

What Do Entrepreneurs Pay for Venture Capital Affiliation?

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ABSTRACT

This study empirically evaluates the certification and value-added roles of reputable venture capitalists (VCs). Using a novel sample of entrepreneurial start-ups with *multiple* financing offers, I analyze financing offers made by competing VCs at the first professional round of start-up funding, holding characteristics of the start-up fixed. Offers made by VCs with a high reputation are three times more likely to be accepted, and high-reputation VCs acquire start-up equity at a 10–14% discount. The evidence suggests that VCs' "extra-financial" value may be more distinctive than their functionally equivalent financial capital. These extra-financial services can have financial consequences.

A CENTRAL ISSUE for early-stage high-tech entrepreneurs is obtaining external resources when the assets of their start-up are intangible and knowledge-based. Particularly for entrepreneurs without an established reputation, convincing external resource providers such as venture capitalists (VCs) to provide financial capital may be challenging. The literature contains two main lines of research for overcoming this problem. One research stream has concentrated on designing institutional structures to permit financing early-stage ventures. This contractual- and monitoring-based approach is aimed at solving potential agency problems between investors and entrepreneurs (e.g., Admati and Pfleiderer (1994), Lerner (1995), Hellmann (1998), and Kaplan and Strömberg (2001, 2002, 2003)). A second research stream has suggested that when the quality of a start-up cannot be directly observed, external actors rely on the quality of the start-up's affiliates as a signal of the start-up's own quality

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(e.g., Megginson and Weiss (1991), Biglaiser (1993), and Stuart, Hoang, and Hybels (1999)). This certification-based approach may help legitimate start-ups and entrepreneurs without a prior track record.

While the first research stream emphasizes the VC's problem (designing the appropriate mechanisms), the second highlights the entrepreneur's problem more directly (affiliating with highly reputable partners), and serves as an antecedent to this study. VC certification value, together with their value-added services such as recruiting executive managers (Hellmann and Puri (2002)), have led analysts in the descriptive literature to write: "It is far more important *whose* money you get [as an entrepreneur] than how much you get or how much you pay for it" (Bygrave and Timmons (1992, p. 208)) and "From whom you raise capital is often more important than the terms" (Sahlman (1997, p. 107)). These views clearly indicate that VCs have different value-added potential and that VC represents more than strict financial capital to entrepreneurs. In contrast, the extant academic literature has not emphasized VC heterogeneity, implicitly treating VCs as one uniform class so that reputation differences *among* VCs are obscured (see Gompers (1996) and Kaplan and Schoar (2003) for exceptions). As well, whereas much of the previous literature has concentrated on the benefits to certification (e.g., Megginson and Weiss (1991) and Stuart et al. (1999)), the *costs* of affiliating with prominent actors have not been systematically analyzed empirically. For example, the prescriptive advice to start-up entrepreneurs of affiliating with the highest status partner possible (Stuart et al. (1999)) seems strong given that calculations of returns to such action that do not take into account the costs of affiliation may be overstated. Indeed, demand for affiliation with reputable actors is likely to vary with the cost of such association. More generally, because affiliation with reputable partners confers performance benefits, such association cannot be freely accessed, for otherwise certification agents would not have incentives to invest in acquiring a reputation in the first place (Shapiro (1983)).¹

Consequently, this paper explores two interlinked questions: Is there a market for affiliation with reputable partners? If so, what are the prices for such affiliation? Entrepreneurial demand for affiliation with VCs provides an excellent empirical setting to explore these questions for two reasons. First, because VCs can certify and start-ups need to be certified, the exchange nature of the relationship provides a natural marketplace for affiliation. Second, due to the tremendous increase in the supply of venture capital in the second half of the 1990s,² the situation of "money chasing deals" makes observing a menu of

¹ The extant research on the market for certification has only established general bounds. Statements on the supply of certification have generally been limited to an acknowledgment that such suppliers will not want to provide affiliation to entities that will damage their reputations (Podolny (1993)). Likewise, on the demand side, screening theories would argue that only those organizations that will benefit most from certification will accept the terms of a stringent supply contract (e.g., Kaplan and Strömberg (2001, 2003)).

² Disbursements to start-ups from VCs, which totaled just \$665 million in 1980 and \$2.3 billion in 1990, skyrocketed to over \$100 billion in 2000 (National Venture Capital Association Yearbook (2001)).

price offers by VCs with varying reputation more likely—a necessary condition for identifying the market for affiliation.

The empirical analysis investigates proxies for VC reputation which explain the variation in offers accepted and valuations offered to start-ups at a point in time, while holding start-up characteristics fixed. To implement this methodology, I developed a novel, hand-collected data set of 148 financing offers (both those accepted and declined) made to a group of 51 early-stage high-tech start-ups. The estimated effects are both statistically and economically significant. A financing offer from a high-reputation VC is approximately three times more likely to be accepted by an entrepreneur. As well, highly reputable VCs acquire start-up equity at a 10–14% discount.

The empirical results suggest that entrepreneurs are willing to forego offers with higher valuations in order to affiliate with more reputable VCs. These results are consistent with the idea that VCs act as more than strict financial intermediaries, placing funds from investors to capital-constrained start-ups. If this were not the case, we might expect entry by suppliers of entrepreneurial finance to equilibrate prices for start-up equity across offers to a given firm. However, if VCs differed in the bundle of services and certification they provide to their portfolio companies, which might be thought of as “extra-financial” VC functions, then prices for affiliation might differ. This implies that the VC information network and its certification value may be more distinctive than their financial capital, and so these extra-financial VC functions can have financial consequences, namely, the price at which VCs are able to acquire equity in a given start-up. Indeed, this view is consistent with the stylized fact that VCs experience substantial interindustry variation in financial performance (Kaplan and Schoar (2003)). Consequently, future research exploring variation within the VC industry, especially as it relates to organizational performance, would be interesting.

The remainder of this paper is organized as follows: Section I discusses the relevant prior literature and derives hypotheses about the entrepreneurial market for VC affiliation. Section II describes the methodology and data used to test these hypotheses. Empirical results are discussed in Section III, while a final section concludes with a discussion of the implications and limitations of the study.

I. Literature and Hypothesis Development

This section starts with a discussion of reputation as an economic good, develops the notion of a market for affiliation, and concludes with hypotheses about the demand for VC affiliation by early-stage start-ups.

A. Reputation and Affiliation as Economic Goods

Reputation, which results from prior experience and performance, has been identified as an economically important asset that can generate future rents when information among actors is asymmetric (e.g., Shapiro (1983) and

Biglaiser (1993)). Starting with Spence (1974), there has been a sizeable theoretical literature on the phenomenon of actors without an established reputation signaling quality to the external market. For example, Bagwell and Bernheim (1996) present a theory of Veblen effects in which people engage in conspicuous consumption because material displays of relative wealth signal social status.

A related strand of research suggests that performance benefits can be realized by the reputable producer's affiliates through a process of certification. This phenomenon has been examined in the context of reputable investment banks and VCs and the pricing of initial public offerings (Beatty and Ritter (1986) and Megginson and Weiss (1991)). These agents can credibly stake their reputations on the claim that the IPOs they back are not overpriced as a result of their repeated interactions with external parties.

More generally, for a certification to be effective, it must fulfill three conditions: (1) the certifying agent must have reputational capital at stake that would be compromised with an invalid certification; (2) the certifying agent's reputational capital must exceed the largest one-time wealth transfer from a miscertification; and (3) the certified target must face a cost of leasing the reputational capital of the certifying agent (Booth and Smith (1986)). This final condition is an important one for insuring that the certifying agent would have the proper incentives to invest in its own reputation. Unfortunately, it has not received much empirical attention; consequently it is this market for "leasing" reputational capital (and the associated prices for doing so) that forms the core of the empirical analysis in this paper.

Venture capitalists meet the three previously stated criteria of certifying agents and can therefore be suppliers of certification (Megginson and Weiss (1991)). Start-ups, especially those in the early stages, often do not have an established reputation, and may therefore demand certification. Individual start-ups do not have repeated interactions with organizations associated with exiting an investment (e.g., acquiring firms or investment bankers), and therefore do not build a reputation in this community. In the market for affiliation, the supply of financial capital (and attention) from reputable VCs is limited. Furthermore, there is heterogeneity in the demand for such association because entrepreneurs have both different initial endowments of resources and reputation, as well as different expectations of the marginal benefit of affiliation.

The market for affiliation is reflected in prices offered by VCs and accepted by entrepreneurs in the exchange of start-up equity for venture capital. Moreover, the price that VCs pay to acquire start-up equity is important to both entrepreneurs and VCs. For entrepreneurs, the valuation they receive at a round of financing determines how much equity is sold for a given capital infusion, and may have corporate control implications. VCs also care about price. In a liquidity event, VCs earn the difference between the share price at that time and the price they paid to acquire the start-up's equity. Interestingly, Megginson and Weiss put forward the notion that entrepreneurs may have to compromise valuation to "pay" for VC certification: "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" (1991, p. 883; emphasis added). Left unanswered, however, is the purchase *price* start-ups pay to access reputable VCs. The next section therefore addresses the question of what makes a VC reputable.

B. What Makes VCs Reputable?

The business press and descriptive literature have characterized simple monetary capital infusion as commodity-like in the early-stage start-up process, and VCs have sought to differentiate themselves by the quality of business services and reputational capital they bring to their portfolio companies (e.g., *New York Times* (2000)). Some VCs argue that while start-ups might give up a larger equity stake in their company for a given capital infusion by a more experienced VC, the entrepreneur's remaining stake in his company is more valuable *ex post* as a result of the venture capitalist's value-added services. These services include business referrals, extensive mentoring, and financial assistance (MacMillan, Kulow, and Khoylian (1989)), which may be particularly important for early-stage start-ups (Roberts (1991)). Entrepreneurs seem to accept the reasoning that there is value in being associated with experienced and connected VCs:

Venture funding is available from many sources. Entrepreneurs choose a lead venture partner to tap into practical experience, contacts, and reputations. "The money is all the same," says Louis Volpe, president of Arrowpoint Communications. "But what type of additional value do you get? With Matrix Ventures, you get experienced people and a good network in telecom." Those intangibles can make the difference in landing a key early customer, attracting top caliber employees, and lining up the best IPO underwriters. The experience can make a real difference driving a brand new company in the right direction fast (*Boston Globe* (2000, p. D1)).

