

Are Angels Different?

An Analysis of Early Venture Financing

Brent Goldfarb Gerard Hoberg David Kirsch Alexander Triantis *

November 4, 2013

Abstract

We examine the role of angel investors in early venture financing using a unique sample of 182 Series A preferred stock rounds. Our sample includes deals in which angels invest alone, VCs invest alone, and where both investor types co-invest. We find that deals with more angel investors have weaker cashflow and control rights, and experience longer times to resolution. Among larger deals, those financed by VCs alone are most likely to experience successful liquidation. Our overall results support the conclusion that angel objectives likely align more with entrepreneurs than VCs, and that outcomes may be linked to conflicts of interest.

*All authors are from the Robert H. Smith School of Business, University of Maryland, College Park, MD 20742; email: brentg@umd.edu, ghoberg@rhsmith.umd.edu, dkirsch@umd.edu, atriantis@rhsmith.umd.edu. The authors gratefully acknowledge support from the Alfred P. Sloan Foundation, the Robert H. Smith School of Business at the University of Maryland, the Library of Congress and its partners in the National Digital Information Infrastructure Preservation Program, and members of the Advisory Council to the Digital Archive of the Birth of the Dot Com Era, especially Jonathan Rubens of McQuaid, Bedford and van Zandt, L.L.P. and members of the ad hoc review committee. We also thank Anthony Ramirez for overseeing our data management efforts and Hye Sun Kim for excellent research assistance. Comments from Adair Morse, Nagpurnanand R. Prabhala, J. Robert Baum, Enrico Perotti, Matthew Higgins, Niles Hatch and participants in seminars at the Kauffman Foundation, the Universities of Maryland, Michigan, Minnesota, and South Carolina, Boston University, the Chicago Fed/DePaul University joint seminar series, the NBER Entrepreneurship Working Group, REER conference, UC-Davis/FMA Conference on Financial Markets Research, the Israeli Strategy Conference, and the Maryland Entrepreneurship Conference have been invaluable. All errors of fact or interpretation remain the responsibility of the authors.

I Introduction

Private equity investments of business angels represent the lion’s share of equity investments in de-novo startups.¹ Yet, due to the paucity of data on angel financing (Fenn and Liang 1998; Prowse 1998), the nature of angels’ investments in startups has largely been characterized based on survey evidence (Freear, Sohl, and Wetzel 2002; Wiltbank and Boeker 2007). For instance, existing evidence and conventional wisdom suggest that angels tend to invest in early-stage deals, hold common stock, and exert influence through social networks rather than imposing formal control rights (Fenn and Liang 1998; Ibrahim 2008; Wilmerding 2003; but see also Shane 2006). We find support for the conventional wisdom that angels invest with fewer protections than do VCs and suggest that this can be explained by preferences more closely aligned with entrepreneurs than with VCs.

We arrive at our new insights on angel investing by analyzing a unique sample of stock purchase agreements and other legal documents pertaining to 182 “Series A” private equity deals.² Our data are derived from the electronic records of the now defunct law firm Brobeck, Phleger & Harrison (Brobeck). One important characteristic of these data is the considerable variation in the extent of angel and VC participation (ranging from all-angel to all-VC financings). We find new relationships between investor mix and cash flow and control rights, such as liquidation rights and redemption rights, as well as with other relevant characteristics, including expected time to resolution and attorney billable hours. We also find that investor mix has a systematic association with success. Our work complements a growing number of articles studying private equity financings of small entrepreneurial firms (Bengtsson 2012). Consistent with previous work, we find that angels obtain weaker rights than do VCs (Shane 2008a; Wong, Bhatia, and Freeman 2009). We advance the literature by ruling out several competing explanations for this phenomenon.

A central limitation in studying angels has been the difficulty in providing a meaningful comparison between angels and VCs, which requires identifying samples of deals for which both angels and VCs compete. This challenge is highlighted in a forthcoming review article which presents a range of stylized facts regarding VCs and angels financing choices, but does not identify evidence about the difference between the two on the margin (Da Rin, Hellmann,

¹Extrapolating from the Survey of Small Business Finance, Fenn and Liang (1998) find that for every one firm that raises a venture capital investment, six raise an angel investment. Similarly, they note that approximately one-third of firms that go public were funded by venture capitalists and two-thirds by angels, and conservatively conclude that there are at least double the amount of angel investments as compared to venture capital investments. Moreover, it is somewhat strange that so much of the literature has focused on Banks vs. VCs when perhaps Angels vs. VCs is a more relevant tradeoff for many entrepreneurs. Robb and Robinson (ming) find that by far the most important form of external financing for new firms is banks.

²Following convention by practitioners, a Series A deal in our context is the first sale of preferred stock by the given firm. The convention used in practice is to label the first preferred stock round as “Series A” and the second as “Series B”, etc.

and Puri 2013).³ Several characteristics of our data allow us to overcome this limitation. First, we select on Series A financing events, and hence we have reasonable uniformity regarding stage. Second, the companies in our sample, including those financed by angels, inhabit the traditional VC domains of information-technology and biotechnology. Third, the size of the angel investments in our sample overlaps with the smaller VC investments; entrepreneurs in our sample did raise similar investment amounts from both investor types. Our data also includes a rich set of controls including risk, firm age, deal size, alliances, product releases, geography, and more. Fourth, at least one side in *all* of the deals in our sample was represented by Brobeck, which was a prominent law firm.⁴ This indicates that the angels observed in this sample are likely to be sophisticated and represent the small slice of angels that are most like VCs. This feature of our data would likely bias our results against our central findings of differences between angels and VCs. We do not expect our results to be representative of angel investors in ultra small start-ups in less prestigious markets. This is important because it is plausible that the differences identified between VCs and angels are likely more pronounced and more biased when samples focus on deals in which angels and VCs do not likely compete directly.⁵ For a large share of the deals in our sample, entrepreneurs had a meaningful choice between both investor types. With this context in mind, we report four central findings.

1. When firms raise smaller amounts of capital, they do so from either angels alone, VCs alone, or from both angels and VCs. In contrast, when larger investments are needed, even sophisticated angels are insufficient and VC participation is generally necessary.
2. In Series A rounds, high-end angels take preferred shares and negotiate similar contract terms alongside VCs. Nevertheless, the presence of sophisticated angels, either investing alone or alongside VCs, is associated with weaker cashflow and control rights.
3. Angel-only financed deals experience longer times-to-resolution (where resolution is defined as either a successful exit or failure). These longer durations are not correlated

³For example, Wong et al. (2009) conditions on angel participation and finds that venture capitalists sometimes co-invest, while Kaplan and Stromberg (2003, 2004) condition on VC involvement. Similarly, analyses of private equity returns by Cochrane (2005), Hall and Woodward (2007), Hochberg, Ljungqvist, and Lu (2007), Kaplan and Schoar (2005), Ljungqvist and Richardson (2003), Moskowitz and Vissing-Jorgensen (2002) and Woodward and Hall (2004) are based on investments by VCs or small privately-held businesses. Wiltbank and Boeker (2007) present survey evidence on angel returns. Angels and VCs compete for the same deals in Hsu (2004)'s study of competition for deals between private equity funders.

