4.3%).

Given that the level of initial returns and the expenses associated with the offering are less for VC than for non-VC backed offers, the implication is that the net proceeds (the amount offered excluding the overallotment option minus the underwriter compensation and miscellaneous offering expenses) to the firm should be higher for firms with venture capital participation. In other words, the total costs of going public should be lower for VC backed issues than for their non-VC backed counterparts. Ritter (1987) has defined the costs of going public as both the direct offering expenses and the underpricing associated with the IPO. In order to measure the percentage of the offering amount that the firm is able to keep, we calculate two ratios: (1) the ratio of the net proceeds to the offering amount which measures the percentage of the offer that the firm retains after offering expenses and (2) the ratio of the net proceeds to the first trading day amount which incorporates the total effect of both underpricing and offering expenses on the proceeds to the issuing firm. (The first trading day amount is calculated as the number of shares offered multiplied by the closing or bid price on the first trading day.) Using the ratio of the net proceeds to the amount offered, VC backed firms, on average are able to keep 89% of the amount offered after all offering expenses compared to non-VC backed firms which retain 87%. The ratio of the net proceeds to the first trading day amount, which measures the total costs of going public, is higher for VC backed firms (84%) than for non-VC backed IPOs (80%). Both of these ratios are significantly different using the *t*-test and the van der Waerden test. In other words, after taking into effect both the direct (offering expenses) and indirect (underpricing) costs of going public, non-VC backed firms are able to retain a higher proportion of the total issue.

B. OLS Regression Analysis

Tests of the certification hypothesis as it applies to initial returns and gross spreads using a regression analysis are presented in Tables VII and VIII. We examine the relationship of both initial returns and gross spreads to the following variables:

(1) *A dummy variable for whether or not the issue is VC backed (TYPE).* The level of initial returns should be lower for VC backed issues (TYPE = 1) than for non-VC backed offers (TYPE = 0). In addition, we hypothesize that the presence of venture capitalists certifies the issue and lowers the cost of due diligence. Therefore, there should be a negative relationship between the dummy variable and both initial returns and gross spreads.

(2) *The natural log of the amount offered (LOGAMT).* Ritter (1984) has documented a significant relationship between the size of the offering and initial returns. Since VC backed firms tend to be larger in terms of offering amount, controlling for size allows us to measure the relative influence of VC backing. If the presence of venture capitalists lowers initial returns, then the coefficient on this variable should be insignificant and negative. Furthermore, Ritter (1987) has documented

Table VII

OLS Regressions of Initial Returns (R_1) against Whether or Not the Issue is VC Backed (TYPE), the Log of the Amount Offered (LOGAMT), the Average Market Share of the Lead Underwriters (MKTSHR), and the Age of the Firm (AGE) for the Matched Sample of 320 VC Backed and 320 Non-VC Backed IPOs during the Period 1983–1987[a]

$$R_1 = \alpha_0 + \alpha_1 TYPE + \alpha_2 LOGAMT + \alpha_3 MKTSHR + \alpha_4 AGE + e_i^b$$

Regression	α_0	α_1	α_2	α_3	α_4	R^2	F-Statistic	Significance of F-Test
(1)	0.137	−0.045	−0.008			0.018	5.7	0.0036
	(5.81*)	(−2.95)*	(−0.84)					
(2)	0.116	−0.412	0.012	−0.847		0.044	9.7	0.0001
	(4.86)*	(−2.76)*	(1.19)	(−4.18)*				
(3)	0.141	−0.052	0.011	−0.722	−0.002	0.059	9.4	0.0001
	(5.66)*	(−3.37)*	(1.03)	(−3.55)*	(−3.00)*			

[a] *t*-Statistics are given in parentheses.
[b] R_1 = percentage return from the offer price to the first trading day price,
 TYPE = dummy variable for whether the IPO is VC backed (VC backed = 1, non-VC backed = 0),
 LOGAMT = log of offering amount (excluding the overallotment option) in millions,
 MKTSHR = average market share of all lead underwriters for a particular IPO defined as the percentage of all IPOs brought to market by each underwriter from 1983–1987 for the full sample of 2,644 IPOs, and
 AGE = age of the firm in years from incorporation date to offer date.
*Significant at the 0.01 level.