Therefore, as a VC gains more investment experience in a particular industrial sector, he or she is more likely to acquire the expertise needed to help start-ups in their portfolio acquire resources for successful development, which is a powerful contributor to VC reputation. Investment experience also accords with Gompers' (1996) age proxy for VC reputation. Each additional investment extends the VC's information network, either acquiring important social contacts and/or gaining experience in effectively structuring deals or monitoring entrepreneurs in the industrial sector (Sorenson and Stuart (2001)). For example, Kleiner Perkins Caufield & Byers, a prominent venture capital firm, claims to facilitate interorganizational cooperation among its network of portfolio companies by "brokering" strategically important information among them. As evidence, the firm claims that there are over 100 strategic alliances among its portfolio companies, and the firm's web site (www.kpcb.com) notes:

We borrow the term "keiretsu" from Japan's powerful networks of companies. However, unlike Japan, Kleiner's keiretsu is a particularly western, entrepreneurial, loosely coupled web of relationships. Kleiner doesn't

control any ventures: they're each independent, run by strong, outstanding entrepreneurs. There's no central controlling bank, or interlocking board of directors. But the executives in the KPCB Keiretsu often share experiences, insight, knowledge, and information. This network, comprised of more than 175 companies and thousands of executives, has proven to be an invaluable tool to entrepreneurs in both emerging and developing companies.

Lindsey (2002) provides empirical support for this VC "keiretsu" phenomenon. Indeed, the VC information brokerage role can be particularly important to start-up development since these early-stage private firms face imperfect markets for information (Aoki (2000)). Thin markets for information arise both because start-ups are secretive in order to protect their competitive position, and because there may be few alternate channels outside of a trusted third party for information dissemination.

In addition, VCs acting as information brokers may assist a start-up in business development in different ways depending on the stage of the enterprise. In the earlier stages, VCs may help in recruiting senior executive officers (Gorman and Sahlman (1989) and Hellmann and Puri (2002)) and in striking strategic alliances (Stuart et al. (1999)). In the later stages of start-up development, VCs may help assemble additional funds and/or achieve liquidity. This may be done through hiring talented investment bankers (Barry et al. (1990) and Megginson and Weiss (1991)) or in locating merger or acquisition partners (Gans, Hsu, and Stern (2002)). Because these resources are reinforced by the VC's investment experience in the start-up's industrial sector, entrepreneurial demand for VC affiliation should be increasing in the VC's industry deal experience. *The dual hypotheses to be tested are therefore: (1) offers made by more reputable VCs are more likely to be accepted, and (2) the price that entrepreneurs pay in the market for affiliation is inversely associated with VC reputation.*

II. Methodology and Data

A. Methodology

To test these hypotheses, I use a method drawn from Stern (2000) in collecting data on the *bundle* of offers—both accepted and declined—made to start-ups for financing the first professional round. This methodology, by taking an offer as the unit of analysis, is well suited to studying the market for affiliation because examining multiple price observations associated with VCs of varying reputation for a *given* start-up in effect traces out a demand curve for affiliation.³ Start-up firm effects can be held constant in examining valuation

³ To my knowledge, the incidence of start-ups receiving multiple financing offers has been investigated only by Smith (1999) who reports that 71% of the responding companies in his survey received more than one financing offer. While the rate of multiple offers is interesting in its own right, the current study instead uses multiple financing offer events to identify the market for affiliation.

differences across financing offers, thus mitigating the problem of unobserved heterogeneity. Consequently, the empirical focus can shift to examining the role of differences in VC characteristics.

The empirical models estimate two equations using a financing offer from the multiple-offers data set as the unit of analysis. The likelihood that an offer is accepted is modeled as

$$\Pr(\text{Offer accepted} = 1) = F(\text{VC Reputation, Valuation, Controls}). \quad (1)$$

This offer acceptance equation is estimated using fixed-effects logit models. The valuation equation is modeled as follows, and is estimated using fixed-effects OLS regressions:

$$\text{Valuation} = F(\text{VC Reputation, Controls}). \quad (2)$$

In implementing this method, it is important to study early-stage financing rounds. Early-stage investors can weigh heavily in shaping the identity of subsequent investors (often through referrals or by virtue of their reputation). As well, earlier rounds of financing are usually associated with more technical and demand uncertainty. As a result, conventional valuation methods are difficult to apply to young firms with intangible assets, and so valuations of early-stage start-ups are subject to a great deal of negotiation (rather than straightforward calculation). The resulting heterogeneity in prices for association with disparate VCs (which themselves vary in reputation) is an important feature of early-stage funding rounds that help identify the market for affiliation.

This section describes both the details of the data collection process and the data used to test the key hypothesis. Before doing so, however, it is useful to address two issues: (1) potential biases resulting from a simple cross-sectional analysis, and (2) data collection challenges associated with employing the proposed methodology. Regarding the first issue, unobserved, or mismeasured start-up qualities correlated with the price VCs pay for equity, such as differences in the demand for affiliation with reputable VCs, may bias cross-sectional estimates. Furthermore, there may be unobserved selection processes matching start-ups with VCs. Without detailed controls for such processes, cross-sectional estimates may be biased in a way sensitive to the sampling scheme.

To collect data on a start-up's financing offers is a challenge in itself, since early-stage entrepreneurs are typically (and rightfully) reluctant to disclose information that might compromise their strategic position (Gompers and Lerner (1999) and Hellmann and Puri (2000)). In addition, VC market consulting companies do not collect data on the bundle of financing offers received by start-ups. Consequently, obtaining the set of declined financing offers (rather than assembling a matched comparable, for example) requires asking entrepreneurs themselves for the sensitive information. I do so through a survey instrument. While designing and administering the survey was a labor-intensive process, few substitutes exist to gather detailed information about (1) the founding and organization of the start-up, (2) the VCs offering to invest in the start-up, and

(3) the prices that were offered. A brief section describing institutional details about the sampled start-ups precedes a discussion about the data.

A.1. The MIT E-Lab Program

The MIT Entrepreneurship Program offers a semester-long class, "Entrepreneurship Laboratory" ("E-Lab"), which assembles teams of MIT and Harvard graduate students to study specific business-related issues at actual start-ups. In exchange for a complimentary business development analysis done by graduate students, the E-Lab firms' senior executive officers commit to allocating a certain amount of time and effort to interacting with the students. E-Lab began in 1995 and approximately 300 start-up companies had applied to participate in the program by the summer of 2000. Far more companies apply for the program, however, than the supply of student teams can accommodate.

In order to qualify for E-Lab, the start-up has to meet two criteria: (1) its head count must be less than approximately 35 at the time of entering the program, and (2) it must have completed a Series A round of investment. This group of start-ups is an attractive one to survey for two reasons. First, the sample includes funded, early-stage start-ups that were not selected for any qualities related to the price that VCs paid for their equity. Second, because of the MIT Entrepreneurship Program affiliation, they may be more inclined to participate in this research study.

B. Data

The empirical approach requires measures of VC reputation from firms offering to invest in the sample of E-Lab firms, as well as information about the offers themselves. The survey instrument (see the Appendix) collects this information using a variety of measures, such as the entrepreneur's perceived reputation ranking of investors from which it received a financing offer. More objective data about the VC's reputation (e.g., investment experience in each high-tech industrial segment) were collected from the Venture Economics database through Securities Data Corporation/Thomson Financial.

B.1. The Financing New High-Tech Ventures Survey

After pre-testing the survey with entrepreneurs (both those contemporaneously undergoing the Series A financing process and those who had already gone through it), VCs, academics, and intellectual property attorneys, I mailed the survey to the population of approximately 300 E-Lab companies. I then placed telephone calls to follow up with informants. The data were collected over the phone over 5 months starting July 15, 2000. Respondents to the survey were typically a founder and/or a person who knew the details of a firm's start-up and financing history (frequently this was one of the following senior executive officers: a CEO, CTO, and/or CFO).

Nearly half of the companies in the E-Lab population responded to the survey. Nonrespondents seemed randomly mixed between those without time to participate in the survey and those (to a lesser extent) unwilling to participate in the study. Formal tests of differences between observables on the two samples are difficult, however, due to the data constraints on the firms *not* in the sample. Indeed, many of the firms in the E-Lab population were not yet listed in venture capital industry consulting firm databases.

The survey responses yielded a total of 246 offers to 149 start-ups. While 98 of these start-ups received a single financing offer, 51 of them received more than one offer for financing their first professional round. The average start-up receiving multiple offers averaged almost three offers each, resulting in 148 offers made to this set of companies.

As an overview of the entire sample, Table I (Panels A and B) reports the age distribution of start-ups in the sample, together with the distribution of offers received by the sample of E-Lab start-ups. The empirical puzzle in these data is that only 43% of the start-ups among those receiving multiple offers accepted their best financial offer. Moreover, the start-ups not accepting their most generous financial offer left a considerable amount of value “on the table,” amounting to \$173.9 million in aggregate pre-money valuation. This was calculated as the sum of the differences between their best financial offer and the accepted offer. For the group of multiple-offer firms declining their best financial offer, the foregone pre-money value as a fraction of the accepted offer ranged from a low of 3.6% to a high of 217%, with an average of 33.2% for the sample. This descriptive interpretation of the data, of course, would be different if the overall sample of single and multiple offers were considered, as shown in Table I.

Panel B of Table I also describes the means of a wide range of start-up characteristics, broken out by the number of offers received. These characteristics include: start-up founding year; Series A financing year; number of employees prior to Series A funding; revenues from first year operations; patent applications and grants; industrial representation; and geographic location. The average start-up was founded in the first half of 1997 and received its Series A funding just 14 months later (over 80% of the start-ups in the data set received Series A funding between 1998 and 2000). Prior to receiving this funding round, the average start-up in the sample employed 10 people and had about \$0.27 million in revenues from first year operations. As well, by the end of 2000, the typical start-up had applied for 5.4 patents and had received 1.2 patent grants. A high proportion of the start-ups, 74%, were located in Massachusetts, which may not be surprising given the nature of the E-Lab program (by comparison, 53% of the accepted VC offers were from Massachusetts-based VC firms). Additionally, 13% of the start-ups in the sample were located in California (15% of the accepted VC offers were from California-based VC firms).

The industrial representation of the E-Lab start-ups in the sample is fairly typical of the broader set of industries funded by VCs over the same time period (the average E-Lab firm in the sample received Series A funding in the middle

Table I
Description of the Overall Data Set

This table describes the overall sample of Series A round financing offers to start-ups. Panel A describes the distribution of start-ups by year of incorporation. Panel B describes the overall sample, together with the distribution of offers and characteristics of the start-ups. For the sample of single and multiple offers, 80.5% of the 149 firms accepted their best (and sometimes only) financing offer. Of the 51 firms receiving multiple offers, 57% did not accept their best financial offer, leaving \$173.9 million "on the table," the sum of the differences between the best financial offer and the accepted offer. For the group of firms receiving multiple offers and declining their best financial offer, this amount represents an average of 33.2% pre-money valuation discount as a fraction of their accepted offers. For the overall sample of single and multiple offers, this statistic is 12.5%. The measure *internet industry* includes services, infrastructure, retail, or other; *computer industry* includes software and hardware; *health industry* includes medical devices and biotechnology. The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment places the VC above the sample median. The measure *high-normalized funds raised* is a dummy variable equal to 1 if the number of prior funds (excluding buyout funds) the VC has raised per years of operation places the VC above the sample median. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *financing offered* is the amount of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer. Panels C and D report the conditional means of start-up and VC characteristics, respectively, for the single-offer and multiple-offer subsamples of the data set. The *t*-tests of equal means between these subsamples are also reported.