⁴This suggests that the deals surpassed a minimum quality threshold in the sense that Brobeck "certified" the opportunity, and indeed we find a higher incidence of successful liquidity events for this sample relative to other firms tracked by Venture Economics. Megginson and Weiss (1991) and Brav and Gompers (1997) use a similar logic to explain the link between VC financing and successful IPOs.

⁵The mean investment of \$150,375 made by angels in our sample is large relative to the \$10,000 average outside equity investment made by individuals as reported by Reynolds (2005). Shane (2008b) reports that investments over \$200,000 fall in the top one percentile of angel investments.

with the degree of success, as angel-only deals are not more or less likely to experience successful exit as compared to other deals except as described by Finding 4.

4. Among larger deals, those financed by VCs alone experience more successful exits than those in which at least one angel participates. We do not observe a similar finding for smaller deals. The superior performance of VC-only, larger deals is only present when the board of directors is not firmly under the control of either common or preferred shareholders.

The first finding indicates that in Series A investment rounds, deal size segments the market. In particular, entrepreneurs who wish to raise funds from angels alone can do so only when their capital requirements are modest. This situation will arise if angel investors are liquidity constrained, which limits the amount of money they are willing to invest in any particular deal. Alternatively, it may be more difficult to find angel investors if angels do not advertise their presence and / or an entrepreneur's network is limited.

Our second finding has both an important implication and raises a puzzle. First, the many theories that have been offered to explain the nature of preferred equity in the VC setting also appear consistent with the high-end angel setting (see Bengtsson 2012; Da Rin et al. 2013; for reviews). However, it is puzzling that angel investors generally obtain weaker control rights than do VCs, particularly given the commonly held assumption that angels invest in riskier and less opaque earlier stage deals than do VCs (Ibrahim 2008; Wilmerding 2003), and the anecdotal and survey evidence that high-end angels also provide coaching services just as VCs do (cf., Linde, Prasad, Morse, Utterback, Stevenson, and Roberts 2000; Shane 2008a; Wong et al. 2009).

Three basic theories may explain this phenomenon. We discuss these next, and refer to them as transaction costs, preferences and selection hypotheses.

The first class, *transaction costs*, assumes the standard moral hazard problem and also that there are obstacles to its resolution through formal contractual solutions. For example if angels invest in smaller deals, and it is too costly to involve lawyers to negotiate complex terms, then we will be unlikely to see complex terms with angel investments (Bengtsson 2012; Casamatta 2003). Similarly, smaller investors may lack bargaining power to demand strong rights. Alternatively, if individual angels cannot fully fund larger amounts due to liquidity constraints, then such deals may be more likely to fall into a commons problem with regard to the responsibility for enforcement (Rajan and Winton 1995). Angels would then be reluctant to insist on terms that would be unlikely to be enforced.

The second class, *preferences*, assumes that angel preferences are more strongly aligned with entrepreneurs than with VCs (perhaps due to a greater ability enforce contracts informally through informal social mechanisms (Freear, Sohl, and Wetzel Jr 1995), due to angels

choosing deals with less potential for goal conflicts, due to a lesser interest in pecuniary rewards (cf., Linde et al. 2000), or simple angel naïveté (Shane 2008a)). If moral hazard is reduced through this channel of alignment, then there would be a reduced need for strong investor protection in the first place (cf., Hellmann 2002). Alternatively, if the presence of angels signals a greater need for entrepreneurial effort, then Aghion and Bolton (1992); Broughman and Fried (2010) predict it would be efficient to favor common shareholders with more rights.

The third class, *selection*, suggests that an unobserved state variable such as the firm’s prospects, drives both investor composition and investor rights. The most direct form of the selection argument is that certain deals are superior (on a “fast track” toward successful liquidation), and VCs may preclude other investors from participating in these deals. This situation would signal higher quality and better outcomes.⁶

We interpret our four findings as most supportive of angel preferences aligning more with the entrepreneur and less with VCs. If fewer investor protections are due to reduced deal size or a commons problem, we should observe that our results weaken when controls for size and the number of investors are included. Instead, our results are fully robust. If angel investors are naïve, then any link to investor rights should dissipate when angels co-invest with VCs (who presumably are not naïve). Instead, we continue to find that investor rights are weaker in mixed deals than in VC-only deals. Similarly, naïveté might predict that angel deals will unconditionally underperform VC deals. Instead, we only find evidence of under performance in large deals, and only when board control is split between preferred shareholders and common shareholders (Findings 3,4).⁷ The finding that deals associated with angels also take longer to resolve, suggests that one dimension in which angels preferences are more aligned with entrepreneurs than VCs is patience. In this sense, our findings are most supportive of the model of Fairchild (2011), who make this very assumption and show that angels are less likely to expropriate funds from the entrepreneur. Although many of our unique tests support the preferences hypothesis, we also note that we cannot rule out the selection hypothesis, and that some of our findings are also consistent with selection. It is, perhaps, unsurprising that both mechanisms may be in play.⁸

A final note of caution. Our sample is small and this limits the power of our tests. Nevertheless, our Finding 2 concerning control rights and cashflow rights is a multi-faceted

⁶Note that the preferences class of explanations embeds within it a selection argument, in that we would expect angels to select deals with better ex-ante interest alignment, holding the underlying prospects of such deals equal. In contrast, the selection class of explanations implies selection on the ex-ante quality of the deal, holding the ex-ante perceived conflicts of interest equal.

⁷Using a clever identification strategy, Kerr, Lerner, and Schoar (2011) find that angels in angel groups add value and that they earn returns similar to VCs in the study period.

⁸Conflicts of interest between different types of financiers has been studied in other contexts, such as between bank and investment house underwriters (Puri 1996)

result based on a series of different measures of these variables. This reduces the likelihood of a spurious result. Analogously, our results regarding outcomes are interesting, and in part are strengthened by our analogous results for the time to resolution and for the existence of successful liquidation events. Hence our findings for outcomes have the more binding limitation that they are based on just two tests from a small sample.

In the next several sections we describe the theoretical context, the data and results. Section II describes relevant theoretical literature and empirical literature. Section III provides an overview of our data and Section IV presents summary statistics. Section V summarizes our results regarding deal characteristics and control rights. Section VI presents the relationship between investor composition and outcomes. Section VII concludes the paper.

II Theoretical Background

Private equity contracts between financiers and entrepreneurs are generally seen as a solution to the moral hazard problems identified by Jensen and Meckling (1976), Myers (1977) and Smith Jr and Warner (1979). The assumption is that the entrepreneur will engage in value-destroying behavior due to limited downside risk, a desire for private consumption, or risk aversion. The basic logic is illustrated by Hölmstrom (1979) who shows that given differing risk preferences, the optimal contract allocates any residual value to investors in the case of an unsuccessful firm outcome (the same has been shown for limited liability (Sappington 1983) and differing time horizons (Jovanovic and Szentes 2007; Lacetera 2009)).