Table VIII

OLS Regressions of Gross Spreads (GRSPD) against Whether or Not the Issue is VC Backed (TYPE), the Log Of the Amount Offered (LOGAMT), the Average Market Share of the Lead Underwriters (MKTSHR), and the Age of the Firm (AGE) for the Matched Sample of 320 VC Backed and 320 Non-VC Backed IPOs during the Period 1983-1987[a]

$$GRSPD = \alpha_0 + \alpha_1 TYPE + \alpha_2 LOGAMT + \alpha_3 MKTSHR + \alpha_4 AGE + e_i^{b}$$

Regression	α_0	α_1	α_2	α_3	α_4	R^2	Significance F-Statistic	of F-Test
(1)	0.106	−0.003	−0.011			0.600	474.9	0.0001
	(109.53)*	(−4.31)*	(−28.48)*					
(2)	0.105	−0.002	−0.010	−0.052		0.622	349.7	0.0001
	(108.94)*	(−4.09)*	(−22.99)*	(−6.35)*				
(3)	0.106	−0.003	−0.010	−0.045	−0.0001	0.649	277.4	0.0001
	(108.40)*	(−5.39)*	(−22.69)*	(−5.60)*	(−6.20)*			

[a] t-Statistics are given in parentheses.
[b] GRSPD = gross spread paid to the underwriter as a percentage of the offer price,
TYPE = dummy variable for whether the IPO is VC backed (VC backed = 1, non-VC backed = 0),
LOGAMT = log of offering amount (excluding the overallotment option) in millions,
MKTSHR = average market share of all lead underwriters for a particular IPO defined as the percentage of all IPOs brought to market by each underwriter from 1983–1987 for the full sample of 2,644 IPOs, and
AGE   = age of the firm in years from incorporation date to offer date.
*Significant at the 0.01 level.

economies of scale in the costs of going public. If this is the case, underwriter compensation should be negatively related to the size of the offer.

(3) *The average market share of the lead underwriters (MKTSHR).* We include the market share of the underwriter in order to separate the effect of venture capital backing from the quality of the underwriter. In addition to the certification provided by venture capitalists, we expect that underwriters will also certify the issue. As in previous studies by Johnson and Miller (1988), Carter and Manaster (1990), and Simon (1990), we expect the market share of the underwriter, as a proxy for quality, to be negatively related to initial returns. In terms of the gross spread, we include the market share of the underwriter to control for the size of the underwriting firm.

(4) *The age of the firm (AGE).* Age is included in the regression equations as a control for the degree of information asymmetry. Similar to Muscarella and Vetsuypens (1989) we expect a negative relationship between initial returns and gross spreads. This implies that older firms have a lower degree of information asymmetry than do younger firms. Furthermore, if the age of the firm is positively correlated with information asymmetry, the cost of due diligence will decline. Therefore,

there should also be a negative relationship between the age of the firm and the gross spread.

B.1. OLS Regression Results for Initial Returns

The results in Table VII using the matched sample strongly support the certification role of venture capitalists in lowering initial returns. In all equations, the coefficient of TYPE is negative and statistically significant indicating that the presence of venture capitalists lowers initial returns in IPOs. Furthermore, the variable LOGAMT is insignificant. The market share of the underwriter (MKTSHR) as a proxy for underwriter quality is negative and significant at conventional levels. This result is consistent with the literature on underwriter certification and is complementary to those found in Simon (1990). As in Muscarella and Vetsuypens, the age of the firm is significant and negatively related to initial returns even though VC backed firms tend to be younger than their non-VC backed counterparts.[14]

In other words, the presence of venture capitalists significantly lowers initial returns after controlling for the size of the issue as well as for the certification provided by the quality of the underwriter.

B.2. OLS Regression Results for Gross Spreads

We measure the influence of VC backing on the compensation paid to the underwriter using the same independent variables as the OLS regression equation on initial returns. Table VIII presents the results of the regression of gross spread on TYPE, LOGAMT, MKTSHR, and AGE. The gross spread is defined as the underwriter compensation as a percentage of the offer price. The coefficients on all variables are significant at conventional levels and negatively related to the gross spread. In other words, VC backing lowers the cost of underwriting the issue. As in Ritter (1987), there are economies of scale in going public with larger offering sizes having a lower percentage gross spread. The market share of the underwriter is also negatively related to the gross spreads and implies that, in our sample, higher quality underwriters charge lower gross spreads. Finally, the older the firm, and hence the lower the information asymmetry, the lower is the underwriter compensation.