Panel A: Distribution of Number of Start-ups by Year of Incorporation

	1984	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000
No	1	1	1	2	5	5	13	14	19	27	39	22

Panel B: Description of Start-ups and VCs by Number of Offers Received								
Start-up characteristics	Number of Offers Received							
	1	2	3	4	5	6	7	Sum/Avg.
Number of start-up firms	98	21	20	6	3	0	1	149
No. of firms accepting best financial offer	98	9	11	1	1	NA	0	120
No. of firms declining best financial offer	0	12	9	5	2	NA	1	29
Percent of firms accepting best financial offer	100	42.9	55	16.7	33.3	NA	0	80.5%
\$ Million "left on table"	0	56.5	50.8	42.5	8.8	NA	15.3	\$174 million
Accepted pre-money value	869.4	147.3	74.2	256.5	11.3	NA	34.7	1,393 million
Foregone value as a percent of accepted pre-money value	0	38.4	68.5	16.6	77.9	NA	44.1	12.5%
Year start-up founded	1997.2	1998.1	1997.6	1997.2	1998.3	NA	1995.0	1997.4
Year of Series A funding	1998.5	1998.8	1998.8	1999.0	1999.3	NA	1999.0	1998.6
Pre-money valuation (\$ million)	8.9	11.3	15.4	48.6	10.9	NA	34.7	11.9
Pre-Series A employment	9.3	9.4	9.7	23.0	15.7	NA	15.0	10.1
First year revenues (\$ million)	0.2	0.3	0.3	0.8	0.1	NA	0.0	0.3
No. of patent app. as of 12/31/2000	4.9	3.8	7.8	12.2	3.0	NA	2.0	5.4
No. of patent grants as of 12/31/2000	1.2	0.5	2.0	0.7	1.0	NA	2.0	1.2
Internet industry	0.5	0.5	0.6	0.8	1.0	NA	1.0	0.5
Computer industry	0.2	0.3	0.2	0.2	0.0	NA	0.0	0.2
Health industry	0.1	0.1	0.2	0.0	0.0	NA	0.0	0.1
Communications industry	0.1	0.1	0.2	0.0	0.0	NA	0.0	0.1
Massachusetts-based start-up	0.7	0.8	0.8	0.8	0.7	NA	1.0	0.7
California-based start-up	0.1	0.1	0.2	0.0	0.3	NA	0.0	0.1
VC Characteristics	1	2	3	4	5	6	7	Sum/Avg.
High industry deal experience	0.2	0.5	0.5	0.5	0.7	NA	1.0	0.3
High normalized funds raised	0.6	0.7	0.7	0.5	1.0	NA	1.0	0.7
High network resources rating	0.4	0.5	0.5	0.7	0.7	NA	1.0	0.4
Corporate VC	0.1	0.0	0.1	0.0	0.0	NA	0.0	0.0
Angel investor	0.2	0.1	0.2	0.0	0.0	NA	0.0	0.2
Financing offered (\$ million)	4.3	6.3	6.0	14.3	6.0	NA	13.7	5.3
Equity taken threshold	0.5	0.7	0.5	0.7	0.7	NA	0.0	0.6

Table I—Continued

Panel C. Comparison of Start-up Characteristics across Offers Received Subsamples			
Variables	Single Offer Mean	Multiple Offer Mean	<i>t</i> -Stat for Equal Means
Year start-up founded	1997.19	1997.77	-1.36
Year of Series A financing	1998.53	1998.86	-1.18
Pre-Series A employment	9.32	11.59	-1.31
First year revenues (\$ million)	0.23	0.35	-0.86
No. of patent applications as of 12/31/2000	4.94	6.28	-0.62
No. of patent grants as of 12/31/2000	1.21	1.14	0.11
Internet industry	0.48	0.59	-1.26
Computer industry	0.24	0.20	0.54
Health industry	0.09	0.10	-0.12
Communications industry	0.11	0.10	0.26
Massachusetts-based start-up	0.72	0.78	-0.79
California-based start-up	0.13	0.12	0.26

Panel D. Comparison of VC Characteristics across Offers Received Subsamples			
Variables	Single Offer Mean	Multiple Offer Mean	<i>t</i> -Stat for Equal Means
Pre-money valuation (\$ million)	8.87	17.73	-2.75***
High industry deal experience	0.25	0.51	-3.35***
High normalized funds	0.64	0.67	-0.29
High network resources rating	0.39	0.55	-1.89*
Corporate VC	0.05	0.02	-2.93***
Angel investor	0.22	0.08	2.25**
Financing offered (\$ million)	4.33	7.27	-2.43**
Equity taken threshold	0.53	0.61	-0.90

*, **, *** indicate statistical significance at the 10%, 5%, or 1% level, respectively.

of 1998). Of the sampled companies, 26% are in Internet services, 17% are in Internet infrastructure, and 5% are in Internet retailing. The software sector comprises about 16% of the sample, while computer hardware represents 6% of the sample. Communications and health sciences (biotechnology and medical devices) each comprise 10% of the sample, respectively. This distribution of firms seems to mirror the overall financing trends by VCs from 1997 to 2000. For example, according to Venture Economics, in 1999, 43% of VC disbursements went to Internet-based start-ups, and 57% of VC funds in the first three quarters of 2000 were invested in that sector.

While Panel B of Table I presents the conditional means of the observable start-up characteristics by the number of offers received, it is difficult to tell whether statistical differences exist. Panel C therefore compares sampled start-ups receiving single offers with those receiving multiple offers via *t*-tests of equality of means. The results reveal that the start-ups' qualities between the single- versus multiple-offers subsamples were statistically the same between the groups.

Panel D presents similar tests for the subsamples of VC characteristics. While these figures reflect *accepted* offers and are likely the result of a bargaining process between entrepreneurs and VCs, it is likely that the multiple-offers subsample contains the better deals (with higher pre-money valuations, more funding offered, and greater interest from more experienced VCs).

In order to use the start-up fixed-effects methodology previously described, only the set of firms receiving multiple financing offers is analyzed in the remaining empirical tables. While selection issues as a result of this empirical strategy may be of concern, the finding that start-up characteristics are statistically the same across recipients of single- and multiple-financing offers is reassuring. As well, tests of result robustness using Heckman's (1979) selection-adjusted estimators employing the full data set are presented at the conclusion of the empirical analysis. While there are some potential costs to relying on the multiple-offers subsample (selection issues), the benefits are in identifying the affiliation effect, a result that will become clear by comparing the results using the multiple-offers methodology (Tables IV through VIII) with "cross-sectional" results based on realized financing outcomes of the entire E-Lab sample (Table IX). In addition, because the multiple-offers subsample likely contains better deals, this bias may actually make it more difficult to find an affiliation effect, since the most promising ventures would potentially have the least to gain from VC affiliation.

B.2. Variable Definitions and Summary Statistics

Table II reports variable definitions and summary statistics for the multiple-offers sample in which the unit of analysis is an offer to a start-up, while Table III contains the correlation matrix for these variables.

Two measures of price are used in the empirical analysis. *Pre-money valuation*, the product of the number of shares outstanding before the Series A financing round and the offered per-unit share price (mean = \$20.6 million),

Table II
Descriptive Statistics of the Multiple Offers Sample

This table provides descriptive statistics of variables used in Tables III through VIII. The measure *VC offer accepted* is a dummy equal to 1 if an offer was accepted by the entrepreneur. The measure *pre-money valuation* is the product of the number of outstanding shares before the Series A round and the share price before the financing round (in \$ million). The measure *relative valuation offered* is the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up. The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment places the VC above the sample median. The measure *industry reputation rank* is the rank (a ranking of 7 being first best, with lower values indicating lower reputation) of VC reputation among offers received, as rated by the entrepreneur. The measure *high-normalized funds raised* is a dummy variable equal to 1 if the number of prior funds (excluding buyout funds) the VC has raised per years of operation places the VC above the sample median. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. The measure *boards per general partner* is the number of boards of directors per general venture capital partner. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *financing offered* is the amount of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer.

Variable	Mean	SD	Source
Dependent Variables			
VC offer accepted	0.345	0.477	MIT Survey
Pre-money valuation	20.589	32.935	MIT Survey
Relative valuation offered	0.826	0.215	MIT Survey
VC Reputation Measures			
High industry deal experience	0.439	0.498	Venture Economics
Industry reputation rank	5.905	1.163	MIT Survey
High normalized funds raised	0.568	0.497	Venture Economics
High network resources rating	0.432	0.497	MIT Survey
Boards per general partner	4.198	2.405	Venture Economics
VC- and Financing-Term Controls			
Corporate VC	0.048	0.214	Corporate web sites
Angel investor	0.068	0.253	MIT Survey
Financing offered	7.863	8.944	MIT Survey
Equity taken threshold	0.520	0.501	MIT Survey

has become a standard measure in the literature (Gompers and Lerner (2000)). *Relative valuation offered* is the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up (mean = 0.83). Note that because many of these financing rounds took place during the late 1990s, the inflated valuations characterizing the “Internet bubble” are likely reflected here. Two additional factors may also be reflected in these valuations: (1) several of the companies had prior informal funding rounds—such as “angel” and/or “friends and family” rounds before their first professional round, and (2)

Table III
Pairwise Correlation Matrix

This table provides a pairwise correlation matrix of the variables used in the empirical analysis. The measure *VC offer accepted* is a dummy equal to 1 if an offer was accepted by the entrepreneur. The measure *pre-money valuation* is the product of the number of outstanding shares before the Series A round and the share price before the financing round (in \$ million). The measure *relative valuation offered* is the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up. The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment places the VC above the sample median. The measure *industry reputation rank* is the rank (a ranking of 7 being first best, with lower values indicating lower reputation) of VC reputation among offers received, as rated by the entrepreneur. The measure *high normalized funds raised* is a dummy variable equal to 1 if the number of prior funds (excluding buyout funds) the VC has raised per years of operation places the VC above the sample median. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. The measure *boards per general partner* is the number of boards of directors per general venture capital partner. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *financing offered* is the level of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VC offer accepted	1											
Pre-money valuation	-0.05	1										
Relative valuation offered	0.05	0.40*	1									
High industry deal exp.	0.13	0.26*	0.03	1								
Industry rep. rank	0.43*	-0.22*	-0.04	0.12	1							
High-normalized funds raised	0.15	-0.25*	-0.03	-0.21*	0.06	1						
High network res. rating	0.17*	0.27*	-0.09	0.08	0.07	-0.06	1					
Boards per gen. partner	0.12	0.10	-0.06	0.46*	0.25*	0.01	0.05	1				
Corporate VC	-0.32*	0.02	0.02	-0.07	-0.06	-0.06	-0.07	-0.23*	1			
Angel investor	-0.10	-0.17*	-0.04	-0.24*	-0.05	0.24*	-0.02	-0.21	-0.06	1		
Financing offered	-0.05	0.73*	0.21*	0.15	-0.17*	-0.26*	0.33*	-0.02	-0.10	-0.19*	1	
Equity taken threshold	0.13	-0.22*	-0.08	0.11	0.24*	-0.07	0.03	0.17	-0.10	-0.23*	0.09	1

*Statistically significant at the 5% level.

financing offers given to start-ups with multiple offers averaged \$8.9 million more in pre-money valuation relative to their single-offer counterparts, a statistically significant difference. In any case, instead of focusing on the magnitude of valuation offered, the primary concern here is to explain variance across financing offers for a given start-up. Given these circumstances, *relative valuation offered* is the preferred measure of price throughout the empirical analysis (though *pre-money valuation* and *relative valuation offered* are positively correlated at 0.40).

