

Experienced entrepreneurial founders, organizational capital, and venture capital funding

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Abstract

This paper empirically investigates the sourcing and valuation of venture capital (VC) funding among entrepreneurs with varied levels of prior start-up founding experience, academic training, and social capital. Social ties with VCs have been identified as an important precursor to organizational resource attainment and performance, and so this study analyzes the correlates of heterogeneous social links with VCs. I also examine venture valuation, as it reflects enterprise quality and entrepreneurs' cost of financial capital. Using data from a survey of 149 early stage technology-based start-up firms, I find several notable results. First, prior founding experience (especially financially successful experience) increases both the likelihood of VC funding via a direct tie and venture valuation. Second, founders' ability to recruit executives via their own social network (as opposed to the VC's network) is positively associated with venture valuation. Finally, in the emerging (at the time) Internet industry, founding teams with a doctoral degree holder are more likely to be funded via a direct VC tie and receive higher valuations, suggesting a signaling effect. The paper therefore underscores some important dimensions of heterogeneity among VC-backed entrepreneurs.

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1. Introduction

For entrepreneurs of new ventures, particularly those with intangible, primarily intellectual property-based assets, venture capital (VC) is an important source of funding for the ongoing operations of the enterprise. This paper focuses on the heterogeneity of this financial capital, both in the means in which it is sourced (in particular, via direct social ties), as well as in its implicit price,

which is imputed into new ventures' valuation.¹ The former dimension is important because the prior literature has stressed the link between the organizational capital (whether it be human or social capital) of founding

¹ Throughout the paper, I regard VC financial resources as positive for the new venture. Researchers have also pointed to potential negative effects from the entrepreneur's perspective associated with VC funding such as increased hazard of founder-CEO succession (Wasserman, 2003), taking a company public too early (Gompers, 1996), higher equity under-pricing at the time of an initial public offering (Lee and Wahal, 2004), non-rational decision making (Zacharakis and Meyer, 1998) and even greater likelihood of venture failure unless the CEO also retained substantial ownership of the company (Fischer and Pollock, 2004). I thank the anonymous reviewers for suggesting this point.

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teams with positive venture outcomes (e.g., Bates, 1990; Brüderl et al., 1992; Shane and Stuart, 2002). Yet there is an implicit debate in the literature regarding whether such new organizational capital should be treated as an endowment (e.g., Shane and Stuart, 2002) or as an investment (e.g., Coleman, 1988). The latter perspective implies the possibility of over- or under-investment and attendant issues of rates of return (while the former perspective does not), and so policy implications turn on the conceptual distinction. The second element of this study, venture valuation, is an important yet conceptually distinct domain of entrepreneurial importance. Valuation determines cost of capital for entrepreneurs, and reflects VCs' evaluation of venture quality. This paper studies the relationship between these outcomes and two dimensions of organizational capital which tends to vary across new enterprises: prior founding experience/academic training and social capital as reflected through founding teams' ability to self-recruit its executive officers. In doing so, the paper contributes to the emerging literature highlighting differences among entrepreneurs.

Individuals with prior venture founding experience, while frequently a topic of mainstream interest or celebrity, has received comparatively little empirical attention in the academic literature (see Gompers et al., *in press* for a recent exception). The mainstream interest in "serial" entrepreneurs may be driven by at least two reasons. First, these individuals are a source of productive commercialization of ideas and technologies. Consider Alejandro Zaffaroni, who started at least seven companies, including ALZA Corporation, to address opportunities resulting from different waves of innovation in the biotechnology industry. Four of the companies were taken public, and two were acquired by leading pharmaceutical companies. Similar individuals could be identified for a wide range of industries. Second, experienced founders constitute an important resource for future generations of entrepreneurs, providing them with angel funding and new venture business development advice, for example. While recognizing the importance of these effects, this study focuses on prior founding experience as an important element of heterogeneity across entrepreneurs which may have implications for venture funding.

Anecdotal evidence suggests that founders with prior start-up founding experience should be advantaged in VC funding. Consider the case of Jim Clark, an entrepreneur who has founded three public companies – Silicon Graphics (founded in 1981), Netscape Communications (1994), and Healtheon (1996) – as well as at least two private firms, myCFO (1999) and Shutterfly (1999). While the business and economic environments

varied across these ventures, Clark was able to raise early stage funding faster and at higher valuations with each successive start-up. As Lewis (2000) described in his book, *The New New Thing*:

“A few people sensed exactly how potent Clark was once he'd spun himself out of Silicon Graphics. The venture capitalist Dick Kramlich assigned a young man named Alex Slusky, whom he had just hired out of Harvard Business School, to follow Clark wherever he went. ‘I told Alex to sleep under Jim's bed if he had to’ recalls Kramlich . . . Slusky's job was to stick to Clark and take notes. When Clark finally decided on his next venture, Slusky was to insist that Dick Kramlich at New Enterprise Associates be allowed to buy a piece of it.” (p. 80).

This behavior is consistent with business press accounts of broader venture capital (VC) behavior toward experienced founders:

“In the world of venture capitalists, where investors risk millions on young companies, it is hardly surprising that successful entrepreneurs get the big money. ‘Every VC dreams of alleviating risk and one way to do that is to back guys who've done it before,’ says Sebastien de Lafond, managing partner at venture capital firm Add Partners in London.” (*Wall Street Journal Europe*, 2002, p. 21).

These anecdotes fit well within the academic literature on the returns to human capital investments associated with training, work experience, and accumulated skills/knowledge (Becker, 1964), which may importantly determine new venture social ties and valuation in VC funding.

Another prominent area of research in organizational capital has underscored the importance of social networks and social capital in resource acquisition (e.g., Stuart et al., 1999 and references therein). With the vast literature on social capital spanning academic disciplines (Adler and Kwon, 2002), it may not be surprising that different authors have in mind different concepts when using the term. I use a definition posited by Glaeser et al. (2002: F438): “a person's social characteristics – including social skills, charisma, and the size of his Rolodex – which enables him to reap market and non-market returns from interactions with others.”² In the context of new ventures, network contacts can be an impor-

² In using this definition, I abstract away from important mechanisms of social capital and social networks, such as network “closure” (which is important for reputation building and enforcement; Coleman, 1988) and “bridging” versus “bonding” ties (which importantly relates to

tant resource in recruiting talented executive officers and technical staff (e.g., Bygrave and Timmons, 1992), as well as in establishing ties with venture capitalists, an important precursor of superior venture performance (e.g., Shane and Stuart, 2002).

Building social capital and human capital are not necessarily separate investments, however. While Coleman (1988) argues that social capital can contribute to human capital, the opposite can also hold. For example, training and prior professional experience (traditional conceptualizations of human capital) can not only contribute to *what* you know, it can also contribute to *who* you know. As a result, academic institutions and workplaces/associational organizations are natural settings in which building human capital can contribute to building social capital.

Moreover, the importance of new ventures' organizational capital in the sourcing and valuation of venture capital may be contingent on the success of founders' prior founding experience and on the stage of industry maturity. Founders with prior successful start-up founding experience likely send a clearer signal of entrepreneurial quality. Likewise, signals generated by foregoing high value alternatives may be particularly important for entrepreneurs operating in emerging industries (in which the necessary ingredients for venture success may be less certain relative to more mature industry settings).

This study examines not only the correlates of varied sourcing and valuation of VC funding among entrepreneurs with disparate backgrounds, it also investigates the comparative roles of prior founding experience, academic training and social capital in VC funding.³ To conduct the empirical analysis, I employ a novel data set drawn from a self-designed survey instrument. Founders of 149 early stage, technology-based ventures participated in the in-depth survey, which allowed measurement of typically difficult-to-observe variables such as early stage VC valuations, VC sourcing through direct personal ties, and executive recruiting via founders' (versus VCs') social networks.

causes and consequences of tie strength; e.g., Putnam, 2000; Adler and Kwon, 2002). I do this because in the empirical work, I am not able to distinguish between these mechanisms (see Davidsson and Honig, 2003 for such an empirical approach); instead, I rely on observable consequences of social capital (in the spirit of Fernandez et al., 2000). I do this also because the hypothesized effects are consistent with both bridging and bonding ties (as in Fischer and Pollock, 2004).

³ It is worth emphasizing that this paper is not concerned with the issue of receipt or not of VC financial resources and its implications (see Hellmann and Puri, 2000 for an excellent example of such a study).

The empirical analysis highlights three main sets of results. The first set relate to human capital. Prior entrepreneurial founding experience is associated with the likelihood of sourcing VC via a personal tie (which itself is correlated with an important organizational outcome, time to VC funding). As well, prior entrepreneurial founding experience is positively related to VC valuation. These results therefore suggest that measures of human capital are associated with development of social capital (which complements Coleman, 1988) and that venture valuation increases with founders' human capital (consistent with the literature on human capital and organizational outcomes). The former result also is in harmony with an investment rather than endowment conceptualization of new venture organizational resources.