Aghion and Tirole (1994) make the general point that when both the entrepreneur's and the investor's effort can contribute to the success of the firm, the optimal effort allocation will determine the allocation of control rights. The realization that VCs often provide considerable value-added services led the problem to be viewed as a double-moral hazard problem (Casamatta 2003; Gompers 1995; Hellmann 2002). As summarized by Da Rin et al., the implications of these information-asymmetry problems is that A. investments should be staged, B. some control rights should be allocated to the investor, and C. greater cashflow rights should be allocated to the investor in the event of a poor outcome. The empirical finding that VC investors stage investments (Gompers 1995) and invest with convertible preferred equity that allocates control rights and greater cashflow rights in the case of mediocre or poor outcomes (Kaplan and Stromberg 2003, 2004; as well as a series of papers by Bengtsson and his coauthors) is broadly interpreted as showing support for these theories.

While the underlying theory has been focused on understanding why staging and pre-

ferred equity is used or not, in practice there is considerable within variation in the degree of protections afforded by these contracts. This has led to a series of articles attempting to relate investor and firm characteristics to contractual features. The strength of investor protections theoretically should be a function of severity of the goal conflict between the two parties, the optimal amount of required effort by both parties, and relative bargaining power. For this reason, Bengtsson and Sensoy (2011) attribute their empirical finding that more experienced VCs systematically invest with weaker formal protections to experienced VCs' better monitoring abilities. Supportive of this, Kaplan and Stromberg (2003) find that VCs obtain greater board control when a firm lacks a product, though there is no evidence that they have greater formal rights to shut down the firm.⁹ However, using a broad, representative sample of US venture capital financing rounds, Bengtsson (2011) and Bengtsson and Sensoy (2011) find that investors obtain stronger control rights for *more* mature firms, as proxied by firm age.¹⁰ Rajan and Winton (1995) hypothesize and Bengtsson (2011) interprets their evidence as supportive of the hypothesis that this may be because there is too low a salvage value to motivate allocation of rights to VCs when firms are less mature.

Our finding that angels sometimes invest with preferred securities is also consistent with this theory (Finding 2).¹¹ Wong et al. (2009) also find suggestive evidence of staging. He reports a large number of follow-on investments, with 40% of these including investors from previous rounds. Given that many firms do not require a second round, or do not perform well enough to warrant one, it is difficult to say if this is a high or low number.

The second part of Finding 2, that angels invest with weaker protections than VCs, has puzzled the literature due to its apparent inconsistency with the standard theoretical framework (Shane 2008a; Wong et al. 2009). Most evidence suggests that angel investments are typically very early stage companies, and more rarely later stage (Shane 2008a). Early stage companies are likely to be more risky, both offering greater opportunities for moral hazard and greater exposure to external risk factors. In his study of VCs, Dessein (2005) predicts that investor control will *increase* with both information asymmetry and ex-post uncertainty. This theory is motivated by the findings of Kaplan and Stromberg (2003) that VCs receive greater control rights in earlier stage firms in more volatile industries

⁹Formally, these rights are enshrined in "redemption" clauses by which a majority of preferred stock holders can vote to redeem their shares, which effectively shuts down the firm.

¹⁰Kaplan and Stromberg (2003) do not include a control for firm age, so this prevents a direct comparison of the results.

¹¹Since we select on the use of preferred securities (Series A), our data cannot inform about the pervasiveness of this phenomenon in the general population. Fenn, Liang, and Prowse (1995) based on the Survey of Small Business Finance, report that angels generally invest using common shares. Using a sample that is also likely comprised of mostly higher-end investments, Wong et al. find that angels often take preferred equity or convertible notes, but also take common equity about 40% of the time. Unfortunately, we do not know much more about how often common or preferred securities are used in general (Shane 2008a).

and Kaplan and Stromberg (2004)'s follow up study that finds that investor control is increasing in moral hazard risk and external risks. Similarly, Lerner and Merges (1998) find that principals retain more control in R&D firms in early stage projects. Thus, the literature focused on VCs does not explain this finding well and sets up our hypothesis that weaker angel rights are motivated by stronger ex-ante incentive alignment.

Other theoretical approaches have also examined the puzzle though they do not appear consistent with our results and the evidence in the literature. Casamatta (2003) suggests that common shares provide stronger incentives than preferred as downside events are less protected. When investment amounts are low, common equity will more strongly motivate the needed effort of common stock investors and entrepreneurs. Thus, the theory predicts investor rights should be weaker in smaller deals. However, our results hold for angels controlling for deal size. An additional solution to this empirical puzzle has been to simply assume that angels do not provide any managerial coaching (Chemmanur and Chen 2006). However, this assumption does not sit well with some evidence that more sophisticated angels sit on boards and provide coaching (Freear et al. 1995; Wong 2009, as well Finding 2). An alternative solution is to assume that angels lack the ability to stage due to financial constraints (Schwienbacher 2007). Though this is consistent with Finding 1, it is not consistent with Wong's finding that angel investors do stage.¹²

III Data Sources

The law firm Brobeck, Phleger & Harrison (Brobeck) had a rich history spanning more than seventy-five years of successful practice, and the failure of the giant firm is a signature event in the history of American legal practice. Founded in San Francisco in 1926, Brobeck served corporate clients in California and the western United States. In 1980, the firm opened a satellite office in Palo Alto from which it developed one of the largest law practices representing technology startups in Silicon Valley and elsewhere (it subsequently opened offices in Austin and the East Coast). The Internet boom of the late 1990s led the firm to pursue a "Big Bet, Big Debt" growth strategy that relied upon rapid growth to support increased infrastructure costs. However, when the technology boom quickly reversed, a self-reinforcing cycle of defections and falling revenues pitched the firm into a "death spiral," with lease obligations and other fixed costs soaring as a percentage of revenue. The firm decided to cease operations in February 2003, and seven months later creditors forced the liquidating firm to seek bankruptcy protection.¹³

¹²We cannot reliably observe whether there were follow on angel rounds, and hence cannot speak to this issue in our study.

¹³Since the firm announced its intention to close, many articles in the legal and business press have looked at the specific reasons for the failure. Kostal (2003) is the most readable account, but the perspective of the

In partnership with the National Digital Information Infrastructure Preservation Program of the Library of Congress and assisted by a blue-ribbon advisory council and a team of legal and technical experts, one of the authors has focused on preserving a subset of the digital records of the failed firm. On August 9, 2006, Judge Dennis Montali of the United States Bankruptcy Court, Northern District of California, San Francisco Division, recognized the historic value of these materials and authorized the creation of a *Closed Archive* allowing a significant fraction of these records to be saved. The Court Order specified that the Brobeck Closed Archive will be established under the direction of the Library of Congress and directed the Closed Archive to maintain the confidentiality of the digital records while allowing social science research to proceed using an access model substantially similar to that employed by the U.S. Bureau of the Census.

The present work is the result of an experimental project designed to test the feasibility of conducting social science under the proposed user model. According to the court-approved methodology, access is restricted to archivists and scholars who have signed strict non-disclosure agreements. Access takes place in an on-site, non-networked, institutional setting, and only for specific, enumerated purposes that, among other restrictions, protects the anonymity of investors. Only aggregated or redacted data are allowed to leave the secure area. This solution balances the need to safeguard legal confidentiality while still supporting approved scholarly access.