The key independent variables are correlates of VC reputation.⁴ In accord with the concept of VC reputation as expected quality based on previous experience, several “objective” measures are employed, based on data as of December 31, 2000 from the Venture Economics database. They include *high industry deal experience*, a dummy variable equal to 1 if the number of investments the VC has made in the start-up’s industrial segment places the VC above the sample median (mean = 0.44). This is the main measure of reputation used in the empirical tables, and is consistent with the concept that VC “domain expertise” is an important input to both VC reputation and VCs’ ability to add value to their portfolio companies.

Two measures proxy for services and resources that VCs provide for start-ups. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, and contacts with investment banks (mean = 0.43). A second (alternative) measure of resource transfer is a proxy for the available time a general partner has to potentially devote to start-up development, *boards per general partner* (mean = 4.2). This measure divides the number of boards of directors on which a VC firm participates by the number of general partners in the VC firm. While the pairwise correlation between *high network resources rating* and *boards per general partner* is not particularly high (0.05), it is interesting to note that there is some degree of correlation between *boards per general partner* and *high industry deal experience* (0.46). These correlations may be due to a countervailing *boards per general partner* effect: A high ratio may proxy for network connections that may be valuable for start-up development.

Finally, two additional measures of reputation are used as robustness checks in the analysis. The measure *high-normalized funds raised* is a dummy equal to 1 if the number of prior funds (excluding buyout funds) the VC has raised per year(s) of operation places the VC above the sample median. This variable (mean = 0.57) is a measure of VC success in raising additional financial

⁴ If a start-up’s Series A round was syndicated, I used information from the lead VC, as prior research suggests that lead investors devote more direct resources to assisting their portfolio companies relative to syndication partners (Gorman and Sahlman (1989)). A syndicated offer is counted as a single offer in this study. Syndicates are common among the accepted offers (65%), a fact that is not surprising given the early-stage financing rounds examined. Unfortunately, my survey did not capture the full syndicate for offers that were not accepted, and so I am not able to test whether syndication has an effect on the likelihood of offer acceptance and on valuation.

capital from limited partners, a requirement for survival in the VC industry.⁵ While the internal rate of return (IRR) of past VC funds will be a nice measure of reputation, IRRs are usually held confidential by VC firms (Gompers and Lerner (1999)). *Industry reputation rank* (mean = 5.9) is an ordered ranking, 7 being first best and 1 being worst, of VC reputation among offers received, as rated by the entrepreneur in the survey instrument (the measure has been reversed from the original survey-based measure for expositional ease). Because this variable is based on entrepreneurial perception and measures relative exclusiveness, *industry reputation rank* incorporates the notion that the value of affiliation may depend on the VC's hierarchical position (Frank (1985) and Podolny (1993)). The subjective nature of this measure warrants discussion of its use, however (see below); consequently this measure will be used only for robustness checks in the empirical analysis.

A group of controls for other VC characteristics is used throughout the empirical analysis. The variable *corporate VC* is a dummy variable (mean = 0.11) for whether the VC is a corporate investor, since evidence and theory suggest that this method of organizing entrepreneurial finance has different organizational and incentive implications relative to independent VCs (Gompers and Lerner (1999) and Hellmann (2002)). The variable *angel investor* is a dummy equal to 1 if a financing offer is from an angel or angel group (mean = 0.07). The variable *equity taken threshold* is a dummy equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) (mean = 0.52). While *equity taken threshold* may be endogenous to price, this variable may be an indicator of corporate control implications of an offer, and is therefore included as a control variable. The variable *financing offered* is the amount of capital offered by the investor in the Series A financing round (mean = \$7.86 million). The previous two measures are meant to proxy for the fact that entrepreneurs may prefer offers that allow them to retain a higher stake of equity in their company. As well, larger financing offers may delay the need to return to VCs for additional funding, providing a liquidity benefit to the new venture.

III. Empirical Results

The empirical assignment is straightforward—to test the hypotheses that (1) financing offers from more reputable VCs are more likely to be accepted, and (2) more reputable VCs acquire start-up equity at a discount. This section is therefore organized around empirical tables that demonstrate these relationships in both univariate and multivariate settings.

⁵ A priori we would expect that *high industry deal experience* and *high-normalized funds raised* would be positively correlated. The -0.21 pairwise correlation may result because the two measures are derived indicator variables for the top half of the deal experience and prior funds raised distributions. Reassuringly, the pairwise correlation between the number of prior VC deals in the industry sector and prior funds raised is positively correlated at 0.56. As well, the unconditioned pairwise correlations between *high industry deal experience* and *high-normalized funds raised* do not reflect control for any other VC or start-up characteristics.

Table IV
Univariate Difference in Means Tests

Panel A describes difference in means tests for accepted versus declined financing offers among offers received by start-ups with more than one Series A financing offer. The measure *pre-money valuation* is the product of the number of outstanding shares before the Series A round and the share price before the financing round (in \$ million). The measure *normalized industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment per years of operation places the VC above the sample median. The measure *normalized funds raised* is a dummy variable equal to 1 if the number of prior funds (excluding buyout funds) the VC has raised per number of years of operation places the VC above the sample median. The measure *industry reputation rank* is the rank (a ranking of seven being first best, with lower values indicating lower reputation) of VC reputation in the start-up's industrial segment among received offers, as rated by the entrepreneur. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. Panel B describes conditional means of *relative valuation offered*, the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up, and equality of means tests for the upper and lower halves (divided at the median) of *normalized industry deal experience*, *normalized funds raised*, *industry reputation rank*, and *high network resources rating*.

Panel A: Difference in Means Tests			
	Offer Accepted	Offer Not Accepted	<i>t</i> -Stat: Equal Means
Pre-money valuation	17.733	22.090	0.764
Normalized industry deal exp.	3.844	2.810	-1.282
Normalized funds raised	0.667	0.515	-1.771*
Industry reputation rank	6.588	5.546	-5.711***
High network resources rating	0.549	0.371	-2.093**
Panel B: Conditional Means of Relative Valuation Offered			
	Top Half	Bottom Half	<i>t</i> -Stat: Equal Means
	Normalized Industry Deal Exp.		
	0.812	0.844	0.880
	Normalized VC Funds Raised		
Relative valuation offered	0.820	0.834	0.397
	Industry Reputation Rank		
	0.798	0.843	1.233
	High Network Resources Rating		
	0.804	0.842	1.070

*, **, or *** indicate statistical significance at the 10%, 5%, or 1% level, respectively.

Table IV shows simple univariate comparisons of conditional means without controlling for fixed firm effects. Panel A describes difference in means tests for accepted versus declined financing offers. While the average pre-money value of accepted offers is \$17.7 million, the declined offers averaged \$22.1 million (the difference is not statistically significant, however). Accepted offers had higher

values of VC reputation relative to nonaccepted offers, as measured four ways. The measures *normalized industry deal experience* (industry deal experience per year(s) of operation), *normalized funds raised* (number of funds raised per year(s) of operation), *industry reputation rank*, and *high network resources rating* all have higher values for accepted offers relative to declined ones. The differences in means for the latter three variables are statistically significant. Panel B describes the conditional means of *relative valuation offered* for the upper and lower halves (divided at the median) of *normalized industry deal experience*, *normalized funds raised*, *industry reputation rank*, and *high network resources rating*. Examining the conditional means of *relative valuation offered* rather than *pre-money valuation* in this context is preferred because the former measure incorporates some information about the comparative nature of the offers. The latter measure does not group offers by start-up firms in any way. While the differences in conditional means for the four reputation measures are not statistically significant, each of the relative means is consistent with the argument that more reputable VCs offer a discount to Series A valuation. Specifically, higher measures of VC reputation are associated with lower valuation offers. These univariate tests, while suggestive, do not control for qualities of the start-up, and so the remaining tables present a more systematic, multivariate analysis.

Table V examines start-up fixed-effects logits of *VC offer accepted* using Chamberlain's (1980) conditional likelihood method. Specification (5-1) shows that in the bivariate case, *high industry deal experience* is positively associated with *VC offer accepted*, at a statistically significant level (5%) and implies a 2.94-fold change in the odds of offer acceptance for a discrete change in this measure of VC reputation. While a more systematic exploration of the robustness of the VC reputation result is found in Table VII, a similar result holds in the bivariate relationship between *VC offer accepted* and *high-normalized funds raised*. The reputation result is strengthened when a measure of valuation, *relative valuation offered*, is included in specification (5-2). Notice the relative importance of the reputation effect over the valuation effect on the likelihood that an offer is accepted. Specification (5-3) includes an additional measure of VC reputation, *high network resources rating*, and controls for a variety of VC- and terms-of-financing-effects: *angel investor*, *corporate venture capital*, *financing offered*, and *equity taken threshold*. The *high network resources rating* measure is meant to capture VC value-added effects through contacts and/or resources that could make an offer more attractive (and can contribute to VC reputation). The estimated coefficient on this variable is positive and statistically significant at the 1% level. The measure *angel investor* is meant to capture the fact that a knowledgeable angel investor could be a substitute for a reputable VC in providing certification and business development resources, while the *corporate VC* method of organizing entrepreneurial finance may have implications for the value they can add to portfolio firms (Gompers and Lerner (1999)). Higher levels of *financing offered* may be a VC offer feature that may make it more attractive, since entrepreneurs may not have to return as many times or as soon for further financing rounds (fund-raising is an activity that

Table V
VC Offer Acceptance Logit Regressions

This table shows start-up fixed-effects logit regressions on a sample of 148 offers across 51 start-ups receiving multiple Series A financing offers. Regression coefficients are reported, with standard errors in parentheses below. The dependent variable, *VC offer accepted* equals 1 if a financing offer was taken and 0 otherwise. The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment places the VC above the sample median. The measure *relative valuation offered* is the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *L financing offered* is the natural logarithm of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer.

Independent Variables	Dependent Variable = VC Offer Accepted N = 148 Observations		
	(5-1)	(5-2)	(5-3)
High industry deal experience	1.080** (0.512)	1.168** (0.532)	1.068** (0.556)
High network resources rating			1.415*** (0.519)
Relative valuation offered		0.606 (0.887)	2.157 (1.425)
Angel investor			0.558 (0.799)
Corporate VC			-0.450 (0.972)
L financing offered			-0.329 (0.593)
Equity taken threshold			1.015 (0.851)
Start-up fixed-effects	Yes	Yes	Yes
Prob > χ^2	0.028	0.070	0.016
Log likelihood	-49.195	-48.962	-42.974

** or *** indicate statistical significance at the 5% or 1% level, respectively.

may be quite time-consuming for start-up executives). Finally, the reputation result is not sensitive to the choice of a wide range of *equity taken threshold* levels between 20 and 50% of equity taken in the financing round (unreported regressions).