The second main results relate to measures of social capital. Using executive recruiting via founders' own social network as a measure of the consequences of social capital (a reflection of prior investments in building social capital), I find that such capital yields financial benefits through higher VC valuations. This result may be due to either less entrepreneurial reliance on VC value-added services, such as recruiting senior executive officers (and associated bargaining power implications) and/or through VC expectations of venture success probabilities associated with enterprises possessing higher levels of social capital.

The third set of results relate to the contingent nature of organizational capital. First, among entrepreneurs with prior founding experience, those with financially successful prior founding experience are both more likely to receive VC funding through a direct tie and to have higher VC valuations. Second, in the emerging (at the time) Internet industry, founding teams with a doctoral degree holder are more likely to be funded via a direct VC tie and receive higher firm valuations, suggesting a signaling effect to external resource providers.

The remainder of the paper reviews the literature and derives empirical predictions of venture capital sourcing and valuation stemming from varied levels of entrepreneurial team organizational capital, the combination of new ventures' social capital and human capital (especially training and prior founding experience). An exposition of the data precedes the empirical results, while a final discussion section concludes the study.

2. Prior literature and hypothesis development

This section surveys the literature on acquiring financial resources and in start-up valuations, and builds on

these studies to generate predictions about differences for individuals with varied organizational capital.⁴

2.1. *Direct social ties and the timing of financial resource attainment*

The financial capital constraints of entrepreneurs and would-be founders are well established in the literature (e.g., Evans and Leighton, 1989). This constraint is particularly binding in technology-based ventures in which the main asset is intellectual property, and so significant development funds are required for product commercialization. Entrepreneurial financial liquidity has motivated a range of literature that has examined, for example, contracting issues between entrepreneurs and external finance providers (e.g., Kaplan and Strömberg, 2004) and the organizational effects of venture capital funding (e.g., Hellmann and Puri, 2002; Hsu, 2006). While researchers have isolated the role of social capital in facilitating access (including shorter waiting time) to financial resources (e.g., Uzzi, 1999; Shane and Stuart, 2002), fewer (if any) studies have examined the antecedent factors to such social capital. Therefore, if social capital such as ties to VCs is related to superior organizational outcomes such as reduced waiting time to accessing external financial resources, it is important to investigate the correlates to these ties rather than treating them as an exogenous organizational endowment. This is the rationale behind developing the first set of hypotheses.

As a prelude, it is worth discussing why the waiting timing to financial resource acquisition is important, particularly for emerging ventures in which time is an especially precious asset. For organizations that are not as resource constrained, scaling-up growth and development can be addressed through additional human resources. For fledgling enterprises, however, the stylized fact is that chief executives or founders (which are often the same individuals) are responsible for raising funds for their ventures, as well as a host of other business development functions. These functions are wide-ranging, and include operations, human resource management, customer and supplier relations, and the

like. Before the onset of an organizational administrative structure (the benefits of which scale with the complexity of the growing enterprise) that allows for functional specialization, it is often the chief executive's responsibility to multi-task across these duties. Consequently, there is often a zero-sum quality associated with any particular undertaking: devoting time to raising funds, for example, may mean less time devoted to product development. While there may certainly be positive spillovers associated with certain duties (e.g., networking and promoting the new venture's brand in the course of fund raising), less administrative intensity devoted to executive task completion is desirable, particularly in "hot" markets in which competing firms can be characterized as racing against other firms in bringing products to market. Consequently, landing financial resource commitments relatively early can allow the new venture team to concentrate on developing their products, monitoring the competitive landscape, and shaping their sales and marketing efforts.

The literature that most closely relates to differences in timing to financial resource attainment (and subsequent growth among entrepreneurial ventures) analyzes quality differentials among founders. The sources of quality differentials can be grouped into the following categories: training and experience factors, lineage-based explanations, and social connectedness reasons. Each is discussed in turn.

The first strand of literature relates educational and management experience to received financial resources. Drawing on a tradition of human capital-based studies (e.g., Becker, 1964), Bates (1990) and Robinson and Sexton (1994) find that educational attainment is correlated with the munificence of received financial resources in entrepreneurial ventures. Such education and work experience has also been linked with venture growth (Colombo and Grilli, 2005) and opportunity costs, which in turn shape entrepreneurial thresholds for staying in business (Gimeno et al., 1997).⁵ At the more micro-contractual level, a study of investment theses from actual VC investment memoranda (summaries of venture capitalist assessments of the strengths and risks posed by start-up investment opportunities) by Kaplan and Strömberg (2004) suggests that the experience of start-up management teams is important in guiding investment decisions. They report that 60% of their sample mentioned start-up management experience as a reason for investing. A quote from one

⁴ The literature on experienced founders segments such individuals into "portfolio" founders, those who found ventures in a parallel fashion, and "serial" founders, those who found businesses in a sequential manner (Wright et al., 1997). While these authors document differences between types of experienced founders, I am interested in contrasting experienced entrepreneurial founders on the one hand, with novice ones on the other (and so I abstract away from the distinction between portfolio and serial founders).

⁵ Also, see these two articles for a general review of the literature between human capital and entrepreneurship.

of these investment memoranda about an investment under consideration states: “Experienced managers out of successful venture backed company; highly sought-after entrepreneur/founder, who co-founded a successful company that subsequently went public.” On the flip side, Kaplan and Strömberg (2004) report examples of the risks and uncertainties cited by VCs: “Founder/Chief Development Officer has only limited operating experience; youth and lack of executive experience of the management team; weak management, will get great management with new hires, investment conditional on this.” These studies therefore stress the importance of variation in education and experience (which reflect prior individual investments) in the timing of acquiring financial resources.

A second set of studies relate entrepreneurial lineage (typically in the context of a spin-off from a corporate parent) to resource acquisition. Employees decide to leave their parent organizations due to beliefs about the quality of their venture idea, their risk-reward calculations, and their individual capabilities (e.g., Helfat and Lieberman, 2002). Such spin-off entrepreneurs may inherit organizational routines (and other “genetic” material) of varying quality from their corporate parents (Klepper, 2001), which can be related to differential resources to founders. Gompers et al. (2004) find empirical support for a model in which spin-offs result primarily from employees who are would-be entrepreneurs in training, waiting for the right resources, training and opportunity before striking out on their own. Furthermore, there is evidence of performance effects associated with the transfer of resources associated with spin-offs. Agarwal et al. (2004) find that incumbents’ capabilities at the time of spin-offs’ founding positively affect new ventures’ knowledge capabilities and probability of survival. Phillips (2002) finds the impact of spin-offs on the parent organization depends on the characteristics of the progeny that is spun-off. In particular, he finds that a progeny’s performance gain is associated with losses to the parent among Silicon Valley law firms. Finally, in a study that examines the relative importance of experience effects with lineage effects, Klepper’s (2002) study of the early automobile industry’s evolution finds experienced entrepreneurs from non-auto industries performed better (as measured by lower industry exit hazard rates) than spin-off firms from existing auto makers. These entrepreneurial lineage-based studies emphasize both human and social capital-derived benefits, and for the most part, tends to conceptualize such start-up benefits as organizational endowments rather than investments.

A third strand of literature explicitly considers the role of social capital on start-up resource acquisition. Case study evidence (Fried and Hisrich, 1994) suggests that because VCs receive so many business plans to fund, social ties are important in determining which start-ups get funded. These findings hint at a process whereby VCs tend to fund entrepreneurs they learn about through referrals from entrepreneurs in their portfolio companies, fellow VCs, and close friends and family. Using more systematic evidence, Burton et al. (2002) suggest that entrepreneurs with prior career experience in more prominent firms are likely to derive information and status advantages, with measurable effects in both obtaining external financing at founding and the innovativeness of their new ventures. As well, Shane and Stuart (2002) find that entrepreneurs with social capital (pre-existing direct or indirect ties with venture capitalists) enjoy a higher likelihood of receiving venture funding in the early stages.

While the literature has tended to stress training and experience-based explanations of financial resource attainment, comparatively less is known about the social mechanism at work. The prior literature in resource access and timing has not been very specific about the means by which experienced founders developed direct or indirect relationships with VCs in the first place (though Wright et al., 1997 and Shane and Stuart, 2002 mention that one way was through the founder having conducted technical due diligence for VCs). What these authors treat as exogenous organizational endowments of social capital must have come from somewhere, and one likely way is through prior involvement in the entrepreneurial community.⁶ Social interaction in geographically circumscribed areas which typically characterize VC investing (Sorenson and Stuart, 2001), along with community-based entrepreneurial clubs, events, and media may serve as an important means by which information about the existence and quality of entrepreneurs is communicated. Entrepreneurial founders, especially those in the early stages of their ventures, typically act in an opportunity-driven manner, as the resources they control are usually limited. This means these individuals are actively engaging in their community to tap into resource-provider networks and exchange ideas. Prior entrepreneurial founders are those

⁶ I use the term “community” in a general way since entrepreneurs themselves will define their relevant community in different ways, and so there could be substantial heterogeneity in what entrepreneurs themselves regard as their community. Since I discuss community in the context of entrepreneurial reputation-building, I have in mind a geographically circumscribed element.

who have typically been in the community the longest championing their venture ideas.