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[14] In order to compare our results for initial returns, we estimate the OLS equations using our proxy of 991 non-VC backed firms for the Barry et al. (1990) sample as a control sample. (*t*-statistics in parentheses)

$$\text{Initial Return} = 0.066 + -0.004 \text{ TYPE} + 0.013 \text{ LOGAMT} + -0.572 \text{ MKTSHR}$$
$$\quad\quad (4.87) \quad (-0.45) \quad\quad\quad (2.17) \quad\quad\quad\quad (-5.09)$$

The results indicate an insignificant relationship between whether or not the firm is VC backed and initial returns. Furthermore, LOGAMT is insignificant and negative. The quality of the underwriter lowers initial returns as the coefficient on MKTSHR is negative and significant. Using the sample of all non-VC backed firms, regardless of industry, results in initial returns being inversely related to the quality of the underwriter and to the amount offered but unassociated with the presence of venture capitalists. The regression equation with age as an independent variable is not presented since the number of years from incorporation to the offer date is not available for all IPOs in the sample.

The results of the two previous sections indicate that the presence of venture capitalists in an issuing firm certifies the offer to both investors and underwriters, which lowers the two most important components of the costs of going public: (1) underpricing and (2) underwriter compensation.

V. Pre- and Post-IPO Holdings of Venture Capitalists

The credibility of venture capitalists in certifying an IPO is conveyed both through their investment in reputational capital and by their financial holdings in the firm. This section examines the extent of insider holdings and sales at the time of the IPO by documenting the change in ownership structure associated with venture capitalists. The certification hypothesis predicts that venture capitalists will retain substantial holdings in the firm as a bonding mechanism for credible certification. In order to examine the selling behavior of venture capitalists at the time of the initial public offering, Table IX presents the pre- and post-offering characteristics of venture capitalist shareholdings.

A. Pre-Offering Venture Capital Characteristics

As a hedge against risk, the majority of VC backed firms have a venture capitalist syndicate with more than one venture capitalist as a shareholder of the firm prior to going public. As shown in Table IX, Panel A, the average holding by venture capitalists in a VC backed firm is 36.6%. Twenty-eight percent of the offers, or 89 IPOs, have venture capitalists owning 50% or more of the equity of the firm prior to going public. These pre-offering holdings of venture capitalists indicate a substantial equity position in the issuing firm prior to the offer.

B. Post-Offering Venture Capital Characteristics

Panel B of Table IX presents the post-offering holdings of venture capitalists. The results indicate that venture capitalists retain a majority of their holdings after the IPO. Less than half (43.3%) of VC backed IPOs have venture capitalists selling *any* of their shares in the offering. Furthermore, only three VC backed IPOs have venture capitalists selling 100% of their total shares in the offering. The mean percentage of venture capitalist holdings sold at the IPO is 8.0%. On average, 6.9% of the offering amount is composed of venture capitalists' sales.

In order to compare the selling by venture capitalists with the sales by other insiders of the firm, we examine the percentage of the amount offered that is composed of secondary shares. Secondary shares are shares sold by insiders of the firm. Of the 181 VC backed IPOs that have secondary shares as part of the offering, on average, 39.6% of secondary sales are composed of venture capitalists' shares. The remaining secondary shares are sold by other inside shareholders.