Notice that start-up characteristics are not included in these specifications. Since start-up characteristics (such as industry representation) are invariant across offers for a given start-up, including these qualities in the regressions does not affect the results. In addition, because financing offers for a *given* start-up did not span a large time window, variables on financing timing were not

included in the regressions. In the pre-test of the survey, I asked respondents about the time window issue. It was my sense based on these interviews that the time window was not open for a long duration, given the start-up financing conditions of the late 1990s. Unfortunately, in the survey, I only noted the date of the realized Series A funding round, so I am unable to empirically document the time window length. Notwithstanding this shortcoming, the main result from Table V is that start-ups in this sample may not be selecting investors primarily on the basis of price and valuation; instead, VC reputation and affiliation effects may indeed be more important.

Table VI presents *relative valuation offered* start-up fixed-effects OLS regressions. The reported standard errors are robust—having been adjusted for clustering by start-up firm. The pairwise specification with *high industry deal experience* in (6-1) shows a negative relationship that is statistically significant at the 5% level. As well, the estimated coefficient implies a substantial discount, 14%, on *relative valuation offered* for a discrete change in the measure of VC reputation.

In (6-2), together with the measure of VC reputation, a dummy variable for *VC offer accepted* is included as a regressor. Notice that this parameter estimate, while positive (in both (6-2) and (6-3)), does not achieve statistical significance and is small in magnitude. The reputation effect persists and is of a slightly larger estimated magnitude relative to the previous specification. In model (6-3), several additional variables (parallel to those used in the prior table) are introduced. While the economic significance of the reputation result is slightly diminished in this specification, the parameter is estimated more precisely, achieving statistical significance at the 1% level. While the *high network resources rating* estimate is not statistically significant, it is estimated with a negative coefficient, which is consistent with the main hypothesis tested. The estimated coefficient on *equity taken threshold* is negative and significant at the 1% level, suggesting that larger equity stakes are associated with price discounts, though as previously mentioned, endogeneity concerns moderate the interpretation of this control variable. As well, the logarithm of *financing offered* is estimated with a positive, significant coefficient, indicating that the magnitude of funding, including potential liquidity effects, is associated with higher valuation. While robustness checks of the valuation regressions are presented in Table VIII, the results presented in Table VI are consistent with the idea that start-up entrepreneurs pay a premium to accept financing from more reputable VCs.

Because the above-reported results may be an artifact of either the particular measures used or due to selection biases arising from examining the multiple-offers data set, Tables VII and VIII present robustness checks of the reputation results for the offer acceptance and valuation regressions, respectively. The first three columns of Table VII successively employ alternate measures of VC reputation in fixed-effects logits to study the robustness of the positive correlation between *VC offer accepted* and reputation in similar specifications to (5-3). Specification (7-1) substitutes *high-normalized funds raised* for *high industry deal experience* as one of the measures of reputation. While the statistical

Table VI
Valuation Regressions

This table shows the result of start-up fixed-effects OLS regressions on a sample of 148 offers across 51 start-ups receiving multiple Series A financing offers. The unit of observation is an offer to a start-up. Robust standard errors (adjusted for clustering by start-up firm) are reported (in parentheses). The dependent variable is *relative valuation offered*, the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up. The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment places the VC above the sample median. The measure *VC offer accepted* equals 1 if a financing offer was taken and 0 otherwise. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: Recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *L financing offered* is the natural logarithm of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer.

Independent Variables	Dependent Variable = Relative Valuation Offered N = 148 Observations		
	(6-1)	(6-2)	(6-3)
High industry deal experience	-0.135** (0.057)	-0.144** (0.060)	-0.098*** (0.036)
High network resources rating			-0.048 (0.045)
VC offer accepted		0.026 (0.050)	0.041 (0.032)
Angel investor			-0.021 (0.084)
Corporate VC			0.016 (0.110)
L financing offered			0.261*** (0.054)
Equity taken threshold			-0.291*** (0.067)
Start-up fixed-effects	Yes	Yes	Yes
Constant	0.885*** (0.025)	0.880*** (0.027)	0.632*** (0.090)
Adj. R ²	0.098	0.094	0.460

** or *** indicate statistical significance at the 5% or 1% level, respectively.

significance falls to the 10% level, a discrete change in the funds raised measure corresponds to a doubling of the odds that an offer is accepted. Relative to specification (5-3), the estimated coefficient of *high network resource rating* is very similar in (7-1), both in magnitude and in statistical significance. In (7-2), *industry reputation rank* substitutes for *high industry deal experience* as an alternative measure of VC reputation. In this specification, both *industry reputation rank* and *high network resources rating* are positive and significant

Table VII
Offer Acceptance Robustness Regressions

This table reports robustness checks on VC offer acceptance regressions. Fixed-effects logit regressions of *VC offer accepted*, a dummy equal to 1 if an offer was accepted by the entrepreneur, on the sample of multiple offers are found in columns 1–3. The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up’s industrial segment places the VC above the sample median. The measure *high normalized funds raised* is a dummy variable equal to 1 if the number of prior funds (excluding buyout funds) the VC has raised per years of operation places the VC above the sample median. The measure *industry reputation rank* is the rank (a ranking of 7 being first best, with lower values indicating lower reputation) of VC reputation among offers received, as rated by the entrepreneur. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. The measure *boards per general partner* is the average number of boards of directors per general venture capital partner. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *relative valuation offered* is the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *L financing offered* is the natural logarithm of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer. Columns 4 and 5 show start-up fixed-effects Heckman sample selection probits on the entire sample of 246 offers across 149 start-ups receiving Series A financing offers. A first-stage selection (probit) equation determines the likelihood that a start-up receives multiple financing offers (*multiple offer*). The estimated covariates are: *L initial employees*, the natural logarithm of the pre-Series A number of start-up employees; *zero patents*, a dummy equal to 1 if the start-up does not have assigned patents; and dummy variables equal to 1 for each of the following industrial segments: *Internet* (infrastructure, retail, and service), *health sciences* (biotechnology and medical devices), and *computers* (software and hardware). Dummies for years of Series A investment (1998, 1999, and 2000) are also included. The term rho is the correlation between error terms of the selection and primary equations; lambda is the inverse Mill’s ratio.

Independent Variables	Dependent Variable = VC Offer Accepted				
	FE Logits Multiple-Offers Sample (N = 148)			FE Heckman Linear Prob. Models, Entire Sample (N = 246)	
	(7-1)	(7-2)	(7-3)	(7-4)	(7-5)
High industry deal experience			1.070** (0.555)	0.328*** (0.120)	0.287** (0.119)
High-normalized funds raised	0.725* (0.437)				
Industry reputation rank		1.097*** (0.312)			
High network resources rating	1.428*** (0.518)	1.072*** (0.547)			0.375*** (0.104)
Boards per general partner			0.000 (0.001)		
Relative valuation offered	1.049 (1.360)	4.012** (1.779)	1.673 (1.385)		0.499* (0.277)
Angel investor	0.536 (0.792)	1.314 (0.864)	0.642 (0.811)		0.200 (0.186)

Table VII—Continued

Independent Variables	Dependent Variable = VC Offer Accepted				
	FE Logits Multiple-Offers Sample (<i>N</i> = 148)			FE Heckman Linear Prob Models Entire Sample (<i>N</i> = 246)	
	(7-1)	(7-2)	(7-3)	(7-4)	(7-5)
Corporate VC	−0.614 (0.920)	−0.795 (1.137)	−0.395 (0.969)		−0.051 (0.186)
<i>L</i> financing offered	−0.009 (0.574)	−1.242* (0.757)	−0.370 (0.600)		−0.039 (0.113)
Equity taken threshold	0.778 (0.840)	1.453 (1.127)	1.230 (0.800)		0.220 (0.154)
Log likelihood	−43.522	−35.754	−47.197	−249.406	−240.326
Rho				−0.000 (1.630)	−0.109 (0.709)
Lambda				−0.000 (0.735)	−0.046 (0.304)

*, **, or *** indicate statistical significance at the 10%, 5%, or 1% level, respectively.

Heckman first-stage (selection) equation (SE in parentheses): *Multiple offer* = −0.262 (0.356) + 0.147 (0.108) *L init. emp.* − 0.461 (0.208) *Zero patents* + 0.663 (0.251) *Internet industry* + 0.278 (0.362) *Health science industry* + 0.315 (0.288) *Computer industry* − 0.199 (0.303) *Year 1998* − 0.080 (0.266) *Year 1999* + 0.292 (0.262) *Year 2000*

at the 1% level, though the estimated coefficient on *relative valuation offered* is much larger in comparative magnitude than the reputation measures. In (7-3), *boards per general partner* is used as an alternative measure of VC resources and is meant to capture the available time that partners in VC firms might have available in mentoring, developing, and connecting start-ups. While that variable is estimated with a nearly zero effect, the other reputation measure used in this specification, *high industry deal experience*, is estimated with quantitatively similar results (statistically and economically) to those found in Table V. Varying the measure of valuation as a control variable from *relative valuation offered* to the log of *pre-money valuation* causes *high industry deal experience* to fall to the 6% level, but does not alter the economic significance of the estimate (unreported specification).

Thus far, the analysis has not taken into account the possibility of a selection bias as a result of only using the multiple-offers data, though descriptive data from Table I suggest no statistical differences in the key observable start-up characteristics in the subsamples of the data corresponding to single versus multiple offers. Had we observed the alternate option for entrepreneurs that factually received single offers, would the results persist? Because establishing that counterfactual is difficult, two-stage Heckman (1979) regressions are presented where in the first stage, a probit of the likelihood of multiple offers is estimated using qualities of the start-up. These estimates are used in a second-stage fixed-effects regression of *VC offer accepted* (in Table VII) and

relative valuation offered (in Table VIII) as an adjustment for possible selection effects.

The first-stage regression in Tables VII and VIII includes start-up covariates of the likelihood of receiving multiple offers: the natural logarithm of the pre-Series A number of start-up employees, *L initial employees*; a dummy equal to 1 if the start-up does not have assigned patents, *zero patents*; dummy variables for the following industry sectors: *Internet industry* (including infrastructure, services, and retail subsegments); *health science industry* (biotechnology and medical devices); *computer industry* (software and hardware); and year of Series A financing dummies for *Year 1998*, *Year 1999*, and *Year 2000*.⁶ Second-stage fixed-effects Heckman linear probability estimates of *VC offer accepted* are reported in the final two columns of Table VII.⁷ While the bivariate specification including *high industry deal experience* (7-4) is estimated more precisely (significant at the 1% level) relative to its counterpart in (5-1), the economic magnitude of the estimate is diminished. Meanwhile, the fully specified model (7-5) yields estimates of similar statistical significance to its counterpart in (5-3), though again with diminished economic significance levels.