This discussion implies that social capital should be regarded as a resource which can be depleted or enhanced depending on the actions and decisions of individuals (the impact of institutional structures may also be important, yet building such structures also entails significant investment). While Coleman (1988) discusses the potential loose coupling between investment in social capital and stocks of such capital, the basic perspective is that social capital, conceptualized as relationships between individuals, can dynamically increase or decrease and so should not be regarded as a static quantity.

Financially successful founders receive visibility through media and word of mouth channels. As the quote in the prior section on Jim Clark after his successful experience founding Silicon Graphics suggests, VC investors are more likely to be aware of and monitor the activities of successful founders. At the same time, there is an influential literature which suggests that significant organizational learning can arise from measured prior failure (e.g., Sitkin, 1992), with the implication here that VCs value founders who have experienced adversity together with success, and so are more likely to be seasoned entrepreneurial managers. From the standpoint of VCs inferring new venture quality, however, observing repeated prior entrepreneurial failure is likely to send a negative signal relative to uniform past success or a mixed prior performance.

Entrepreneurs who do not have prior founding experience, in contrast, have no available track record for outsiders to infer their quality. These individuals may wish to signal their quality (Spence, 1974). Absent direct observation, resource providers will rely on trusted proxies of quality, such as strategic alliance partners (Stuart et al., 1999) or top management ties (Higgins and Gulati, 2003). In the context of growing ventures, affiliated distinguished individuals (for example on a board of directors or a scientific advisory board) or prominent angel investors can serve as especially important signals of quality (e.g., Elitzur and Gavius, 2003). This discussion suggests a set of predictions of antecedents to direct VC ties (how social ties with VCs are attained):

Hypothesis 1a. Entrepreneurial teams with more founding experience have a higher likelihood of VC funding via a direct social tie.

Hypothesis 1b. Entrepreneurial teams with more successful prior founding experience have a higher likelihood of VC funding via a direct social tie.

2.2. Start-up valuations

An important metric associated with VC funding is not only how it is sourced, but also the price paid (in start-up equity) for the infusion of financial capital, and so valuation assessments reflect underlying or expected enterprise value. 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 funding determines how much equity is sold for a given capital infusion, and may have corporate control implications (e.g., through board of director participation). Venture capitalists also care about valuation. In a liquidity event (such as an initial public offering or a merger/acquisition), VCs earn the difference between the share-price at that time and the price they paid to acquire start-up equity. However, valuations at the early stage of business development for the technology-based venture are often negotiated rather than calculated as a result of the intangible nature of the new venture's assets (Hsu, 2004).

Entrepreneurs with prior founding experience are in a better negotiation position over valuation since they are more likely to have learned from their prior experience. Such learning can span dimensions ranging from the mundane (negotiating leases) to the extraordinary (recognizing untapped personnel talent), and everything in between. To the extent that financially successful prior founding experience allows those individuals starting new ventures the patience to wait for more favorable deal terms, we would expect the enhanced bargaining position effect to reinforce human and social capital accumulation effects in enhanced venture valuations. Observing prior venture success also signals to VCs that the founder is more likely to have high entrepreneurial and business development ability. It also suggests that the founder has network contacts – such as to loyal customers or suppliers – that may be correlated with new venture success.

In contrast, entrepreneurs without prior founding experience may have difficulty in both actual new venture development ability and also in perceived ability (or inability as the case may be). As well, founders without prior founding experience may not be as adept at negotiating with VCs over deal terms including valuation, perhaps because they may not be familiar with bargaining protocol or the feasible bargaining terrain available. This power asymmetry is exacerbated in the negotiations over venture valuation due to uncertainty regarding the entrepreneurial team's likely performance in the current enterprise. Consequently, as previously discussed, such novice entrepreneurial founders may

wish to signal quality to the market by affiliating with reputable entities (Megginson and Weiss, 1991; Stuart et al., 1999). In effect, entrepreneurs pay to “lease” the VC’s reputation in order to access external resources (Hsu, 2004). Experienced entrepreneurial founders with an established track record may not have to pay this premium relative to novice founders. In addition, experienced entrepreneurs may receive higher valuations because of reduced risk of operating failure from the point of view of the VC, particularly since experienced entrepreneurs may be more likely to be sensitive to protecting their own entrepreneurial reputation.

Another manifestation of differing organizational capital by experienced versus novice venture founders is the extent of entrepreneurial reliance on business development services of venture capitalists. For example, on the occasion of General Colin Powell’s appointment as a venture partner at the VC firm Kleiner, Perkins, Caufield & Byers (KP), the associated press release⁷ identified KP as an innovator in providing *venture and relationship capital* services to entrepreneurs (italics in the original). Presumably, Powell, as a former chairman of the U.S. Joint Chiefs of Staff and former U.S. Secretary of State, would bolster KP’s relationship network. Experienced entrepreneurial founders are likely to have established social ties to the labor and capital markets, as well as to potential strategic alliance partners that would mitigate their reliance on VCs to “broker” these same ties. In contrast, novice entrepreneurs, with not as many established links on average, may be subject to brokerage fees in the form of lower valuations to their start-ups—and need VCs to help bridge structural holes (Burt, 1992) to access markets and partners.

The idea that actors who broker information and resources between otherwise disconnected parties can earn “commissions” (Marsden, 1982) is an important reason why social structure can create “entrepreneurial opportunities for certain players and not for others”—thereby leading to imperfect competition (Burt, 1992, p. 8). Fernandez et al. (2000) provide empirical support for the general concept that social structure and networks can provide financial returns. In the context of hiring via employee referrals, these researchers investigate tapping into individuals’ social networks in the context of hiring new workers via employee referrals. They find that an organization’s investment in the form of a referral bonus yielded a 67% return in reduced recruiting costs.⁸

⁷ Found at: http://www.kpcb.com/news/article.php?frm_id=55 (accessed 1 August 2005).

⁸ Similarly, Uzzi (1999) finds that organizational embeddedness in a social network is related to a lower cost of financial capital in middle-

By now there is mounting evidence that VCs assist in start-up business development in ways beyond strict financial intermediation (transferring financial capital from investors to entrepreneurs). More or less use of these services, such as executive recruiting, locating follow-on sources of funding, and identifying promising strategic alliance partners (e.g., Bygrave and Timmons, 1992; Gompers and Lerner, 1999; Hellmann and Puri, 2002), can affect the negotiated early stage start-up valuation, and so VCs’ extra-financial functions can have financial consequences. VCs are able to provide inter-organizational brokering as a result of having developed their information and social networks through their portfolio investments (Sorenson and Stuart, 2001; Hochberg et al., 2007); furthermore, these networks may be particularly well developed in the industrial sectors in which they have substantial investment experience (Hsu, 2004). In addition, well-connected entrepreneurs will be less risky for VCs in the sense that social organizational resources are performance-enhancing for the new ventures, and so such start-ups will also be expected to command higher valuations. The foregoing discussion suggests the following empirical predictions:

Hypothesis 2a. Entrepreneurial teams with more founding experience will receive higher VC valuations.

Hypothesis 2b. Entrepreneurial teams with more successful prior founding experience will receive higher VC valuations.

Hypothesis 2c. Entrepreneurial teams with higher social capital will receive higher VC valuations.

2.3. Organizational capital in emerging industries

The sourcing and valuation of venture capital by entrepreneurs is likely to be a more complex issue in the case of newly created industries. Such situations are often associated with eras of technological progress, as in the automobile, television, and Internet industries. In these emergent contexts, VCs face additional dimensions of uncertainty relative to investing in more established industries. Operational, commercial and technical risks (e.g., can the team execute on their business plan? will

market banking. The conceptualized mechanism in the Uzzi study has more to do with social embeddedness and trust rather than economic returns due to network position, and follows the tradition of a pair of influential contributions: Granovetter’s (1974) study of the influence of social structure on labor market outcomes and Powell’s (1990) essay on the distinguishing features of network forms of organization.

there be a market for the product or service? will the product or service work as envisioned?) are common to entrepreneurial firms regardless of industry stage. In relatively mature industries, VCs may have a better idea of the set of entrepreneurial skills and resources necessary to achieve high performance (either through their direct investment experience or as a result of observing others' actions and consequences). However, in emergent industries, VCs face a qualitatively different type of uncertainty: what is likely to be the dominant design (Utterback, 1994) in the new industry, and more generally, what are the elements of the objective function that entrepreneurial firms should try to maximize?

In the face of a host of new entrants with different backgrounds and resources entering an emerging industry, VCs are likely to rely even more on signals of venture quality relative to more mature industry situations as signals are more important in more uncertain situations. Entrepreneurial teams with high levels of human capital may send a powerful signal to resource providers by foregoing valuable alternate uses of their capital (the signal being that these individuals have high opportunity costs to their entrepreneurial endeavors). The educational training element of increasing human capital (e.g., in academic institutions) may also impart a natural context for building valuable social relationships (Hsu et al., 2007), which may help match entrepreneurs with VCs.