Brobeck represented both new ventures and investors. Under the experimental protocol, we analyzed documents related to “Series A” investments, as identified by legal practitioners. While there may be some variance as to how this term is used broadly in practice, in our sample it ubiquitously identified a company’s first preferred stock financing round. To identify a research sample, an initial query was performed on a subset of the Brobeck digital corpus. The subset consisted of approximately 3.7 million digital records which included word processing documents, spreadsheets, and other electronic miscellany. We focus on six categories of Brobeck representations (matters) that had usable electronic documents concerning relevant deals for the purposes of this study.¹⁴ We identify 182 Series A funding rounds with sufficiently complete electronic records and an indication of deal closure. The earliest deal occurs in 1993 and the latest deal in 2002.

We carefully examine a number of documents for each deal. The Stock Purchase Agreement establishes the basic terms of the sale of stock, including the type and amount of stock being sold, its purchase price, and numerous conditions for closing and other repre-

bankruptcy trustee is also highly relevant (Murphy et al. 2005).

¹⁴Each matter was categorized and also contained a short description of the nature of that particular legal representation. The categories for which there were some matters with the words “Series A” in their descriptions were (with the matter counts shown in parenthesis): “Venture Finance/Company Side” (429), “Venture Financing/Investor Side” (264), “Venture Fund Formation” (133), “Other Financing” (109), “General Business and Technology” (79), and “General Corporate Representation” (44).

sentations. It also identifies the date of closing, and some information regarding the capitalization prior to closing. This document, along with the term sheet, identifies investors involved in the deal in a capitalization table. The Amended and Restated Charter sets forth investor rights including dividend rights, liquidation preferences, redemption rights, voting rights, and conversion rights/anti-dilution protection. The Voting Agreement sets forth the composition, size, and conditions of election of the Board of Directors. Other documents including Co-Sale and First Refusal Agreements, and Investor's Rights Agreements, provide additional information including details regarding additional rights, restrictions, and option plans. The documents in the Brobeck corpus are very similar to the samples provided by the National Venture Capital Association on their website.¹⁵

For each firm in our sample, we also collect complete histories and outcomes based on public sources including Lexis-Nexis, Hoovers, SEC filings, the Internet Archive (archive.org), and Thomson Financial's Venture Economics. In particular, we have a record of each firm's internet presence (from 1996 to present) as well as a complete record of every press release and article about the firm in the popular press. This allows us to identify liquidations, bankruptcies, acquisitions, IPOs, and major company milestones such as strategic alliances, product releases, and subsequent VC investments in the firms.

While we provide a detailed description of the companies in our sample in Section IV, it is useful to point out at the outset that we can generally categorize these firms as high growth potential ventures. Most deals inhabit the traditional VC domains of information-technology and biotechnology (even those financed exclusively by angels). It is also reasonable to assume that Brobeck selected deals with high-growth potential. Vronsky (2007) finds evidence that leading Silicon Valley law firms, such as Brobeck, certified deals in the same way that VCs certify deals at the time of IPO in the sense of Megginson and Weiss (1991) and Brav and Gompers (1997). Hence Brobeck had both reputational and monetary incentives to ensure that the deals it represented were of high quality.¹⁶ We also find that VCs investing in deals in our sample were of higher prominence than the general population of VCs, and the deals in our sample performed well relative to the universe of VC-funded ventures, independent of whether they were financed by VCs, angels, or both.

We also note that we do not believe that the failure of Brobeck is indicative of the quality of the investors, firms or deals in our sample. First, the causes of the bankruptcy do not appear attributable to low quality clientele, but rather to idiosyncratic features of the Brobeck partnership (Kostal 2003) and / or to poor strategic decisions and real-estate investments by the firm's senior partners (Murphy, Dillman, and Johnston 2005). Second we

¹⁵See http://www.nvca.org/model_documents/model_docs.html.

¹⁶Law firms commonly rely on either implicit or explicit contingent payment schemes from entrepreneurial companies they represent (Dzienkowski and Peroni 2002; Vronsky 2007). Leading law firms seek to refer strong deals if they wish to work with prominent VCs (Bernstein 1995).

compare the venture capitalists in our sample to the general population of VCs (below). The evidence suggests that the investors in the sample were of high status and more successful than the median VC investors.

IV Descriptive Statistics

A Investor Composition and Deal Size (Finding 1)

We begin with a description of the firms in our sample, in which we document support for our first finding that deal size segments the market. We then describe the investors. Through a comparison between our sample and the universe of venture capitalists in Venture Economics, we ascertain that the sample is comprised of high quality, California-centric investors and firms.

We classify participants in the Series A deals based on three major categories – founders, VCs, and angels. Founders are identified using a two stage process. First, founders are often explicitly identified in the records. When founders are not explicitly identified, but common shareholders are, we identify founders using the following three step rule: (1) the largest common shareholder is identified as a founder; (2) any other common shareholder holding at least 30% as many shares as the largest common shareholder is also identified as a founder;¹⁷ and (3) any common shareholder holding the position of president or CEO is also identified as a founder. Founders ubiquitously hold common shares. For the 165 companies in our sample for which we have founder data, there were a total of 458 founders, leading to an average of 2.78 founders per company, and a range of 1 founder (for 56 companies) up to a maximum of 22 founders in one company (only four companies have more than 8 founders).

We identify venture capitalists primarily by cross-referencing investor names with investors appearing in the Venture Economics database, but we also label as VCs investors with names sharing a common word root with the term “venture”.¹⁸ This category includes VC arms of banks and corporations which are included in Venture Economics. In addition, there are a small number of professional angel investment groups in our sample. Although angels are the main source of capital for these groups, we put them into the VC category given that their investment process closely resembles that of VCs. In total, there were 482 different VCs that participated in 150 of the 182 deals in our sample.

¹⁷This threshold is arbitrary, and we only include this analysis for the purposes of illustration. Our study’s focus is on how VCs and angels invest in Series A financings (which almost universally do not include founders).

¹⁸There were a few occasions where investors had the word “venture” in their names but were not in Venture Economics and were not venture capital organizations in the institutional sense we refer to here. In each such case, their investment sizes were under \$50,000. These small investment organizations are often set up for estate planning purposes. We classified these investors as angels.

There is considerable variation in the literature and in practice regarding the exact definition of angel investors. We label as angels all investors who are not otherwise classified as founders or VCs according to the definitions above. This category, which consists of 2,528 different investors across 144 of our 182 sample firms, is predominantly composed of individuals, who invest either directly in their name, or through trusts and other investment vehicles, such as companies set up by individuals for investment purposes.¹⁹ Although we cannot accurately identify friends and family, we note that investors with the same name or ethnic origin as founders appear to represent a relatively small proportion of the angels and the overall angel investment in our sample.²⁰ We also include as angels universities, governments, and other non-VC entities, including Brobeck itself. Since some of the investors we categorize as angels may be viewed as belonging to distinct classes that should be separated from the stereotypical individual angel investors, we later conduct robustness tests to ensure that these non-individual investors do not have a significant impact on any of our key results, and we find that our results are indeed robust. We provide more detailed information on both the angels and VCs in our sample in Section C. However, the high-potential nature of deals in our sample, as well as the large average amounts invested by angels, suggest that our sample includes sophisticated angels.