Table VIII explores the robustness of the valuation results. A parallel specification structure to that used in the previous robustness table is employed. Specification (8-1) substitutes *high-normalized funds raised* as one of the measures of VC reputation. While the *high-normalized VC funds raised* variable is estimated with a positive (though insignificant) coefficient, recall that univariate comparisons in Table IV indicate that *high-normalized VC funds raised* was negatively correlated with *relative valuation offered* (although the difference was not statistically significant). In the multivariate regression, the prior funds variable may be picking up some countervailing effects, such that VCs with more prior funds raised are able to raise subsequent funds of larger sizes.⁸ The resulting relaxation in VC liquidity may have a confounding effect on this proxy for VC reputation.

Specification (8-2) utilizes an alternate measure of VC reputation, *industry reputation rank*. The variable estimate is negative and statistically significant at the 5% level. However, an objection to using this measure of reputation is that it is subject to entrepreneurial recall bias and/or ex post rationalization

⁶ The omitted category for the industry variables is the communications industry. The results of the selection equation are found at the bottom of Tables VII and VIII. Note that the selection equation includes variables (start-up characteristics) that are likely to act as good instruments because these characteristics are not relevant in the second-stage analysis (they are absorbed by the start-up fixed effects).

⁷ Testing the robustness of *VC offer accepted* in the context of fixed effects Heckman selection models presents an econometric challenge—known as the incidental parameters problem (Heckman (1981) and Hsiao (1986))—in that there are no consistent estimators for fixed-effects probits. Therefore, fixed-effect Heckman regressions using a second-stage linear probability model are reported. The results are robust to this estimation strategy, though the linear probability model is biased when predicted values fall outside of the (0, 1) range.

⁸ Indeed, the measure does not take into account variation in achieved VC fund size across the sample (e.g., a prior fund of \$750 million is treated the same as a \$30 million fund in the count of prior funds raised).

Table VIII
Valuation Robustness Regressions

This table reports robustness checks on *relative valuation offered*, the offered pre-money valuation to a start-up relative to the highest offered valuation received by that start-up. Fixed-effects OLS analysis (with robust standard errors) on the sample of multiple offers is reported in columns 1–3. The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment places the VC above the sample median. The term *high normalized funds raised* is a dummy variable equal to 1 if the number of prior funds (excluding buyout funds) the VC has raised per years of operation places the VC above the sample median. The measure *industry reputation rank* is the rank (a ranking of 7 being first best, with lower values indicating lower reputation) of VC reputation among offers received, as rated by the entrepreneur. The measure *VC offer accepted* is a dummy equal to 1 if an offer was accepted by the entrepreneur. The measure *high network resources rating* is a dummy equal to 1 if a VC firm received the maximum Likert-scale measure (of 5) in at least one of the following entrepreneur-rated VC network resources: recruiting resources, contacts with customers and suppliers, or contacts with investment bankers. The measure *boards per general partner* is the number of boards of directors per general venture capital partner. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *L financing offered* is the natural logarithm of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer. Columns 4 and 5 show start-up fixed-effects Heckman sample selection probits on the entire sample of 246 offers across 149 start-ups receiving Series A financing offers. A first-stage selection (probit) equation determines the likelihood that a start-up receives multiple financing offers (*multiple offer*). The estimated covariates are: *L initial employees*, the natural logarithm of the pre-Series A number of start-up employees; *zero patents*, a dummy equal to 1 if the start-up does not have assigned patents; and dummy variables equal to 1 for each of the following industrial segments: *Internet* (infrastructure, retail, and service), *health sciences* (biotechnology and medical devices), and *computers* (software and hardware). Dummies for years of Series A investment (1998, 1999, 2000) are also included. The term ρ is the correlation between error terms of the selection and primary equations; λ is the inverse Mill's ratio.

Independent Variables	Dependent Variable = Relative Valuation Offered				
	FE OLS Regressions Multiple-Offers Sample (<i>N</i> = 148)			FE Heckman's Entire Sample (<i>N</i> = 246)	
	(8-1)	(8-2)	(8-3)	(8-4)	(8-5)
High industry deal experience			−0.073*	−0.135***	−0.098***
			(0.039)	(0.044)	(0.034)
High normalized funds raised	0.061 (0.042)				
Industry reputation rank		−0.041** (0.018)			
High network resources rating	−0.056 (0.053)	−0.038 (0.047)			−0.048 (0.031)
Boards per general partner			−0.000* (0.000)		
VC offer accepted	0.056 (0.035)	0.046* (0.034)	0.031 (0.033)		0.041* (0.024)
Angel investor	0.114 (0.162)	−0.044 (0.083)	−0.064 (0.072)		−0.021 (0.054)

Table VIII—Continued

Independent Variables	Dependent Variable = Relative Valuation Offered				
	FE OLS Regressions Multiple-Offers Sample (N = 148)			FE Heckman's Entire Sample (N = 246)	
	(8-1)	(8-2)	(8-3)	(8-4)	(8-5)
Corporate VC	0.024 (0.093)	0.029 (0.114)	-0.014 (0.112)		0.016 (0.055)
L financing offered	0.355*** (0.082)	0.276*** (0.050)	0.287*** (0.046)		0.261*** (0.028)
Equity taken threshold	-0.290*** (0.074)	-0.283*** (0.071)	-0.306*** (0.065)		-0.291*** (0.039)
Constant	0.370*** (0.132)	0.793*** (0.148)	0.555*** (0.071)		
Adj. R ² /LL	0.593	0.471	0.497	-100.045	-57.314
Rho				0.000 (0.677)	-0.000 (0.960)
Lambda				0.000 (0.111)	-0.000 (0.118)

*, **, or *** indicate statistical significance at the 10%, 5%, or 1% level, respectively. Heckman first-stage (selection) equation (SE in parentheses): *Multiple offer* = -0.262 (0.356) + 0.147 (0.108) *L init. emp.* - 0.461 (0.208) *Zero patents* + 0.663 (0.251) *Internet industry* + 0.278 (0.362) *Health science industry* + 0.315 (0.288) *Computer industry* - 0.199 (0.303) *Year 1998* - 0.080 (0.266) *Year 1999* + 0.292 (0.262) *Year 2000*

by the survey respondent. As an imperfect control for these potential effects, a dummy variable for *VC offer accepted* is included in the specification because the accepted offer is likely to be the chief candidate for recall and retrospection biases. Although the reputation measure is statistically significant at conventional levels, we should interpret the result cautiously because of the limitations of this measure.

In both specifications (8-1) and (8-2), *high network resources rating*, a measure of VC services to and resources for the start-up (and an important contributor to VC reputation), is estimated with a negative (though insignificant) coefficient, a finding consistent with the results from Table VI.⁹ Specification (8-3) varies this measure of VC resources to *boards per general partner*, and while the measure reaches statistical significance at the 10% level, the economic effect is insignificant. Importantly, note that the *high industry deal experience* proxy for VC reputation is robust (though reduced in statistical significance due to some degree of collinearity with *boards per general partner*).

⁹ As well, potential effects of geographic colocation between VC and start-up in facilitating resource exchange were explored. Tests were conducted to examine (1) whether geographic colocation of VC and start-up mattered for offer acceptance or for valuation, and (2) whether VCs located in California or Massachusetts were advantaged in offer acceptance or equity pricing. In both cases, there were no notable results. This may not be the ideal data set to test such geographic effects, however (most of the start-ups in the data set are based in Massachusetts).

In an unreported regression, the log of *pre-money valuation* was used as an alternate measure of valuation. The estimates of *high industry deal experience* were robust to this variation. As well, introducing specifications with dummy variables for the most frequently appearing VC firms in the sample did not alter the main results (unreported regressions). These indicator variables may be appropriate if we believe that the pricing behavior of a handful of VCs is driving the results (over 100 distinct VC firms are represented in the sample, however).

Finally, in (8-4) and (8-5), fixed-effects Heckman regressions are reported using the entire sample of single and multiple offers in an effort to address potential selection issues. In both the bivariate and the fully specified equations, the results are very similar to those reported in Table VI—while the economic significance of the results is unchanged, the precision of the estimates is slightly enhanced.¹⁰

A final robustness check suggested that the hypothesized affiliation effects could be found using within-industry variation, though these results are not formally reported because they are merely suggestive. With the caveat that the categories of “Internet” (that includes Internet infrastructure, Internet services, and Internet retailing) and “non-Internet” (that includes biotechnology, medical devices, communications, and computer software and hardware) are very coarse groupings, the measures of VC reputation (*high industry deal experience* and *high network resources rating*) are positively associated with *VC offer acceptance* and negatively associated with *relative valuation offered*, although these relationships tend to hold more strongly for the non-Internet subsample and less so for the Internet subsample.¹¹ These results are based on parsimonious specifications (keeping the limited sample size issue in mind); however, due to the nature of the data set, no conclusions about whether these results are due to time period effects can be made.

To conclude the empirical analysis, it is interesting to compare these results to a simple cross-sectional OLS analysis of the natural log of *pre-money valuation* on all accepted offers, done as if information on the bundle of declined offers were not available. The results, presented in Table IX, are striking.

In (9-1), a bivariate regression, *high industry deal experience*, is estimated with a *positive* coefficient, which is significant at the 1% level. When several

¹⁰ Estimates of lambda (the inverse of Mill’s ratio) and rho (the correlation between error terms in the first and second stage equations) in the Heckman models suggest that selection problems are not severe, and so these selection regressions are not reported for all specifications in the paper.

¹¹ Because of the contemporaneous emergence of the Internet industry, *high industry deal experience* may not be a good measure in this empirical setting (I thank the referee for pointing this out). While there is variation in this measure within the subsamples, it is doubtful that *high industry deal experience* is an adequate proxy for VC knowledge and experience helpful for start-up development in the Internet industries. Using the *industry reputation rank* proxy for reputation yields strong results, though the problems with this measure are discussed elsewhere in the paper. Using *high normalized funds raised* yields similar results for the *VC offer accepted* regressions but rather weak results for the valuation regressions.

Table IX
Cross-sectional Regressions

This table reports OLS regressions, and is based on a sample of *accepted* Series A financing offers of 149 start-ups. The unit of observation is an offer to a start-up. The dependent variable is *L pre-money valuation*, the natural logarithm of the product of the number of outstanding shares before the Series A round and the share price before the financing round (in \$ million). The measure *high industry deal experience* is a dummy variable equal to 1 if the number of deals the VC has previously funded in the target start-up's industrial segment places the VC above the sample median in this category. The measure *boards per general partner* is the number of boards of directors per general venture capital partner. The measure *angel investor* is a dummy variable equal to 1 if a financing offer is from an angel investor or angel group. The measure *corporate VC* is a dummy equal to 1 if the VC is a corporate VC. The measure *L financing offered* is the natural logarithm of capital offered (in \$ million) by the investor. The measure *equity taken threshold* is a dummy variable equal to 1 if the investor receives at least 30% of start-up equity (the median of the sample) as a result of the Series A financing offer. The measure *L initial employees* is the natural log of the number of employees prior to receiving the Series A round. The measure *zero patents* is a dummy equal to 1 if the start-up does not have assigned patents. The measure *industry effects* represents a collection of indicator variables for the *Internet* (infrastructure, retail, and service), *health sciences* (biotechnology and medical devices), and *computers* (software and hardware) sectors (the communications industry is the excluded industry segment). Years of Series A investment dummies (1998, 1999, 2000) are also included.