Entrepreneurial teams with higher levels of organizational capital are also likely to be able to use their background to improve their bargaining position with respect to VC valuations. In addition to a simple signaling/opportunity cost effect, human and social capital represent real organizational assets, which may be particularly valuable in highly uncertain, emergent industry situations. While prior training, experience, and social connections may not, by definition, be as directly applicable in the case of operating in a new industry, the importance of problem solving, entrepreneurial process knowledge, and network connections in defining elements of the appropriate new venture objective function may be especially valued by VCs.

This discussion implies that an important contingency in the role of new ventures' organizational capital in the sourcing and valuation of venture capital is the stage of industry maturity. There is a related literature which has examined the contingent certification role of new firms' affiliates to infer quality of the focal start-up firm (e.g., Stuart et al., 1999), but the distinction here is the role of the focal venture itself rather than the ventures' affiliates. The predictions can be summarized as follows:

Hypothesis 3a. Entrepreneurial teams with more human capital in an emergent industry have a higher likelihood of VC funding via a direct social tie.

Hypothesis 3b. Entrepreneurial teams with more human capital in an emergent industry will receive higher VC valuations.

Hypothesis 3c. Entrepreneurial teams with more social capital in an emergent industry will receive higher VC valuations.

3. Data

A sample of early stage start-ups, which were not selected based on their organizational capital (level of prior founding experience or social capital) is required to test these hypotheses. Furthermore, assembling a sample of all VC-backed start-ups will mitigate heterogeneity in start-up "type" across the sample. For example, Hellmann and Puri (2000) suggest that VCs are more likely to fund firms with more innovative product market strategies and are faster to introduce products to market. As well, Kortum and Lerner (2001) find that VC-funded research and development is associated with more innovative productivity relative to corporate R&D. Beyond establishing relative uniformity of the type of company sampled (venture-backed), it will also be important to gather detailed firm- and project-level data in order to reduce the severity of omitted variable bias in the empirical analysis (Audretsch and Mahmood, 1995).

To gather such data, I surveyed a group of start-up companies which had applied to participate in a semester-long educational program at MIT known as "Entrepreneurship Laboratory" ("E-Lab"). This program assembles teams of MIT and Harvard graduate students (primarily enrolled in the master's of business administration programs) to study specific business-related issues at actual start-ups (note that these start-ups are not necessarily founded by MIT alumni, nor are they necessarily commercializing MIT-originated technology). 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 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. Over that time period, more companies applied for the program than the supply of student teams could accommodate.

Table 1
Summary statistics and variable definitions*

Variable	Definition	Mean	S.D.
Dependent variables			
(1) Funding through direct VC tie	Dummy = 1 if the series A VC investor was a direct, personal contact of a member of the founding team	0.42	0.50
(2) Pre-money valuation	Product of the number of outstanding equity shares in a start-up before the series A investment round and the share price, in millions of dollars	11.91	19.05
Measures of organizational capital			
(3) Number of start-ups founded	Count of start-ups collectively started by members of a start-up founding team. Multiple founders from a previous start-up team are collectively treated as one previous start-up	1.06	1.49
(4) High network recruiting	Dummy = 1 if the share of non-founder executives recruited through the founding team's social network places the start-up in the top half of the sample	0.47	0.50
(5) MBA degree	Dummy = 1 if a member of the start-up team held a masters in business administration degree at the time of founding	0.31	0.46
(6) PhD degree	Dummy = 1 if a member of the start-up team held a doctoral degree (PhD and/or MD) at the time of founding	0.26	0.44
(7) High prior start-up return	Dummy = 1 if a previous start-up by a member of the founding team was reported to have liquidated at an internal rate of return of 100% or higher on series A investment	0.30	0.46
Controls: other start-up characteristics			
(8) Number of founders	Count of members on the start-up's founding team	2.86	1.35
(9) Start-up age	Age in months of the start-up as of December 2000	39.95	30.60
(10) Initial employees	Number of employees immediately before the series A round of external funding	10.09	10.10
(11) Prior angel investor	Dummy = 1 if the start-up received a prior angel round of funding	0.58	0.50
(12) Number of patents	Number of patents granted to the start-up as of December 2000	1.19	4.08
(13) Multiple financing offers	Dummy = 1 if a start-up received more than one written offer for financing the series A round	0.34	0.48
(14) Equity taken out	Equity stake (in percentage points) taken out as a result of the series A round	31.88	14.73
(15–17) Corporate strategy variables	Indicator variables for corporate strategy based on technology (mean = 0.67), product (mean = 0.69), and/or organization (mean = 0.28) (see the text)		
Industry and year controls			
Industry segments	Set of segment dummies = 1 for Internet (mean = 0.52), software (mean = 0.20), biotech (mean = 0.05), and communications (mean = 0.11). Excluded category is "other"		
Year dummies	Set of dummies = 1 if a start-up received series A funding in 1996 (mean = 0.03), 1997 (mean = 0.07), 1998 (mean = 0.16), 1999 (mean = 0.31), or 2000 (mean = 0.36). Excluded category is "other"		

* The natural logarithm of a variable, X , will be denoted $L X$.

In order to qualify for E-Lab, the start-up has to meet two criteria: (1) its headcount must be less than approximately 35 at the time of entering the program, and (2) it must have completed a series A round of VC investment. This group of start-up companies was surveyed to collect firm-level information. Respondents to the survey were typically a founder and/or a person who knew the details of the firm's start-up and financing history (frequently one of the following senior executive officers: chief executive officer, chief technology officer, and/or chief financial officer). Nearly half of the companies in the E-Lab population responded to the survey, yielding 149 observations. Unfortunately, it is not possible to conduct formal statistical tests of a potential response bias by comparing observable

qualities of firms in the sample to those not in the sample because these firms are very young, and for the most part, do not appear in industry directories.⁹ The remainder of this section contains a description of the

⁹ While formal statistical tests of potential bias are not possible, suppose we believe that founders with lower levels of social or human capital are less likely to respond to the survey. The sample would then constitute a conservative test of the hypotheses since the sample represents a higher than "true" distribution of social and human capital. More generally, because the sample is not selected based on prior founding experience or social capital, analysis of either a random distribution of non-respondents or a distribution that truncates ventures in the way just mentioned, would not bias the tests to finding the hypothesized effects.

variables (summarized in Table 1) used in the empirical analysis.

3.1. Dependent variables

The variable *funding via direct VC tie* is an indicator variable of whether the series A VC investor was a direct personal contact of a member of the start-up team, based on information from the survey (mean=0.42). These data are good measures of the consequence of direct social ties, relatively difficult to acquire, and accords well with the Shane and Stuart (2002) measures of founders' social capital. A second dependent variable, *pre-money valuation*, is the product of the number of outstanding shares of a firm and the share price prior to the series A round (mean = \$11.9M). This measure, which is a standard measure of valuation in the literature (Gompers and Lerner, 1999), is the outcome of bargaining between VCs and entrepreneurs (particularly for early stage ventures) and represents the value of a start-up before capital infusion. It is worth mentioning that valuation data of early stage, private firms are not normally available to researchers, as entrepreneurs are not required to disclose the information. Because of their skew distributions, *pre-money valuation* is specified in natural logs in the multivariate analysis.

3.2. Independent variables

I employ two sets of independent variables in the empirical analysis: organizational capital measures and controls (a correlation matrix of these variables is found in Table 2). Since all firms in the dataset are early stage ventures, the organizational capital measures are mainly attributable to founders' capital.

3.2.1. Organizational capital measures

The variable, *high network recruiting*, is a dummy = 1 if the share of non-founder executives recruited through the founding team's social network places the organization in the top half of the E-Lab sample (mean=0.47), and is a measure of social capital. Operationally, *high network recruiting* was calculated in two stages. A first stage counted the number of non-founder senior executives recruited through a personal friend, classmate, co-worker, or advisor (information gathered from the survey) and divided that number by the total number of non-founder executives. A second stage divided that distribution at the median and assigned a value of 1 to observations in the top half (and zero otherwise). Because social capital is difficult to observe directly, *high network recruiting* is a proxy for measurable con-

Table 2
Correlation matrix of independent variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
(1)	1																
(2)	-0.06	1															
(3)	0.24	0.04	1														
(4)	-0.07	0.23	-0.03	1													
(5)	-0.01	0.04	-0.11	-0.11	1												
(6)	-0.10	0.04	-0.02	-0.09	0.04	1											
(7)	0.28	0.04	0.43	0.01	-0.11	-0.08	1										
(8)	0.05	0.00	0.06	-0.37	0.19	0.05	0.05	1									
(9)	-0.08	0.09	-0.06	0.27	-0.14	0.11	-0.06	-0.25	1								
(10)	0.04	0.53	-0.12	0.14	-0.06	-0.08	-0.07	0.09	0.20	1							
(11)	0.02	-0.08	0.03	-0.01	-0.05	-0.06	-0.19	0.02	0.01	1							
(12)	0.01	-0.17	0.03	0.08	-0.03	0.26	0.06	-0.12	0.37	-0.11	1						
(13)	-0.04	0.30	0.03	-0.08	0.22	0.16	-0.03	0.17	-0.10	0.11	-0.10	1					
(14)	-0.01	-0.28	0.05	-0.09	0.06	0.03	0.05	0.15	-0.06	-0.11	-0.20	0.23	1				
(15)	-0.12	-0.03	-0.12	-0.03	0.10	0.25	-0.02	0.04	0.22	0.01	-0.11	0.17	0.05	-0.02	1		
(16)	0.03	-0.01	-0.10	0.06	-0.05	-0.17	-0.07	-0.18	-0.07	-0.01	-0.05	-0.21	-0.18	0.02	-0.35	1	
(17)	0.08	0.06	0.22	-0.22	0.04	-0.08	0.16	0.20	-0.11	-0.04	-0.08	0.04	0.19	-0.00	-0.18	-0.39	1