Figure 1 shows the distribution of investor composition for deals in our sample. The histogram in the top panel shows the share of investors who are angels. Thirty-two of our deals (18% of the 182 deals) rely solely on angel investments, 38 (21%) have only venture capital investment, and the other 112 deals (61%) draw on both angel and VC investment, with a reasonably uniform distribution of the mix between the two groups of investors.

Note, however, that the bottom panel of Figure 1, which is based on dollars invested rather than number of investors, indicates that venture capitalists systematically invest more money. This suggests that deals involving VC investments are larger, which is indeed the case. Figure 2 shows the distribution of deal size, i.e., dollars invested in Series A deals, for three investor composition categories: angel-only, mixed, and VC-only deals. Angel-only deals are predominantly smaller deals, with a median of \$1.12 million, relative to the overall median of \$3.5 million for our whole sample of Series A deals. Mixed deals tend to be somewhat larger (median of \$4.49 million) than VC-only deals (median of \$3.53 million). While there are numerous VC-only and mixed deals with investment size below the overall sample median, only 3 of the 32 angel-only deals have investment size larger

¹⁹Wong et al. (2009) formally defines angels as those that are “accredited investors” according to SEC Regulation D, Rule 501. Rule 501 states that accredited investors must have a net worth of over \$1M or annual income of over \$200,000. While most angels in our sample are accredited investors, we do find occasional unaccredited investors participating in deals.

²⁰Some researchers such as Fenn and Liang (1998) specifically exclude family and friends from their definition of angels. Our general definition of angels, however, is intended to capture investors who are not professional managers of venture capital.

than the sample median. The presence of VCs thus appears to be virtually a necessity for closing large deals. Interestingly, the paucity of large angel deals in our sample is consistent with the contemporary informal impressions of practitioners of how the market is segmented (Linde et al. 2000). Moreover, these general characteristics of our data suggest that there are five subsamples of our overall data that deserve closer scrutiny, as they may indicate distinctly different deal types in each category: three subsamples based on investor composition (angel-only, VC-only, and mixed deals), and two subsamples sorted on size (large and small deals).

B Firm Characteristics

Table I reports means (standard deviations in parentheses) for numerous characteristics of the 182 firms in our overall sample, as well as across the five subsamples. We assess the representativeness of our overall sample by comparing the characteristics of our firms against those of 9,901 US-based firms with a first recorded investment occurring between 1993 and 2002 (our sample period) for firms founded between 1967 and 2002 (reflecting founding dates in our sample) that are recorded in the Thomson Financial Venture Economics database. We exclude deals labeled as buyout, acquisition, other or unknown. Out of the 182 deals in our sample, 111 also appear in the Venture Economics database (but without the full information to which we have access). We weight statistics from the Venture Economics sample to reflect the (below described) over-representation of recent deals in our sample. A detailed description of this comparison is found in the Appendix. Our sample is more West Coast- and Texas-centric than the full sample of Venture Capital deals, over-represents the period 2000-2002 relative to 1998-2000 and pre 1998, and covers slightly more smaller deals (mean \$6.14 million) with younger firms. The mean age in our sample 1.8 years vs. 3.1 years in VentureXpert. This difference is not due to the angel-only deals in our sample. Regarding industry, our sample is representative.

Panel B of Table I also shows three additional firm characteristics for which there are no comparable Venture Economics statistics. We find that most firms did not achieve milestones prior to Series A funding, with only 13% having products and 10% being involved in strategic alliances. These findings are consistent with the young age of our firms. Finally, for the firms in our sample, Brobeck represented the company 62% of the time, almost twice as often as they represented one or more of the investors for the deals in our sample (and this is relatively consistent across our subsamples).

C Investor Characteristics

We now provide more detailed information regarding the investors and investor composition of our deals. Panel A of Table II shows statistics regarding the pre-Series A ownership distribution. We obtain this information from the Series A capitalization tables, but the archive also contains explicit information describing pre-Series A financing using common shares in about a quarter of the cases (as shown in the last row of Panel A). Not surprisingly, founders retain most of the ownership of the company (approximately 90%) prior to the infusion of significant capital in the Series A round, with statistically insignificant differences in founder ownership across subsamples. As we report earlier, there are on average 2.78 founders per firm, but Panel A shows that smaller firms and firms that have only angel investors in the Series A round have fewer founders on average. Perhaps smaller scale firms require fewer principals to achieve the firm’s objectives, but it could also be that companies with fewer founders are unable to attract the same level of capital as firms with deeper management teams. As expected, the pre-Series A investment largely comes from angels (they obtain 7.6% of the common shares, compared to 2.9% for VCs).²¹

Panel B of Table II provides information related to the Series A round investors. The first two rows summarize key statistics reflected previously in Figures 1 and 2, most prominently that only 3 of the 91 large deals are angel-only deals, while 29 of the 91 small deals do not involve any VCs.

Founders sell on average almost half of their firm (46.2%) to investors during the Series A round, and somewhat more in larger deals (56.2%). Founders rarely invest money in their own firms in a Series A round (less than .1% of the total investment). In mixed deals, 23.4% of the investment comes from angels, and the balance from VCs. Finally, Panel B shows that, on average, 12.8 angels invest in angel-only deals, 4.8 VCs invest in VC-only deals, and a total of 14.5 investors participate in mixed-deals. Since angels typically do not have as much capital as VC firms, more angel investors are needed to fund an angel-only round.²² Mixed deals are larger, and thus should be expected to have more investors. This variation is helpful in identifying whether Finding 2 is related to a commons problem.

We find that only 9.3% of angels investing in Series A deals had previously invested in the same companies, though this proportion is twice as high for angel-only deals. Thus, the common perception that angels who participate in mixed deals are repeat investors

²¹All of the ownership percentages reported are based on shares issued in the seed and Series A round, rather than fully diluted shares that take into account warrants and options outstanding. To ensure that dilution does not have an impact on our regression results reported in the paper, we account for the existence of options and warrants, and for their dilutive effect (e.g., on the fraction of ownership sold in a Series A round), and find that our results are robust to these controls.

²²In our sample, the mean investment by an angel is \$150,375, while the median investment size is \$25,000, thus representing a highly skewed distribution which reflects the diverse set of investors captured in our angel category.

from the seed round is not supported by our data. However, it does suggest that, at least for early rounds, these investors do stage at the same rate as VCs. We observe the same VCs participating in both pre-Series A and Series-A rounds for a given company (7.1% on average). Panel B also shows that Brobeck invested in approximately one quarter of the deals it handled (either in common or preferred shares), and more so in the larger deals.

Additional investor characteristics are shown in Panel C of Table II. The post-money ownership figures follow from the pre-Series A and Series-A ownership fractions of the different investors, together with the fraction of the company sold in the Series A round. On average, founders retain majority ownership of their company following the Series-A round only in angel-only deals and small deals. Of course, as we shall see later, this does not necessarily translate into retaining full control of the firms given that founders hold common shares while outside investors predominantly hold preferred shares with more powerful control rights, including board seats.