Independent Variables	Dependent Variable = L Pre-money Valuation		
	(9-1)	(9-2)	(9-3)
VC characteristics			
High industry deal experience	0.478*** (0.145)	0.425*** (0.132)	0.058 (0.081)
Boards per general partner			-0.000 (0.000)
Angel investor			0.033 (0.113)
Corporate VC			-0.056 (0.173)
L financing offered			0.663*** (0.039)
Equity taken threshold			-0.753*** (0.072)
Start-up characteristics			
L initial employees		0.514*** (0.081)	0.189*** (0.050)
Zero patents		-0.223 (0.154)	-0.165** (0.083)
Industry effects			
Year 1998		0.028 (0.215)	-0.157 (0.116)
Year 1999		0.263 (0.194)	-0.075 (0.105)
Year 2000		0.466** (0.197)	0.061 (0.107)
Constant	1.959*** (0.084)	0.828*** (0.253)	1.563*** (0.162)
R ²	0.070	0.338	0.820

** or *** indicate statistical significance at the 5% or 1% level, respectively.

start-up qualities are included in specification (9-2), the VC reputation result persists, disappearing in statistical significance only with the inclusion of VC characteristics (9-3), though the reputation measure is still estimated with a positive coefficient in that specification. As previously mentioned, problems of unobserved heterogeneity likely bias these estimates.

IV. Conclusion and Discussion

I have tested and confirmed the proposition that entrepreneurs are willing to accept a discount on the valuation of their start-up in order to access the capital of VCs with better reputations. These results help deepen our understanding of the market for affiliation by presenting empirical evidence that affiliation is an ordinary economic good for which actors seeking association will face a price-reputation trade-off. This finding is consistent with the view that VCs' reputation (which in turn depends on their experience, information network, and direct assistance to the portfolio firms) may be more distinctive than their functionally equivalent financial capital. These conclusions are drawn from an analysis of multiple offers to a set of start-ups, which allows a high degree of statistical control. Because the characteristics of the start-up can be held constant, only differences in VC reputation across financing offers explain inter-offer variation in offer acceptance and price for start-up equity.

One may wonder why prices charged by competing VCs to acquire the equity in a given start-up can be differentiated in equilibrium, given free entry. VCs with higher reputations may be able to sustain their higher prices (rather than having competition equilibrate prices) as a result of investments in reputation being costly (Shapiro (1983) and Megginson and Weiss (1991)). Consequently, while financial capital per se is not a differentiated good, the reputation of VCs providing the financial capital can be a source of differentiation among VC organizations. The findings in this article are consistent with Kaplan and Schoar's (2003) recent evidence of substantial cross-sectional variation and persistence in VC fund performance.

Several alternate explanations to the empirical pattern have been considered throughout the empirical analysis. First, more savvy VC firms might have foreseen the coming public market downturn and offered lower prices as a result. However, entrepreneurs receiving multiple offers would not necessarily have to accept offers from such VC firms, and so this explanation does not seem consistent with the observed empirical pattern. A second alternative hypothesis is that the term sheet covenants across offers for a given start-up may have differed. Indeed, the price VCs offer for equity may not be the only factor that matters when entrepreneurs select a VC firm, and other dimensions of the term sheet may not be "priced in" to the offered valuations. While surveyed entrepreneurs were asked for a copy of their term sheet offers, very few complied with this request. However, Suchman (1995) provides some evidence of convergence in VC financing agreements over time as a result of using the same law firms. As well, while Kaplan and Strömberg (2003) find that covenants in VC contracts differ by stage of start-up development, the offered terms of financing

for a *given* start-up across VC firms may not be as variable. Nevertheless, different VCs probably prefer different terms, and offered terms are likely to vary even for a given start-up in a particular time period. As a result, comparing offers primarily on the basis of price is an inherent limitation of the present study.

Several additional issues associated with the data used for this study result in interpretational concerns. First, are the findings simply an artifact of the sample used? Although this group of companies might be of higher quality relative to average start-ups (assuming that the decision to be involved with MIT is a signal of quality), the sample, while modest at 148 offers, may represent a conservative test of the hypothesized effect. High quality entrepreneurs have their own reputations and established networks, which would tend to obviate the need to pay a premium to access capital from more experienced funding sources. In any case, employing start-up fixed effects makes this quality issue less important for the purposes of the empirical analysis. Indeed, the unique timing of the study in an environment in which many VCs were “chasing after deals” allowed identification of the market for affiliation—though it does not necessarily address the applicability of these results to other time periods or other relationships. It is difficult, unfortunately, to speculate on that answer.

A second issue is whether the results are produced from the competitive effect associated with studying a sample of multiple offers. This proposition is also hard to evaluate, however, due to the difficulty of establishing a counterfactual to single-offer situations. On a related note, a deeper understanding of the process leading to multiple offers would be desirable. The manifold processes generating offers (some of which are unobserved, such as entrepreneurial charisma), as well as the disparate bargaining processes leading to offers, makes the fixed-effects methodology attractive in controlling for unobserved heterogeneity. Nevertheless, had I collected information about the sequencing of offers, I might have been able to gain some empirical insight into the process generating multiple offers. Sequencing data may have also helped in beginning to empirically disentangle the pure affiliation effect from the VC value-added effect.

Two issues related to offers and how they might affect the interpretation of the results are also worth discussing. First, what if entrepreneurs “shopped” their deal to other VCs without receiving a formal term sheet? Unfortunately, I do not have the history of how many pitches entrepreneurs made to different VC groups without receiving formal offers. The results may be biased if (1) informal offers were leveraged to negotiate more favorable formal offers, and (2) VCs with a less established reputation were more willing to revise their valuations upward relative to VCs with more established reputations. Unfortunately, data constraints prohibit this analysis; however, survey respondents were instructed to provide information on final formal term sheets only (including informal offers would have subjected the sample to entrepreneurial interpretation of what constituted an informal offer). A second issue is whether some of the high valuation offers were withdrawn by VCs as the negotiations became more serious. Again, systematic data are unfortunately unavailable to address this question. If withdrawals came from across the full distribution of VCs, this

would not bias the results. If, on the other hand, withdrawals were systematically from less-reputable VCs, the study would be biased toward finding the results (and the opposite would be true if reputable VCs tended to withdraw offers). Given the market environment (“money chasing deals”) in which these data were collected in the second half of 2000 and my conversations with survey respondents, however, I believe that offer withdrawal was not a pervasive phenomenon in this sample. However, because I cannot rule out these two issues, they represent caveats to the study.

A final issue is interpreting what start-ups are buying. For example, industry deal experience in the start-up’s sector can proxy for both the scope of the VC’s information network as well as the VC’s ability to evaluate deals. Unfortunately, the data in this study do not provide a clean way of disentangling these effects. As well, higher ability entrepreneurs may be taking a lower offer in an effort to signal quality (Spence (1974)). While the empirical setting and the documented empirical patterns make this explanation unlikely, the proposition cannot be ruled out.

Looking to the future, while this study does not test the ex post performance implications of selecting a particular VC, it would be interesting to do so. For example, did start-ups accepting funding from more reputable VCs receive higher step-ups in valuation in subsequent rounds? Did they achieve an IPO faster or deliver products to the market more quickly?¹² Nevertheless, the findings in this study are consistent with the theory that entrepreneurs who are tied into more connected networks at reputable VC firms expect to come across more opportunities for start-up growth, but must pay a premium for such access.

¹² As a preliminary analysis, I examined as of January 31, 2002 whether accepting funding from a more reputable VC was correlated with surviving in the post-bubble shakeout period. While there are issues about the appropriate lag time to examine such an effect, a substantial fraction of the firms in the sample are either still operating, or were acquired for an undisclosed amount, rendering an assessment of “success” difficult. For these reasons, these preliminary analyses were not illuminating.

Appendix
MIT Sloan Financing New
High-Tech Ventures Survey

Name of Firm: _____

Location (city, state): _____

Part I: Background Information

A. Founding the Company

When was your company founded (month, year)? _____

When was your company incorporated (month, year)? _____

Name of Founder	Current Job Title	Company	Reason for Leaving (If Applicable)	No. of Prior Start-ups Founded	Name of Prior Start-ups

If the founding team previously started other companies, which category best describes the average approximate internal rate of return(s) on Series A investment for those previous venture(s)?

- < 0 0–10% 11–50% 51–100% 101–500% >500%

How many of those founded firm(s) were taken public? _____

At the time of start-up, what did your founding team consider to be the company's key competitive advantage? (select the most important **two**)

- | | |
|--|---|
| <input type="checkbox"/> Establishing a new market
<input type="checkbox"/> Recruiting superior personnel
<input type="checkbox"/> Superior positioning in the product niche
<input type="checkbox"/> Superior customer service & responsiveness
<input type="checkbox"/> Other: _____ | <input type="checkbox"/> Establishing a new technology
<input type="checkbox"/> Establishing an advantageous cost position
<input type="checkbox"/> Maintaining superior intellectual property
<input type="checkbox"/> Superior product quality/reliability |
|--|---|

B. Employee Information

Number of Employees: at the time of raising Series A financing: _____
as of 7/1/2000: _____

Current number of employees in each of the following functions:

R&D	Sales	Marketing	Manufacturing or Operations	General & Admin.	Service
_____	_____	_____	_____	_____	_____

Please indicate which of the senior executive officers below was on the founding team. If not on the founding team, please designate from what source the executive officer came. Please "x" out the position if it does not exist in your company, and draw lines connecting positions, if one person holds multiple positions.

	CEO	COO	CFO	CTO	VP, Marketing	VP, Sales	VP, Bus. Dev.	Other: _____
On founding team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Or, contact through:</i>								
Personal friend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Classmate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Co-worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Investor/financier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Recruiter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C. Financing the Company

Did you have a completed business plan before getting your Series A funding? Yes No

Time from completing the business plan to receiving your first financing offer: _____ months

Who were the participants in your company's financing(s) to date? If a number of "angel investors" participated, please group them all as "Angels" in the Investor column. If applicable, please place an asterisk (*) next to the lead investor.

<u>Round</u>	<u>Date</u>	<u>Investor</u>	<u>Amount</u>
--------------	-------------	-----------------	---------------

Total number of financing offers for the Series A round: _____

What is the current percentage of corporate ownership held by the following groups:

Founders	Employees & Option Pool	Venture Capitalists	“Angel” Investors	Strategic Investors	Public
____%	____%	____%	____%	____%	____%

For the Series A financing, which of the following areas were the subject of active negotiation between the parties?