Note. Variable numbering corresponds to Table 1 numbering.

sequences (the founding team's ability to hire from their personal network) of such capital. This measure is constructed in the spirit of Fernandez et al. (2000) who looked for measurable consequences of social capital (hiring through employee referral). Moreover, executive officer recruiting is an important activity if we are to believe the mantra popular in the VC profession that "an 'A' quality team with a 'B' quality idea is preferable to a 'B' team with an 'A' idea." More generally, because founders' models of employment relations and human resources practices and policies are important in the early stages of new venture development and have long lasting effects (Baron et al., 1996), it will be interesting to examine executive recruiting at start-ups.

The remaining organizational capital measures in this section proxy for human capital. The *number of start-ups founded*, which ranges from 0 to 9, is a count of the collective number of previous start-ups the entrepreneurial team had founded (mean = 1.1). In the case that multiple founders from a previous start-up are on the current start-up team, their collective experience in the previous start-up is counted as a single previous start-up. Forty-six percent of the entrepreneurial teams in the sample had no start-up founding experience. It is worth stressing that few prior studies empirically examine the role of prior start-up founding experience (see Burton et al., 2002; Baum and Silverman, 2004; Gompers et al., in press for exceptions); many related studies use prior work experience in start-ups, particularly in the literature on spin-offs. The experience and learning associated with prior start-up founding relative to prior employment in a new venture is likely to be distinct, as founding experience likely entails dimensions such as raising financial capital, recruiting employee talent, and serving on new ventures' top management team, which may not be picked up by simple prior start-up work experience or other experience variables.

MBA degree is a dummy variable = 1 if a member of the starting team held a masters of business administration degree at the time of the firm's founding (mean = 0.31). *PhD degree* is a dummy variable = 1 if a member of the starting team held a doctoral degree (either a medical doctorate or a doctorate of philosophy) at the time of the firm's founding (mean = 0.24). These two variables are meant to capture variation in founding teams' human capital as measured through attained formal education. While an MBA degree proxies for general managerial training on the founding team, PhD-level expertise on the founding team likely reflects one of two effects. The first might be a straightforward scientific and/or specialized knowledge effect, which could be valuable in the context of technology-oriented new

ventures (e.g., Colombo and Grilli, 2005). As well, the presence of a PhD-trained individual on a founding team might also signal to outsiders that the venture is a credible one, thereby helping the organization obtain resources. On the other hand, Roberts (1991) has argued for an inverted-U relationship between new venture performance and education level, with performance dropping at the PhD level because such individuals typically have a more research rather than commercial orientation.

Finally, *high prior start-up return* is a dummy variable = 1 if previous start-ups by a member of the founding team was (self) reported to have liquidated at an average internal rate of return of 100% or higher on Series A investment (mean = 0.30).¹⁰ The variable indicates situations in which there is additional information about the founders beyond having prior start-up founding experience, namely financially successful prior founding experience. It is worth noting that the variables discussed in this section reflect prior conscious or unconscious investments in organizational capital. The accumulation of this capital was not costless to the entrepreneurs, and so should be conceptualized as investments rather than as endowments.

3.2.2. Control variables

A number of control variables are used in the empirical analysis. A first group of variables capture various start-up characteristics. The *number of founders* variable counts the number of team members on the start-up's founding team (mean = 2.9) since team founding experience will be related to the size of the founding team (Eisenhardt and Schoonhoven, 1990) and can be a proxy for human capital (Baum and Silverman, 2004). From Table 2, we see that on a pair-wise basis, *number of founders* is negatively related to *high network recruiting*, suggesting that smaller teams (more so than larger ones) tend to source their executives through their personal networks. Perhaps this is related to the decision to assemble a founding team of a given size in the first place. *Start-up age* is the age in months since the start-up's incorporation dating from December 2000 (mean = 40.0). *Initial employees* (mean = 10.1) is the number of employees immediately preceding the series A round of funding.¹¹ *Prior angel investor* is a

¹⁰ Survey respondents were asked to report average internal rates of return to their prior founded venture(s) according to the following size categories: below 0%, 0–10%, 11–50%, 51–100%, 101–500%, and over 500%.

¹¹ Audretsch and Mahmood's (1995) finding that entry size affects the probability of firm survival suggests that initial start-up size should be a control variable.

dummy = 1 if the start-up received a prior angel round of funding before the series A round of funding in their current venture (mean = 0.58). Angel investors (some of whom are themselves experienced entrepreneurial founders) may act as a source of introductions to venture capital investors (Elitzur and Gaviols, 2003), and may also represent a source of certification and/or due diligence for VC investors, particularly in the case of prominent angels, though there is substantial variation among angels on this dimension (e.g., Freear et al., 1994). *Equity taken out* is the equity ownership stake in percentage points taken out in the series A round as a result of VC funding (mean = 31.9). This is an important control variable in start-up valuation regressions, as VC valuation may not be constant across different levels of start-up equity stakes due to, among other things, corporate control implications of differing equity stakes.

A second group of variables aim to control for start-up quality. *Number of patents* counts the number of patents granted to a start-up as of December 2000 (mean = 1.2) and is a measure of the proprietary technological base of the firm. A second measure of start-up quality, *multiple offers*, is a dummy = 1 if a start-up received more than one financing offer for the series A round, and is meant to capture relatively unobserved-to-the-researcher factors (that are observable to the VCs) that might suggest a high quality start-up. Alternately, *multiple offers* may proxy for VC competition over start-up equity, though it is likely that this interpretation may still be tied to underlying start-up quality. Of the E-Lab firms, 98 received a single financing offer, while 51 received more than one offer (averaging about three apiece) implying that about 34% of the firms in the sample received multiple offers.

A third set of start-up variables aim to control for ventures' corporate strategy via three dummy variables coded from the survey instrument.¹² These variables are coded from entrepreneurial self-assessments of the basis on which they had a competitive edge, and are either technology-based (superior technology or intellectual property; mean = 0.67), product-based (functionality, market, product niche, or cost; mean = 0.69), or organization-based (customer service or personnel; mean = 0.28). Survey respondents could choose up to

two of the underlying nine sources of competitive edge ("other" is the final category, which is the excluded group in the empirical analysis).

A set of *industry segment* controls are also used in the empirics. The industrial representation of the E-Lab start-ups in the sample is typical of the broader set of industries funded by venture capitalists over the same time period (the average E-Lab firm in the sample was founded in the middle of 1997). Fifty two percent of the sample companies are in Internet sectors, including retailing, services and infrastructure. The software, communications, and biotechnology sectors make up about 20%, 10%, and 5%, respectively, of the sample. This distribution of firms seems to mirror the overall financing trends by venture capitalists between 1997 and 2000. For example, according to Venture Economics, in 1999, 43% of VC disbursements went to Internet-based start-ups, while 57% of VC funds in the first three quarters of 2000 were invested in the sector.¹³ The excluded industry category in the regression analyses are an amalgamation of other technology-intensive segments, including medical devices and semiconductors.

Finally, a set of *year dummies*, one for each year from 1996 to 2000, indicates the year in which the start-up received series A funding (firms started before 1996 is the excluded category). The vast majority of the firms in the sample were funded between 1996 and 2000, with about 67% of the sample companies funded in 1999 or the first half of 2000. These year dummies capture (in a coarse way) temporal changes in the funding environment.

4. Empirical results

To begin the empirical analysis, it will be instructive to examine simple univariate comparisons of start-ups with ($N=80$) and without ($N=69$) prior start-up founding experience to illustrate differences between these sub-samples. The first panel of Table 3 reports conditional means for the experienced and novice entrepreneurs (and tests of differences) in the method by which they made initial contact with the VC from which they received funding. Entrepreneurs who were prior founders reported that their VC investor was a prior personal contact (mean = 0.54) much more frequently relative to entrepreneurs without such experience (mean = 0.29), a difference that is statistically

¹² The literature suggests that measures of corporate strategy should be taken into account in the empirical analysis. While several archetypes of start-up strategy have been developed (e.g., McDougall and Robinson, 1990), the debate concerning type of strategy and organizational survival seems unresolved (e.g., Romanelli, 1989 versus Feeser and Willard, 1990). Nevertheless, since initial strategy can have long-lived imprinting effects on organizations (Boeker, 1989), founding strategy is an important independent variable.