Finally, in Panel B, we report proximity measures based on the zip code of investors relative to the zip codes of the corporate headquarters, using an automated Mapquest query (we observe zip codes for investors only in 136 of the deals). We find that investors were generally in similar geographic locales as the firms they invested in: 60% were within 3 hours of driving time from the firms they invested in, and 18% were within the same zip code. Investors are closer to the firm in smaller deals, and most likely to be in the same zip code for angel-only deals.²³

Given the restrictions we face in the use of our data, there is limited additional information that we can provide to better characterize the angels in our sample. For instance, we are unable to conduct searches that would provide additional information regarding angels' backgrounds (education, and technical and managerial experience), their prior investment experience, their age and wealth, and their relationships to the founders and to the other angels and VCs that invest with them in the deals. The only finer information we can provide is a summary of angel types, which we show in Figure 3. Approximately 70% of investors appear as individuals in the records documenting the Series A rounds. We believe that most of the 10% of investors that are categorized as "small company" are also individuals, investing through corporate vehicles for tax and estate-planning purposes. Together, these two categories make up over 80% of the dollars invested by angels in the mixed and angel-only Series A deals, and even a larger fraction in the angel-only deals. "Companies" and "others" (which include universities, non-profits, and governments) play relatively minor roles relative to individual investors. Note also that while Brobeck invested in a quarter of the deals, their overall stake (dollar weighted participation) in these companies is very

²³We also consider (unreported) probit models examining the likelihood that a given deal will be angel-only and VC-only financed given its other characteristics, and we confirm the univariate results reported in the paper.

small.

Figure 3 shows that angels who invest on their own are more likely to be individuals (82%) than those who invest alongside VCs (66%), though the difference is much smaller (88% versus 82%) if smaller companies and individuals are bundled together as a single category. We have also separately calculated the mean angel investment in angel-only and mixed deals, which are \$78,016 and \$55,771, respectively, for small deals, and the medians in both cases are very close to the overall angel median investment size of \$25,000 (since there are few large angel-only deals, it is not relevant to provide the analogous comparison for large deals). Though we have limited information about the angels in angel-only versus mixed deals, it does not appear that there is any significant difference between angels investing in either of these types of deals.

We consider robustness to two potential changes to our definition of angel investors. First, some of the investors we are classifying as angels may not necessarily be angels, and they also are likely not suitable to classify as VCs. These include the investors we tag as Other or Unknown in Figure 3, and include Universities, governments, and banks, for example. In our test of robustness, because these investors may not be suitable as either angels or VCs, we consider dropping these investors from consideration regarding our computation of our investor composition variables. Second, we examine robustness to reclassifying the investors in the “company” category in Figure 3 as VCs. Many of these companies are larger companies, and although they do not show up as VCs in our database by virtue of their not being in the Venture Economics database, they may still be investing in a manner consistent with traditional VC or CVC investment. For these investors, we thus consider reclassifying them from angels to VCs. We also note that we control for Brobeck itself as an investor, and hence we do not alter our consideration of this investor, which we do not treat as an angel or a VC. In all, we find that our results are highly robust to these alternative definitions of angels and VC investors.²⁴

As shown in Table III, compared to the population of VCs in VentureXpert, the VCs in our sample are more likely to be US- and California-based, more likely to manage early stage, but not seed stage nor buyout funds, are older, and have higher prestige and performance. This higher prestige and performance is most prominent in the subset of larger deals. Details of this comparison are found in the Appendix.

²⁴We summarize robustness in detail here. Our cashflow rights and control rights results are all robust except that our small and large subsample results for the redemption variable lose significance. All of our results regarding time to resolution, the prediction of successful exits, and the tests of our COI hypothesis are fully robust. Our results for billable hours are robust for the whole sample, but the small deal subsample result loses significance. In all, our results are robust to these alternative definitions of angel and VC investors.

V Deal Characteristics

We turn now to specifics about deal structure, including the types of securities issued and the terms involved. Preferred stock was sold in all but three of the Series A rounds in our sample. Table IV shows that warrants were also sold in 15% of the rounds, and more so in the smaller deals (20%). Employee option plans were set up in 69% of the rounds, and were more prevalent in the large deals (80% of the time) than in the small deals (only 57% of the time), perhaps due to the need to attract a larger and more diverse talent pool for these larger deals. Interestingly, we observe multiple within-round closings in 45% of the deals. This phenomenon, in which investors purchase more shares of the company at identical terms over a period of time, is referred to by Kaplan and Stromberg (2003) as “ex-ante staging”, and appears to be much less prevalent for VC-only deals. This might be due to the tighter control held by the few VC investors in these deals, and the deeper pockets of these VCs, allowing them to commit to immediate funding along with stronger terms. This might also lead to a more easily structured subsequent Series B round as soon as it is required and merited. We find that the average time between first and second closings is 153 days, though it is much longer for large deals (198 days on average).²⁵

One of the interesting facets of our data is that we are able to observe the number of hours billed by attorneys for each deal. Panel A of Table IV shows that the Series A deals resulted in an average of 169 billed hours per deal. We find that larger deals lead to more billed hours, as do mixed deals (and VC-only deals) relative to angel-only deals. Since one might not expect that the mere scale of a deal should be related to the amount of legal work, we surmise that the higher billed hours of larger deals may reflect that these deals are more likely to involve VCs, who may demand more complex contract terms and be more persistent in negotiating the terms of the deal.

We now turn to documenting the relationship between investor composition and cash-flow and control rights. In Panel B of Table IV, we summarize the rights associated with the Series A preferred stock based on a review of the closing documents for all the firms in our sample. Gompers (1999) and Kaplan and Stromberg (2003) document that preferred stock is typically differentiated from common stock through superior cashflow rights, voting rights, board representation, liquidation rights, redemption rights, and anti-dilution provisions (See, Bengtsson 2012; for a broader summary of existing empirical findings). Moreover, investment deals are often supplemented by a requirement that the founder’s stock be subject to vesting requirements. Consistent with these existing studies, we find substantial variation in the existence and extent of cash flow and control rights, particularly liquidation preferences, redemption rights, cumulative dividend rights, and seats on

²⁵The presence of multiple closings correlates little with outcomes.

the board of directors.²⁶

We classify board seats as being assigned to common shareholders using a two step procedure. First, in many cases, the documents identified which board seats were to be designated by common shareholders or Series A shareholders. Second, for cases in which seat ownership was not specified by share class, but individuals were, we used a fuzzy name matching algorithm to link specific board members to specific investors. As shown in Table IV, common and preferred shareholders have roughly the same representation (46% versus 54%) on the boards of companies across our whole sample. Not surprisingly, firms with VC-only and mixed Series A deals have more board seats assigned to preferred shareholders, as do larger deals, likely due to the larger size and higher concentration of VC participation in those deals.

Turning to cashflow rights, preferred shareholders sometimes have stronger residual cashflow claims in the form of cumulative dividend rights as opposed to regular dividend rights. With regular dividends, an annual payment, often a percentage of investment (generally 8%), is paid conditional on a positive shareholder vote. With cumulative dividend rights, this amount accumulates each year. The cumulative dividend clause is included in relatively few Series A deals (9% of our deals), and never appears when the deal has only angel investors. Cumulative dividends are seen as an investor-friendly term, and provide a strong incentive for the firm to accelerate to a successful exit event. We find that the term is most prevalent in VC-only deals, consistent with the notion that VCs are less patient investors and that they can exert stronger influence on deal terms when they invest on their own.