		Not Active			Very Active		
Pre-money valuation	N/A	1	2	3	4	5	
Board representation	N/A	1	2	3	4	5	
Employee option pool	N/A	1	2	3	4	5	
Vesting schedules	N/A	1	2	3	4	5	
Liquidation rights	N/A	1	2	3	4	5	
Anti-dilution clauses	N/A	1	2	3	4	5	
Other (specify: _____)	N/A	1	2	3	4	5	

Why did you select the offer you chose?

D. Building Corporate Governance

Number of members of the Board of Directors: _____

How many directors are from: within the firm _____ outside the firm _____

Number of board members appointed by your investors: _____

Please rate the importance of the following functions of your *investor-appointed* directors:

		LOW			HIGH		
Oversight and monitoring of the company	N/A	1	2	3	4	5	
Source of advice and counsel to the company	N/A	1	2	3	4	5	
Source of external business contacts	N/A	1	2	3	4	5	
Recruiting and team building	N/A	1	2	3	4	5	
Market validation/prestige	N/A	1	2	3	4	5	

Do you have a board of advisors? Yes No

Please rate the importance of the following functions of your *board of advisors*, if you have one:

		LOW			HIGH		
Oversight and monitoring of the company	N/A	1	2	3	4	5	
Source of advice and counsel to the company	N/A	1	2	3	4	5	
Source of external business contacts	N/A	1	2	3	4	5	
Recruiting and team building	N/A	1	2	3	4	5	
Market validation/prestige	N/A	1	2	3	4	5	

E. Product, Technology, and Strategy

Which industrial classification best describes your company:

- Internet: Services Internet: E-tailer Internet: Infra. Internet: Other
 Software Medical Devices Biotech Communications
 Computer hardware Other (specify: _____)

Year 1 2 3 4 5

Actual company revenues:
(Thousands of dollars)

Year 1 2 3 4 5

Actual corporate profits/losses:

Number of: patent applications filed by your firm: ____ patents pending: ____
patents issued to your company: ____

Has your firm entered into any technology licensing deals?

- Yes: licensed out Yes: licensed in

If your firm has licensed out, what were the terms?

- Exclusive Non-exclusive

Who were the licensees?

- Product market incumbents Product market entrants

Year 1 2 3 4 5

Actual licensing revenues by yr:
(Thousands of dollars)

Has your firm been acquired since its inception? Yes No
If so, by whom?

At the time of your Series A financing, please rate the importance of each of the following as obstacles to the commercial success of your enterprise:

	Not an Obstacle	Very Important Obstacle				
Lack of brand name image	N/A	1	2	3	4	5
Lack of distribution channels/sales force	N/A	1	2	3	4	5
Lack of servicing resources	N/A	1	2	3	4	5
Lack of manufacturing capability	N/A	1	2	3	4	5

Part II: Financing Offer Characteristics

Please complete one record for each term sheet you received, copying this form as many times as needed. If possible, please also attach a copy of the term sheet received from each investor organization.

Name of Investor: _____

Location (City/State): _____

How did you make initial contact with this investor?

- Sent an unsolicited business plan
- He/she was a personal contact
- Referred by an advisor or friend
- Other (specify: _____)

If you were referred to the investor through a friend or knew the investor directly, how did you come to know that person?

Does this investor host a regular conference or formal networking event for top managers of its portfolio companies? Yes No

Does this investor have dedicated personnel to help its portfolio companies in the following areas:

- Recruiting Yes No
- Finance & accounting Yes No
- Business development Yes No

Please rate this financing offer/investor along the following dimensions:

		LOW			HIGH	
Overall reputation of this investor	N/A	1	2	3	4	5
Reputation in your industrial sector	N/A	1	2	3	4	5
Expected availability to mentor the team	N/A	1	2	3	4	5
“Chemistry” with this investor	N/A	1	2	3	4	5
Expected ability to recruit key managers	N/A	1	2	3	4	5
Potential contacts with key customers or suppliers	N/A	1	2	3	4	5
Potential contacts with investment banks	N/A	1	2	3	4	5

What *pre-money* valuation did this investor assign to your company at the Series A round? \$_____ Million

What *post-money* valuation did this investor assign to your company at the Series A round? \$_____ Million

Proposed equity stake taken by this investor as a result of this financing offer: _____

REFERENCES

- Admati, Anat R., and Paul C. Pfleiderer, 1994, Robust financial contracting and the role of venture capitalists, *Journal of Finance* 49, 371–402.
- Aoki, Masahiko, 2000, Information and governance in the Silicon Valley model, in Xavier Vives, ed.: *Corporate Governance: Theoretical and Empirical Perspectives* (Cambridge University Press, Cambridge, UK).
- Bagwell, Laurie S., and B. Douglas Bernheim, 1996, Veblen effects in a theory of conspicuous consumption, *American Economic Review* 86, 349–373.
- Barry, Christopher B., Chris J. Muscarella, John W. Peavy, III, and Michael R. Vetsuypens, 1990, The role of venture capital in the creation of public companies: Evidence from the going-public process, *Journal of Financial Economics* 27, 447–471.
- Beatty, Randolph P., and Jay R. Ritter, 1986, Investment banking, reputation and the underpricing of initial public offerings, *Journal of Financial Economics* 15, 213–232.
- Biglaiser, Gary, 1993, Middlemen as experts, *RAND Journal of Economics* 24, 212–223.
- Booth, James R., and Richard L. Smith, II, 1986, Capital raising, underwriting and the certification hypothesis, *Journal of Financial Economics* 15, 261–281.
- Boston Globe*, 2000, The matrix, June 6, D1.
- Bygrave, William D., and Jeffrey A. Timmons, 1992, *Venture Capital at the Crossroads* (Harvard Business School Press, Boston, MA).
- Chamberlain, Gary, 1980, Analysis of covariance with qualitative data, *Review of Economics Studies* 47, 225–238.
- Frank, Robert H., 1985, The demand for unobservable and other nonpositional goods, *American Economic Review* 75, 101–116.
- Gans, Joshua S., David H. Hsu, and Scott Stern, 2002, When does start-up innovation spur the gale of creative destruction? *RAND Journal of Economics* 33, 571–586.
- Gompers, Paul, 1996, Grandstanding in the venture capital industry, *Journal of Financial Economics* 42, 133–156.
- Gompers, Paul, and Josh Lerner, 1999, *The Venture Capital Cycle* (MIT Press, Cambridge, MA).
- Gompers, Paul, and Josh Lerner, 2000, Money chasing deals? The impact of fund inflows on private equity valuations, *Journal of Financial Economics* 55, 281–325.
- Gorman, Michael, and William A. Sahlman, 1989, What do venture capitalists do? *Journal of Business Venturing* 4, 231–248.
- Heckman, James J., 1979, Sample selection bias as a specification error, *Econometrica* 47, 153–161.
- Heckman, James J., 1981, The incidental parameters problem and the problem of initial conditions in estimating a discrete time-discrete data stochastic process, in Charles F. Manski and Daniel L. McFadden, eds.: *Structural Analysis of Discrete Data with Econometric Applications* (MIT Press, Cambridge, MA).
- Hellmann, Thomas, 1998, The allocation of control rights in venture capital contracts, *RAND Journal of Economics* 29, 57–76.
- Hellmann, Thomas, 2002, A theory of strategic venture investing, *Journal of Financial Economics* 64, 285–314.
- Hellmann, Thomas, and Manju Puri, 2000, The interaction between product market and financing strategy: The role of venture capital, *Review of Financial Studies* 13, 959–984.
- Hellmann, Thomas, and Manju Puri, 2002, Venture capital and the professionalization of start-up firms: Empirical evidence, *Journal of Finance* 57, 169–197.
- Hsiao, Cheng, 1986, *Analysis of Panel Data* (Cambridge University Press, Cambridge, UK).
- Kaplan, Steven, and Antoinette Schoar, 2003, Private equity performance: Returns, persistence and capital, Working paper, University of Chicago Graduate School of Business.
- Kaplan, Steven, and Per Strömberg, 2001, Venture capitalists as principals: Contracting, screening, and monitoring, *American Economic Review* 91, 426–430.
- Kaplan, Steven, and Per Strömberg, 2002, Characteristics, contracts, and actions: Evidence from venture capitalist analyses, Working paper, University of Chicago Graduate School of Business.
- Kaplan, Steven, and Per Strömberg, 2003, Financial contracting theory meets the real world: An empirical analysis of venture capital contracts, *Review of Economic Studies* 70, 281–315.

- Lerner, Josh, 1995, Venture capitalists and the oversight of private firms, *Journal of Finance* 50, 301–318.
- Lindsey, Laura, 2002, The venture capital keiretsu effect: An empirical analysis of strategic alliances among portfolio firms, Working paper, Stanford University.
- MacMillan, Ian C., David M. Kulow, and Roubina Khoylian, 1989, Venture capitalists' involvement in their investments: Extent and performance, *Journal of Business Venturing* 4, 27–47.
- Meggison, William, and Kathleen Weiss, 1991, Venture capital certification in initial public offerings, *Journal of Finance* 46, 879–903.
- National Venture Capital Association Yearbook, 2001 (Thomson Financial/Venture Economics, Arlington, Virginia).
- New York Times*, 2000, Venture capitalists, venturing beyond capital, October 15, C1.
- Podolny, Joel, 1993, A status-based model of market competition, *American Journal of Sociology* 98, 829–872.
- Roberts, Edward B., 1991, *Entrepreneurs in High Technology: Lessons from MIT and Beyond* (Oxford University Press, Oxford, UK).
- Sahlman, William A., 1997, How to write a great business plan, *Harvard Business Review* 75, 98–108.
- Shapiro, Carl, 1983, Premiums for high quality products as returns to reputation, *Quarterly Journal of Economics* 98, 659–680.
- Smith, Gordon D., 1999, How early stage entrepreneurs evaluate venture capitalists, in *Frontiers of Entrepreneurship Research* (Babson College, Boston, MA).
- Sorenson, Olav, and Toby E. Stuart, 2001, Syndication networks and the spatial distribution of venture capital investments, *American Journal of Sociology* 106, 1546–1586.
- Spence, Michael A., 1974, *Market Signaling: Informational Transfer in Hiring and Related Screening Processes* (Harvard University Press, Cambridge, MA).
- Stern, Scott, 2000, Do scientists pay to be scientists? NBER Working paper 7410.
- Stuart, Toby E., Ha Hoang, and Ralph Hybels, 1999, Interorganizational endorsements and the performance of entrepreneurial ventures, *Administrative Science Quarterly* 44, 315–349.
- Suchman, Mark C., 1995, Localism and globalism in institutional analysis: The emergence of contractual norms in venture finance, in W. Richard Scott and Søren Christensen, eds.: *The Institutional Construction of Organizations* (Sage Publications, Thousand Oaks, CA).