¹³ Due to the high Internet representation in the sample, I do not code a variable for whether previous venture findings match current ones in industrial sector.

Table 3
Univariate difference in means tests

	No prior start-up founding experience	Prior start-up founding experience	T-statistic magnitude
(Panel A) Initial contact with venture capitalist funding the start-up			
VC investor was a direct, personal contact	0.29	0.54	3.13***
VC investor contact was made through an unsolicited business plan entry	0.04	0.01	1.16
(Panel B) Start-up senior executive officer recruiting			
Senior executive officers recruited through VC investor	0.21	0.11	2.71***
CEO recruited by VC investor	0.22	0.03	3.75***
VP of business development recruited by personal network	0.08	0.30	2.60***

This table describes difference in means tests for start-ups with ($N=80$) and without ($N=69$) prior start-up founding experience. Panel A describes differences in means of initial contact with the venture capitalists ultimately funding the start-up. Each of the measures is a dummy = 1 if the condition is fulfilled. Panel B describes differences in recruiting senior executive officers. The variables are dummy variables = 1 if the condition is fulfilled. ***Indicates statistical significance at the 1% level.

significant at the 1% level. Both groups did not make much use of unsolicited business plans in successfully landing a series A VC investor, a result consistent with Fried and Hisrich's (1994) findings that unsolicited business plans are rarely funded by VCs.

Panel B of Table 3 examines differences in start-up senior executive officer recruiting methods between seasoned and novice founders. The results reveal that entrepreneurs who have previously founded a firm tend to rely more on their own (rather than on VC) social networks in recruiting their executive officers. This finding is particularly striking for recruiting the chief executive officer (the difference between the experienced and novice founders is significant at the 1% level).¹⁴ To show that this effect is not confined just to the CEO, the next row shows that recruitment of another significant executive officer, the vice president of business development, also follows a similar pattern. Start-ups with founding experience reported recruiting their VPs of business development through personal networks much more frequently relative to those without such experience (the difference is significant at the 1% level).¹⁵

¹⁴ Of course, the likelihood of recruiting the CEO through VC versus personal social network channels should be adjusted for the age of the start-up since CEOs are more likely to be replaced as the start-up grows older (Wasserman, 2003). An unreported probit analysis controlling for start-up age does not change the statistical or economic importance of the univariate result: start-ups without founding experience are 15% more likely to have used their VCs to recruit their current CEO. A similar result holds after controlling for equity stake held by founders (Boeker and Karichalil, 2002 suggest that CEO turnover is importantly impacted by equity retained by founders). In addition, while I portray executive recruiting as primarily through VC or start-ups' own channels, there may be other significant mechanisms, such as executive recruiting firms, print advertisements or word of mouth.

¹⁵ A similar difference is found more generally for recruiting non-CEO executive officers via personal networks.

While these descriptive results are suggestive, they do not systematically control for a variety of factors. Therefore, the remaining empirical analyses examine correlates of receiving funding through a direct VC tie and firm valuation in a more systematic way through multivariate regressions. In line with similar studies (e.g., Gompers and Lerner, 1999) which deal with continuous data with skewed distributions, a log–log empirical specification is used throughout the multivariate analyses (except for categorical variables). The reported results are not sensitive to this functional form specification, however.

Because the *funding via direct VC ties* variable has been linked to organizational performance (Shane and Stuart, 2002),¹⁶ Table 4 examines correlates of *funding via direct VC ties* in an effort to unpack what had previously been treated as a social capital endowment of the new venture. Probit models are estimated due to the qualitative nature of the dependent variable. The first column reports a baseline model with the set of control variables. Two variables are statistically significant. Start-up age is estimated with a negative coefficient, consistent with the idea that maintaining strong network ties to VCs may be more difficult as the firm ages, presumably because top managers have to devote attention to other duties and are not able to invest as much time and effort in maintaining VC ties. Alternately, the relationship might result because firms having direct VC ties use them quickly. The biotechnology sector dummy is positive with a large implied effect: biotechnology firms are 49% more likely

¹⁶ In addition, in unreported regressions (available from the author upon request), *funding via direct VC ties* is associated with faster speed to VC funding in both a parsimonious bivariate regression as well as a fully specified model. These results are not separately reported because they are consistent with Shane and Stuart's (2002) results.

Table 4
Funding via direct VC tie probits

Independent variables	Dependent variable = Pr (funding via direct VC tie) (Note: coefficients represent marginal effects)			
	Entire sample (N = 149)			Founded ≥ 1 prior firm (N = 80)
	Model (4-1)	Model (4-2)	Model (4-3)	Model (4-4)
L number of start-ups founded		0.188** (0.085)	0.168** (0.086)	0.192 (0.225)
MBA degree		0.036 (0.101)	−0.079 (0.150)	−0.042 (0.192)
PhD degree		−0.172 (0.115)	−0.347** (0.132)	−0.359* (0.187)
High prior start-up return				0.294* (0.169)
L number of founders	0.077 (0.146)	0.102 (0.151)	0.094 (0.154)	0.455 (0.325)
L Start-up age	−0.246** (0.103)	−0.210** (0.104)	−0.243** (0.107)	−0.123 (0.166)
L initial employees	0.029 (0.061)	0.029 (0.097)	0.033 (0.063)	0.006 (0.090)
Prior angel investor	0.035 (0.095)	0.029 (0.097)	0.018 (0.099)	0.236 (0.162)
L patents	−0.005 (0.054)	0.026 (0.056)	0.046 (0.058)	0.000 (0.095)
Multiple financing offers	−0.064 (0.093)	−0.050 (0.098)	−0.084 (0.099)	0.015 (0.161)
L equity taken out	−0.118 (0.095)	−0.096 (0.097)	−0.125 (0.101)	−0.153 (0.142)
Technology-based strategy	−0.103 (0.117)	−0.068 (0.121)	−0.120 (0.125)	−0.145 (0.173)
Product-based strategy	0.065 (0.119)	0.049 (0.121)	0.040 (0.122)	0.418* (0.211)
Organization-based strategy	0.119 (0.118)	0.046 (0.122)	0.055 (0.125)	0.270 (0.191)
Internet sector	−0.000 (0.153)	−0.001 (0.158)	−0.239 (0.189)	0.394 (0.247)
Software sector	0.073 (0.173)	0.028 (0.176)	−0.060 (0.178)	0.293 (0.260)
Biotechnology sector	0.494** (0.146)	0.472** (0.163)	0.533** (0.135)	0.569*** (0.080)
Communications sector	0.089 (0.200)	0.081 (0.205)	0.006 (0.212)	0.233 (0.310)
Year 1996	−0.091 (0.312)	−0.123 (0.317)	−0.075 (0.348)	0.346 (0.308)
Year 1997	−0.252 (0.164)	−0.232 (0.175)	−0.135 (0.221)	−0.551* (0.082)
Year 1998	−0.034 (0.196)	0.037 (0.202)	0.048 (0.206)	−0.042 (0.313)
Year 1999	−0.266 (0.168)	−0.201 (0.177)	−0.142 (0.186)	−0.279 (0.256)
Year 2000	−0.463** (0.156)	−0.406** (0.168)	−0.393** (0.171)	−0.342 (0.284)
Internet sector × MBA degree			0.238 (0.205)	
Internet sector × PhD degree			0.441* (0.187)	
Log likelihood	−90.35	−86.62	−84.13	−39.57

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

relative to the base omitted industry (an amalgamation of primarily computer hardware and medical device firms) to have their VC funding sourced via a direct VC tie, which is consistent with the conceptualization of that industry as relying on organizational networks for innovation and commercialization (e.g., Powell et al., 1996).

The next column adds to the control variables the key independent variables—proxies for organizational capital. The estimated *number of start-ups founded* coefficient is positive and statistically significant at the 5% level, suggesting that a doubling of the number of start-ups founded is associated with a 19% increase in the likelihood of having linked to their VC via a direct personal tie, therefore confirming Hypothesis 1a.¹⁷ If *funding via direct VC ties* can be construed as a mea-

sure of social capital and *number of start-ups founded* is a proxy for specific human capital, then these results suggest that human capital can augment social capital.

In a third specification, (4-3), the full set of independent variables and controls are once again included—but two interaction effects on academic degrees and an emergent commercialization environment (the Internet) are also included. These interaction terms test the prediction that in emergent industry contexts, the importance of human capital is accentuated in explaining *funding via direct VC ties*. Three results stand out: first, the *number of start-ups founded* result persists, as before. Second, the direct *PhD degree* effect is negative and statistically

¹⁷ The marginal effect is evaluated at the means of the other independent variables. In all regressions in this paper, replacing *number of start-ups founded* with either a dummy variable indicating whether a prior founded start-up was VC-funded, or a variable that counts the number of previous founded firms that were venture backed does not change the results (in many cases, the results are strengthened).