Also shown in Panel B of Table IX, venture capitalists suffer a dilution of their holdings after the offer. The decline in the percentage of equity held by

Table IX
Pre- and Post-Offering Characteristics of VC Holdings[a]

	All VC IPOs (N = 320)
Panel A: Pre-Offering Characteristics	
Average percentage of equity owned by all venture capitalists prior to the offer	36.6% [36.3%]
Number of IPOs where venture capitalists own 50% or more of the shares prior to the offer	89 (28%)
Panel B: Post-Offering Characteristics	
Number of firms which have venture capitalists selling at the IPO	139 (43.3%)
Number of venture capitalists who sell 100% of their holdings	3 (0.9%)
Average percentage of venture capitalists' holdings sold at the IPO	8.0% [0.0%]
Average percentage of the amount offered that is composed of venture capitalists' shares	6.9% [0.0%]
Average percentage of secondary shares sold by venture capitalists (only for the 181 VC backed IPOs with secondary shares)	39.6% [33.8%]
Average percentage of the firm held by venture capitalists after the offer	26.3% [25.9%]
Number of IPOs where venture capitalists own 50% or more of the shares after the offer	27 (8.4%)

[a] Medians in brackets. Percentage of firms in parentheses.

venture capitalists is due to both the sales of VC shares at the IPO and the issuance of additional primary shares to the public. The fraction of equity held by venture capitalists in the issuing firm drops from 36.6% prior to the offering to 26.3% after the firm goes public. Furthermore, prior to the IPO, 28% of VC backed IPOs have venture capitalists owning 50% or more of the shares, but the number and fraction of VC backed IPOs with venture capitalists owning 50% or more after the offer falls to 27 or 8.4%. These results indicate that while a large number of venture capitalists give up voting control of the firm, the majority retain a significant portion of their holdings in the issuing firm. The large post-offering holdings of venture capitalists can be used as an additional sign of credibility at the time of the offer since venture capitalists forego the opportunity to profit directly from false certification.

VI. Conclusions

This paper provides support for the certification role of venture capitalists in bringing new issues to market by examining the impact of venture capitalists on the pricing and subsequent ownership structure of IPOs. The presence of venture capitalists in the offering firm certifies the quality of the

issue through their investment in financial and reputational capital. A comparison of VC backed IPOs and a control sample of non-VC backed offers from 1983–1987, matched by industry and offering size, indicates that VC backed firms are significantly younger, have greater median book values of assets, and a larger percentage of equity in the capital structure than their non-VC backed counterparts.

One assumption inherent in the certification hypothesis is the degree of repeat business venture capitalists have with the offering participants. Our results indicate that larger venture capitalists tend to use the same underwriters with great frequency. In addition, VC backed firms are able to attract higher quality underwriters and auditors as well as a larger institutional following than non-VC backed IPOs.

By reducing the asymmetry of information between the issuing firm and investors and financial specialists such as underwriters and auditors, venture capitalists are able to lower the costs of going public. We find evidence of significantly lower underpricing and underwriter compensation, holding offering size, underwriter quality, and firm age constant for VC backed IPOs than for non-VC backed firms. Evidence on subsequent ownership structure of VC backed IPOs indicates that venture capitalists are not using the IPO as an opportunity to cash out of their holdings and realize a return on investment. Indeed, a majority of venture capitalists do not sell *any* of their holdings at the offer date.

Appendix A
Comparison of the Top Underwriters by Dollar Amount Market Share to the Carter and Manaster (1990) Ranking

Underwriter	Market Share[a]	Carter and Manaster Rankings
Merrill Lynch Capital Markets	22.3%	9.0
Lehman Brothers	17.9	8.0
Saloman Brothers	15.4	9.0
Goldman, Sachs and Co.	14.7	9.0
First Boston Corp.	13.9	9.0
E. F. Hutton	11.2	8.0
Morgan Stanley	9.4	9.0
Drexel Burnham Lambert	8.9	7.0
Prudential Bache Securities	7.9	8.0
Alex. Brown and Sons	7.4	7.5
Dean Witter Reynolds	6.8	8.0
Bear, Stearns and Co.	6.1	8.0
Kidder Peabody and Co., Inc.	5.6	8.0
Paine Webber	4.6	7.5
Lazard Freres and Co.	4.4	8.0
Smith Barney, Harris Upham and Co.	3.7	8.0
A. G. Edwards	3.5	6.5
Donaldson, Lufkin and Jenrette	3.4	7.0
L. F. Rothschild Unterberg	2.9	8.0
Hambrecht and Quist	2.8	6.0

[a]These rankings are based on the dollar amount ($70.3 billion) of all 2,644 offers classified as IPOs by Investment Dealers' Digest Corporate Database.

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