The variable *Liquidation* is a dummy variable indicating whether preferred shareholders have special liquidation cashflow rights going beyond their initial investment. A value of zero indicates that, after preferred shareholders receive their initial investment, all remaining proceeds upon liquidation go to common shareholders. The dummy variable *Cap on Common*, which takes a value of one for only two deals, indicates that common liquidation amounts are capped. When the *Liquidation* dummy takes a value of one, preferred shareholders have cashflow rights beyond their initial investment, and in all cases but two, they share these additional cashflows equally with common shareholders (in the two cases, all remaining proceeds go to preferred shareholders up to a specified cap). The mean liquidation dummy of 0.42 indicates that 42% of our sample deals provided strong liquidation rights to Series A investors. The dummy variable *Cap on Preferred*'s mean of 0.47 indicates that 47% of these stricter deals had an upper limit on the amount that can be paid to preferred shareholders. Because many preferred liquidation rights are capped, it is important to note

²⁶Practitioners classify these terms as investor friendly, entrepreneur friendly or neutral (Wilmerding 2003).

that when the company value upon liquidation is sufficiently high, preferred stockholders waive their liquidation rights, and convert their stock to common. Note that the liquidation preference specified in angel-only deals is much less favorable towards the investors, indicating that while angels enjoy some benefits of ownership of preferred, rather than common, shares, their cashflow rights are still relatively weak.

Finally, we find that preferred shareholders have the right to redeem their shares at will in about one quarter of our deals, typically after a period of time and usually conditional on a Series A majority or super-majority vote. Such a right would be invoked when a firm is not performing well, and is considered to be an investor-friendly term. Angels investing on their own seldom demand such a redemption right in their stock purchase agreements.

Given that Kaplan and Stromberg (2003) (KS) examine cashflow and control rights for a similar number of deals, but from a different source and an earlier time period, it is useful to provide a quick comparison of the terms of our respective deals. Our samples differ in important respects. Our data represent 182 series A investments in 182 portfolio firms made by 482 distinct venture capital firms. In contrast, KS analyze 213 investments (of which 98 are series A) in 119 portfolio firms made by 14 VC firms and their affiliates (KS do not report the total number of distinct VCs who invested in the deals in their sample). While they do not distinguish between pure-VC and mixed deals, KS find that non-VCs own, on average, a 20% (non-diluted) stake in investment targets following series A rounds, which compares to the 16% for mixed deals in our sample. In general, the deals in our sample involve weaker control right provisions.²⁷ For example, we find that only 8.8% of deals involve cumulative dividend rights, which is considerably below the frequency of 43.8% in KS. We also find that 23.6% of our deals have redemption features, compared to 78.7% reported in KS. (Interestingly, KS reported that 12.9% could redeem shares at fair market value, which is only slightly lower than the 16.4% in our sample). Finally, we find that 85% of our deals include anti-dilution provisions, with the weighted average method used in 92% of those cases, similar to the 95% of deals in KS that include anti-dilution protection, and the 78% of them that use the weighted average method.²⁸ The differences between our respective samples likely reflect the stage of the deals we analyze, and the presence of angel-only deals in our sample.²⁹

²⁷It is difficult to compare the success rates of the two samples, as KS do not report outcomes as hazards which would allow comparison of the likelihood of a given outcome.

²⁸We do not focus on anti-dilution provisions in our study given that there is little cross-sectional variation across the deals.

²⁹Gompers (1999) notes certain characteristics of his sample of fifty VC private placement agreements. These appear consistent with our sample. For instance, 51.4% of board seats are controlled by VCs, which is between the 47.8% we find for the VC-only deals and the 60.2% we find for mixed deals in our sample. However, redemption rights are found in 68% of the deals in Gompers' sample, which is more in line with KS than with our sample, again likely reflecting that their sample includes more later-stage rounds.

A Determinants of Deal Characteristics (Finding 2)

Simple crosstabs based on Table IV illustrate our finding quite well. Two measures of downside cash-flow protections are largely absent from angel-only deals. For cash flow rights, none of the angel-only deals receive cumulative dividends (compared to 16 in the broader sample). This univariate relationship is significant at the 5% level. Similarly, only 4 of 32 angel-only deals contain provisions for redemption rights (significant at the 1% level), as compared to 72 of the 150 deals that include VC investors. The presence of angels in VC deals is also associated with weaker rights. 10 of 102 (10%) of mixed deals have cumulative dividend rights, while 6 of 32 (19%) of VC-only deals have cumulative rights. In larger deals, liquidation rights are present in 10 of the 18 VC-only deals, but only 24 of the 73 mixed deals.

Table V reports the results of probit models predicting the likelihood of investor-friendly cumulative dividend and liquidation rights. Table VI reports the results of an OLS model predicting the fraction of board seats allocated to common shareholders (we have fewer observations for this test, 147, due to missing board data for some firms), and a probit model predicting the likelihood of redemption rights. All independent variables are standardized (except dummy variables), and we report marginal effects for all probit models in order to give our reported coefficients simple economic interpretations (how much a one standard deviation increase of a given variable impacts the dependent variable evaluated at the mean, or alternatively a switch from 0 to 1 for a dummy variable).

Table V and Table VI both illustrate that angel investors are associated with more founder friendly deal terms and here we provide evidence in support of our second key finding. We find evidence in Table VI that angel-only financings cede 19% greater board control to common shareholders (significant at the 10% level for the whole sample and for smaller deals). Given the mean value of 0.46, this is large. The table also shows, intuitively, that common shareholders receive greater board control (roughly 11% more per standard deviation) when a smaller fraction of the firm is being sold. In addition, in larger deals, VC-only deals have greater liquidation rights (73% more), and VCs are 39% more likely to have the ability to redeem shares. We do not find that VCs have more or less board seats or cumulative dividend rights when investing together with angels.

Finally, some additional results emerge in Table V and Table VI. Firms with more concentrated Series A investors (measured using a C4 index summing the shares of the four largest investors) are associated with weaker cashflow rights, but only for larger deals. This result is intriguing, as one might have expected greater investor concentration to be associated with greater bargaining power by the concentrated investor(s), and hence stronger investor rights. One explanation for the negative coefficient is substitution: the concentrated investor(s) may already have significant power over the firm and hence they

prefer to bargain for cashflow rights. The result is inconsistent with Rajan and Winton (1995)’s prediction that commons problems should lead to *weaker* investor rights.

Biotechnology firms are associated with 23% more board control for common shareholders, especially for smaller deals (30% more). This might be due to the more knowledge-intensive nature of this business. We also find that investors in firms that are more mature (measured by firm age) are roughly 7% more likely to seek cumulative dividend rights, especially when deals are large. Dividend rights strengthen incentives to speed up the commercialization and exit process, and this may only be effective when firms are mature enough to offer cashflows that might be used to pay future dividends. Deals in which Brobeck invested had stronger liquidation rights, suggesting that they either encouraged terms that were more investor-friendly, or they were more likely to invest when terms appeared to be more favorable to investors.