Also, since *number of start-ups founded* is a measure of collective entrepreneurial teams' prior findings, I examine whether prior co-foundings matter (in the spirit of Eisenhardt and Schoonhoven, 1990) and whether the distribution of prior findings among current teammates matters. Both variables are not significant across the specifications in this paper, and they do not overturn the robustness of the main results.

significant at the 5% level).¹⁸ As Roberts (1991, p. 253) writes about technical venture founders with doctoral degrees: “. . .the general temperament, attitude, and orientation of PhD recipients are usually out of line with those necessary for successful technical entrepreneurship in engineering-based fields.” In addition to these attitudinal- and skill-based interpretations, PhD recipients may not have invested in activities to enhancing their social capital in entrepreneurial finance communities (note also that the direct *MBA* effect is statistically zero). The third result from this specification is that the interaction effect between *Internet sector* and *PhD degree* is positive (although only at the 9% level), suggesting that in emerging industry contexts, the signaling value of a PhD degree may be important in attracting the attention of VCs.¹⁹

To examine the impact of relatively *successful* prior founding experience, the final column of Table 4 conditions the analyzed sample on having founded at least one prior start-up, which reduces the number of observations to 80. This specification, which includes the same right hand side variables as (4-2) but adds the *high prior start-up returns* variable (a dummy variable indicating at least an average 100% internal rate on series A investment for prior founded firms). While the estimated *high prior start-up return* effect is positive and significant only at the 8% level, the implied elasticity suggests that *high prior start-up returns* is associated with a 29% boost in the likelihood of being funded via a direct VC tie for the current start-up, thus providing support for Hypothesis 1b.²⁰ Also, having a founder with a doctorate decreases the likelihood of having a direct VC tie by 36% (though this effect is significant only at the 9% level), again per-

haps suggesting that more technical founding teams may be investing less in social ties to the VC community. Overall, the results contained in Table 4 suggest that human capital accumulation, which probably has both investment and endowment components, can help build ventures' social capital.

Shifting from studying the sourcing of VC funding to the valuation of entrepreneurial ventures, Table 5 examines determinants of start-up valuations at the series A funding round. I again start with a baseline model, (5-1), which includes only control variables. A number of variables which accords with our intuition are statistically significant: *start-up age*, *initial employees*, and *patents*. Note that the measure of unobserved start-up quality, *multiple VC offer*, is positive and highly significant, implying that unobserved (to the researcher) effects that are potentially observed by VCs evaluating the start-ups are significant.²¹ As well, *equity taken out* is estimated with a negative and significant effect, a result consistent with the idea that larger start-up equity stakes, which are often associated with corporate control implications (through board memberships) are disfavored by entrepreneurs. The year dummies are motivated by Gompers and Lerner's (2000) evidence that when fund inflows are high, valuations tend to be higher than in other periods. The *year 1999* and *year 2000* dummies are generally positive and significant across the specifications, which accords with the general exuberance in the public financial markets during that era.²²

Column (5-2) includes the set of organizational capital variables in addition to the control variables. An interesting set of results emerge. The *high network recruiting* coefficient is significant at the 1% level, and indicates that a discrete change into the upper half of recruiting non-founder executives through founders' personal networks is associated with a 37% increase in valuation. This provides support for Hypothesis 2c.²³

¹⁸ At first blush, it might seem that if this variable is really a proxy for the health science industries. If that were the case, the coefficient on the *biotechnology* dummy would be attenuated relative to a specification that excludes *PhD degree*. In fact, the opposite holds, and in all specifications, the *biotechnology* dummy is positive, suggesting that non-industry effects could be driving the *PhD degree* estimate.

¹⁹ Interaction effects between *PhD degree* and *MBA degree*, which test whether technical and management excellence in a founding team might have positive effects, yielded no statistically significant results. In addition, I ran a number of interaction effects between the human capital and social capital measures. I did not find significant interactions, suggesting that social capital and human capital, at least using these measures in this dataset, did not exhibit either substitution or complementary effects across both dependent variables in this study.

²⁰ I also experimented with more objective measures of prior founding success, including a measure of number of prior companies taken public and a dummy for whether a prior founded firm was VC funded. The former measure does not produce strong results, while the latter measure yields qualitatively similar results as *high prior start-up return*.

²¹ An alternative, non-quality-based interpretation of the *multiple offers* variable is that the degree of competition among VCs to acquire equity in some ventures was intense, perhaps in ways not entirely related to underlying start-up quality, and so in an ex-post sense, the multiple offers variable might also proxy for a winner's curse effect. I thank an anonymous referee for alerting me to this alternate interpretation.

²² I do not include *time to funding* (from firm founding) as a control variable since it may be considered endogenous (*valuation* and *time to funding* could be co-determined). If I treat *time to funding* as exogenous and include it on the right hand side of the valuation regressions, the main results are not altered (and the variable itself is not significant).

²³ The results are robust to using shares of non-founder executives recruited through entrepreneurial teams' personal networks (without constructing the variable that splits the distribution at the median).

Table 5
Valuation OLS regressions

Independent variables	Dependent variable = L pre-money valuation			
	Entire sample (N = 149)			Founded ≥ 1 prior firm (N = 80)
	Model (5-1)	Model (5-2)	Model (5-3)	Model (5-4)
High network recruiting		0.370*** (0.127)	0.395** (0.172)	0.269 (0.181)
L number of start-ups founded		0.231** (0.101)	0.186* (0.101)	0.160 (0.225)
MBA degree		0.171 (0.123)	0.372** (0.187)	0.156 (0.198)
PhD degree		0.131 (0.148)	−0.145 (0.191)	0.175 (0.226)
High prior start-up return				0.390** (0.187)
L number of founders	0.012 (0.187)	0.109 (0.190)	0.072 (0.188)	−0.207 (0.310)
L start-up age	0.252** (0.124)	0.238** (0.121)	0.234* (0.121)	0.167 (0.171)
L initial employees	0.493*** (0.078)	0.518*** (0.076)	0.525*** (0.075)	0.484*** (0.100)
Prior angel investor	−0.198 (0.123)	−0.170 (0.119)	−0.200* (0.118)	−0.232 (0.172)
L patents	0.173*** (0.069)	0.141** (0.069)	0.144** (0.069)	0.059 (0.097)
Multiple financing offers	0.460*** (0.124)	0.435*** (0.122)	0.402*** (0.122)	0.402** (0.167)
L equity taken out	−0.379*** (0.122)	−0.331*** (0.118)	−0.344*** (0.118)	−0.196 (0.147)
Technology-based strategy	−0.272* (0.152)	−0.186 (0.150)	−0.217 (0.150)	0.013 (0.194)
Product-based strategy	0.040 (0.154)	0.097 (0.149)	0.061 (0.147)	0.366 (0.239)
Organization-based strategy	−0.004 (0.151)	0.058 (0.153)	0.113 (0.152)	0.202 (0.208)
Internet sector	0.212 (0.192)	0.271 (0.189)	0.133 (0.263)	0.027 (0.257)
Software sector	0.041 (0.216)	0.078 (0.210)	−0.020 (0.213)	−0.157 (0.285)
Biotechnology sector	−0.124 (0.315)	−0.133 (0.309)	0.018 (0.312)	−0.688* (0.403)
Communications sector	0.362 (0.251)	0.448* (0.244)	0.438* (0.246)	0.154 (0.367)
Year 1996	0.139 (0.419)	−0.011 (0.404)	0.091 (0.400)	0.118 (0.544)
Year 1997	0.339 (0.306)	0.265 (0.295)	0.268 (0.301)	0.672 (0.463)
Year 1998	0.165 (0.266)	0.110 (0.258)	0.172 (0.256)	−0.153 (0.340)
Year 1999	0.556** (0.263)	0.580** (0.255)	0.658*** (0.255)	0.364 (0.297)
Year 2000	0.658** (0.279)	0.627** (0.271)	0.679*** (0.268)	0.775** (0.325)
Internet sector × high network recruiting			0.058 (0.225)	
Internet sector × MBA degree			−0.342 (0.248)	
Internet sector × PhD degree			0.652** (0.291)	
Constant	0.776 (0.858)	−0.010 (0.849)	0.179 (0.866)	0.221 (1.207)
R ²	0.47	0.53	0.55	0.59

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

The positive coefficient (significant at the 5% level) on *number of start-ups founded* suggests that a doubling of this variable at the mean of the other independent variables is associated with a 23% increase in pre-money valuation, a result that supports Hypothesis 2a. While not included in a reported specification, the estimated *funding via direct VC tie* effect (if treated as an exogenous variable) is not statistically significant, suggesting that while obtaining *funding via a direct VC tie* reduces waiting time to funding, it does not improve valuation.

The third column, (5-3), builds on the prior specification by including the same two interaction effects as were presented in specification (4-3), together with an additional interaction between the *Internet sector* and *high network recruiting*, a measure of social capital. A few results are notable. First, the *high network recruiting* result persists at the 1% level while the *number of start-ups founded* result is preserved (though its statistical significance is weakened). Second, the *MBA degree*

variable is now positive and significant at the 5% level. The interaction effect between *Internet sector* and *PhD degree* is positive and significant at the 5% level. The latter two effects suggest that general management human capital contributes to venture valuation, as does a doctoral degree (but the doctoral degree effect is consistent with a signaling explanation since it only holds for the emergent Internet industry). Note also that the interaction term between the *Internet sector* and *high network recruiting* is not statistically significant, thereby failing to confirm Hypothesis 3c. Finally, *prior angel investor* is negative and weakly statistically significant in this specification, which may suggest a negative signaling effect (plausible in the “money chasing deals” environment in which these data were collected).

The final column of the table, (5-4), examines the effect of financially successful prior founding experience by conditioning the sample on having founded at least one prior venture. Again in a fully specified model, OLS

regressions of log *pre-money valuation* are presented. The estimated effect on *high prior start-up return* is positive and significant at the 5% level, with a large economic effect (having a 100% or greater internal rate of return on prior start-up founding is associated with a 39% premium on pre-money valuation within the sample of companies that had experienced founders), which lends support to **Hypothesis 2b**. A similar result holds if the sample is not conditioned on having at least one prior start-up founding experience and treating teams without founding experience as having low prior returns. Since it is not possible to know the performance of entrepreneurial teams had they experienced a prior founding event, I do not formally report the results from that analysis. Taken together, the results in **Table 5** suggest that higher levels of organizational capital and entrepreneurial founding experience (particularly for those with financially successful prior experience) have measurable effects on start-up valuations.²⁴

5. Discussion and conclusion

This paper has examined how the sourcing and valuation of VC funding varies among entrepreneurs with heterogeneous organizational capital using a novel dataset of 149 early stage start-ups. Responses to an in-depth survey allowed measurement of typically difficult-to-observe variables such as valuation of early stage ventures, executive recruiting via founders' (versus venture capitalists') social network, and multiple funding offers. Rather than treating social capital as an exogenous organizational *endowment* arising from what founders bring to their organizations (as in **Shane and Stuart, 2002**), the view here is that organizational resources (including human and social capital), should be treated as prior or on-going *investments* made by founders and their new ventures, which can on aver-

age lead to subsequent organizational performance. The paper therefore examines the correlates of heterogeneous social capital in the setting of start-ups receiving funding from VCs. I find that human capital accumulation can help build ventures' social capital (this is a complementary effect to **Coleman's (1988)** finding that social capital helps build human capital). I also investigate the determinants of new venture valuation, an economically and managerially important measure of organizational performance. I find that measures of human capital and social capital are positively related to venture valuation. A final set of results relate to the contingent nature of organizational capital. First, among entrepreneurs with prior founding experience, those with financially successful prior founding experience are both more likely to receive VC funding through a direct tie and to have higher VC valuations. Second, in the emerging (at the time) Internet industry, founding teams with a doctoral degree holder are more likely to be funded via a direct VC tie and receive higher firm valuations, suggesting a signaling effect to external resource providers.

The study contributes in three ways to the literature and has a variety of research and managerial implications. First, the study furthers the conceptualization of social capital as an asset which results from investments to build or upkeep (similar to physical and human assets). The implications of this view are straightforward. From a societal perspective, as **Coleman (1988)** argues, without individual appropriation that recoups the investment made to enhance social capital, individuals may underinvest, and so there may be a role for public policy. The policy issue is exacerbated by the potential positive spillovers associated with social capital. From an individual perspective, in addition to appropriability, the investment nature of social capital naturally raises issues about differentially productive mechanisms of building such capital.

A second contribution of the study is developing the view that human capital can contribute to the development of social capital. More specifically, training and prior professional experience (traditional conceptualizations of human capital) can not only contribute to *what* you know, it can also contribute to *who* you know. As a result, academic institutions and workplaces/associational organizations are natural settings in which building human capital can contribute to building social capital. A final contribution is in providing evidence of the possible contingent effects of human capital in the sourcing and valuation of venture capital, which suggests that a more complex treatment of the asset is in order.

²⁴ In a series of unreported regressions, I also conducted a limited test of the "stigma of failure" theory advanced by **Landier (2002)**. The stigma hypothesis relates the current cost of capital faced by entrepreneurs who failed in their prior start-up to variation across business environments in the stigma of prior entrepreneurial failure. The empirical test examines the valuation offered to experienced entrepreneurs with prior internal rates of return below 0%. While these data are self-reported, the tests do not reveal statistically different valuations for these entrepreneurs in their current start-up, thereby failing to detect a significant stigma effect in this U.S.-based sample, a finding consistent with Landier's work. An important note to the empirical test here is that it is conditioned on observing an entrepreneur in a restarted effort (I do not observe previously failed entrepreneurs who choose not to restart in this sample)—and so the test does not fully align with Landier's theory.

In reflecting on these contributions, four interpretational issues merit discussion. First, the primary focus in this paper is in variation *among* VC-backed entrepreneurs, with regard to funding via direct social ties with VCs and in valuations when receiving venture capital. Therefore, the results from this study should be interpreted with this margin of heterogeneity in mind. Fortunately, factors related to the topic of receiving (or not) VC resources has been analyzed elsewhere in the literature.²⁵

A second interpretational issue involves the time period from which the data are drawn. Founders were surveyed during a “money chasing deals” VC funding environment in which equity markets were overheated, a fact that we know only *ex-post* (after the bursting of the Internet bubble). During such exuberant environments, we would not expect differences in organizational capital to play a very significant role in VC sourcing or valuation. Using data from this time period would bias researchers *away* from finding systematic effects between these outcomes and the key organizational capital variables.

Third, it is possible that the experienced entrepreneurial founder results reflect an enhanced bargaining position *vis-à-vis* venture capitalists (including being more patient for financial resources due to possible deeper financial pockets if a prior venture has been financially successful), rather than “genuine” entrepreneurial experience effects. While this interpretation is different than that discussed throughout most of the paper, it is difficult to empirically distinguish these mechanisms, both of which are likely to contribute to the observed outcomes. Notice also that learning to negotiate with VCs may be an important part of entrepreneurial founding experience.

Finally, it is important to recognize the limitations of the social capital measures used in the study. The survey-based data allow me to construct novel measures of the observed consequences of high versus low social capital (e.g., the ability of the founders to hire executive officers through their own social network as opposed to the VC’s network), in the spirit of the Fernandez et al.,

2000 study. However, because I do not have information about the original source of the social tie, I am not able to distinguish the mechanism by which the processes operate. In particular, I do not know if the founders’ social networks are characterized by bonding (strong tie-based) versus bridging (weak tie-based) social capital (e.g., Putnam, 2000; Adler and Kwon, 2002), or if network closure-based mechanisms (Coleman, 1988) are at work. As a result, I have employed the social capital term generically in this paper. Nevertheless, the differing mechanisms do not imply different prediction in the hypotheses I examine, and so I follow the Fischer and Pollock (2004) strategy in abstracting away from the difference (though in future work, it would be interesting to better understand such mechanisms at work).²⁶

The study also suggests some possible future directions for academic research on experienced entrepreneurial founders. While a relatively well-developed literature in entrepreneurship and innovation examines differences between entrepreneurs and non-entrepreneurs, it would be interesting to better understand how different characteristics *among* entrepreneurs and the firms they found are related to outcomes, particularly if those characteristics can be acquired or learned (methodologically, the possibility of several observations of a given individual in the setting of experienced entrepreneurial founders is attractive from the standpoint of statistical control). The results in this paper are consistent with the findings and discussion contained in Klepper and Simons (2000) that not all entrants are equivalent, particularly in their ability to effectively compete against industry incumbents. Therefore, further research characterizing different capabilities among entrant firms more generally would be welcome.

Two empirical puzzles which involve experienced entrepreneurial founders would also be interesting to investigate. First, organizations as they grow larger gain advantages of economies of scale and scope, as well as the potential to cross-subsidize product or service development in the case of multi-divisional firms. Despite these advantages, however, some entrepreneurs decide to start new ventures instead of adding divisions onto

²⁵ Accordingly, I do not collect out of sample (non-VC) data. It is worth mentioning that the data in this study is well suited to exploring the dimensions of VC-backed entrepreneurial heterogeneity, including hard-to-observe factors such as early stage venture valuation and source of executive recruiting in new ventures. Despite the relative rarity of venture capital in entrepreneurial finance, a major theme in the literature on VC is the value-added and specialized institutional features of VC that make it a productive mechanism of technology commercialization (e.g., Gompers and Lerner, 1999).

²⁶ The variable *high network recruiting* can be interpreted as either indicative of an expansive social network which facilitates top management recruiting (consistent with bridging social capital), or a narrow but tight social network, which also facilitates recruiting (aligned with bonding social capital or entrepreneurial charisma as included in Glaeser et al.’s (2002) definition of social capital). I thank an anonymous reviewer for pointing this out. Unfortunately, I am not able to disentangle these mechanisms using these data; I can only observe the end result of high versus low social capital.

their old ones, as was the case with Alejandro Zaffaroni, the founder of influential biotechnology firms such as ALZA Corporation and Affymetrix. Second, why do some financially successful experienced entrepreneurs who could self-fund their subsequent start-ups return to VCs for funding (such as the case with Jim Clark's start-ups after Netscape)? Doing so could potentially deepen our understanding of both the value-added role of venture capitalists and the start-up business development process.

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