VI Outcomes

We now explore the relationship between investor composition and two dimensions of the firm’s outcome: time to resolution and the rate of successful exit via merger or IPO.

In Table VII, we provide some descriptive statistics regarding the outcomes of the 182 firms in our sample as compared to 9,902 firms in Venture Economics that recorded an initial financing during the comparable 1993-2002 time period. We further condition the Venture Economics comparison sample on US-based venture capital investment targets founded after 1967 with the first investment not labeled as buyout, acquisition, other or unknown. Outcome variables of the Venture Economics sample are as reported in that database, but weighted to reflect the distribution of deal origination dates in the Brobeck sample. We identify acquisitions and IPOs in our sample through archival sources such as press releases, as does Venture Economics for their universe of firms.³⁰

“Non-exited survival” for our firms is defined as the firm still being an ongoing private concern, and an independent company, as of December 2012. This status is based on the web and other public sources. Failure for firms in our sample indicates that the firm is not surviving and did not experience a positive liquidity event. Outcome variables for the Venture Economics sample are as reported in that database. Since firm failure is often a silent event, only liquidity events are reported reliably in Venture Economics. Finally, we use Venture Economics to identify which of our firms received a subsequent round of financing involving at least one VC investor.

³⁰Since we are unable to accurately value companies that have been acquired or continue as private companies, we cannot ascertain investors returns. Thus, we focus on determining the success of the companies in terms of survival and profitable exits, rather than measuring the magnitude of investment returns (Gompers, Kovner, and Lerner 2009).

The success of the firms in our sample closely parallels that for the Venture Economics firms. In our sample, 39.8% of the firms experience a successful liquidity event (IPO or acquisition), 14.4% are non-exited surviving firms, and the remaining 45.9% are failures. While the precise figures shown in Table VII for our sample and the Venture Economics data differ somewhat, the only statistically significant difference between them is that the incidence of acquisitions for our sample (36.5%) is significantly higher than that for the Venture Economics firms (17%). Looking across the different subsamples in Table VII, there are a couple of statistically significant differences in failure (larger companies have lower incidences of failure), acquisitions (larger companies are more likely to be acquired), and time to resolution (angel only deals are more likely to experience longer times to resolution). We will shortly examine these differences more carefully using multivariate regressions.

Finally, note that roughly half of the firms in our sample and three-quarters of those in Venture Economics have a subsequent financing round documented in Venture Economics (and thus involving at least one VC), but for angel-only firms, the fraction is much lower. Since it is known that the majority of companies having an IPO do not have VC backing, it is possible that many of the firms in our sample with angel-only Series A rounds simply continue to eschew VC financing over time. However, in unreported multivariate probit regressions, we find that while the incidence of future VC-backed financing is negatively related to angel-only Series A financing, the relationship is not statistically significant upon controlling for other factors. We find that the incidence of future VC financing is higher when the fraction sold at the time of the Series A round is higher (potentially indicating a more capital intensive business), the firm is older at the time of the Series A round, there are no product releases before the Series A round (suggesting perhaps that the firm is not able to self-finance quite as quickly), and the firm is not in the IT industry.

A Investor Composition and Time to Resolution (Finding 3)

Table VIII examines whether investor composition at the time of a transaction can predict the length of time it takes to observe final resolution, defined as either failure or a successful exit via merger or IPO. This test is motivated by the fact that institutional constraints give VCs a likely preference for faster resolution. If some firms foresee a longer time to resolution, such as a firm focusing on R&D with a potentially long development cycle, we would expect this firm to match more with angel investors who may not face these constraints. Analogously, many studies suggest that VCs play an active role in managing portfolio firms, and may “groom” these firms in a way that accelerates resolution. In this case, we would expect that the presence of VCs should predict a faster resolution. In the tests that follow, we include controls for various investor and firm characteristics, as well as industry and time dummies, and in all cases we report robust standard errors.

Table VIII displays the results of hazard models (columns 1, 3, 5) and a basic OLS model (columns 2, 4, 5) where the number of years to resolution is the dependent variable for all deals, large deals, and small deals, respectively. We display results for the Cox proportional hazards model, but we also note that our results are robust to using the Exponential Hazard Model or the Gompertz Hazard Model (not reported). For the Cox model, the table depicts the impact of each regression variable on the hazard rate.³¹ The negative and highly significant coefficient for Angel Only financing in columns 2 and 4 indicates that hazard rates are indeed lower when only angel investors are present and no VCs are present. This result obtains for the overall sample and for the small deals subsample. We do not find results for the large deal subsample because this subsample does not contain adequate angel only deals to run this analysis per earlier discussions.

Although the hazard model offers more consistency, we also include results for an OLS model where the dependent variable is the number of years to resolution. The results remain highly significant when compared to the hazard model as expected. We continue to find that deals financed by angels alone experience a longer time to resolution.

We conclude that investor composition is strongly related to the time to resolution. This finding might be due to increased patience on the part of angels (or a more pro-active focus on quick resolution by VCs), or it might be due to the fact that investors with weaker control and cashflow rights might lack the power, or the will, to force a generally unsuccessful firm to liquidate. Consistent with angels playing a more passive role, we later show that billable legal hours are lower for deals financed by angels alone.

B Investor Composition and Successful Exit (Finding 4)

We document the evidence in support of Finding 4 with multivariate probit regressions to further analyze the relationship between investor composition and successful exit. Table IX displays the marginal effects for probit models for the full sample as well as the large and small deal subsamples. The dependent variable is a dummy set equal to one for firms experiencing an IPO or an acquisition, and zero otherwise. We find that VC-only financed firms are more likely to experience these successful liquidity events, but only in the sample of large deals. This suggests a unique role for transactions where non-VC investors do not participate in the Series A round.³² The most direct explanation relates to certification, as

³¹As is customary with hazard models, for ease in interpretation, we report the odds ratios (OR) instead of coefficients. For example, for a dummy variable, the OR is the odds of IPO/Merger if the dummy equals 1 divided by the odds of an IPO/Merger if the dummy equals 0. ORs greater than 1 indicate a positive effect while ORs less than one indicate a negative effect.

³²We conduct many additional (unreported) robustness checks to ensure that our categorization of angel investors (e.g. angel investment groups, corporations, and Brobeck itself) does not affect our results. These tests uniformly produce results consistent with those displayed. In addition, we examine the impact of using cutoffs other than 100% when categorizing deals as angel-only or VC-only to see whether our results depend

full VC participation in a large deal could signal that the deal is on a fast track to resolution. We examine specific channels regarding this result in the next section.

C Conflicts of Interest and Managerial Characteristics

A key finding in the last section is that large deals are more likely to exit via merger or IPO when they have a venture capital only investor composition. Because large deals are almost never funded by angel investors only, this finding indicates that venture only deals outperform deals with mixed angel and VC investor composition. The most direct explanation is a selection argument and relates to certification. The strong form of the argument is that full VC participation in a large deal signals that the deal is on a fast track to resolution. Savvy entrepreneurs with high quality opportunities match with VCs, and choose not to accept funding from investors. The weaker form of this arguments adds that these savvy entrepreneurs are successful in matching with VCs in part *because* they have similar goals. The absence of angels further improves the firm’s prospects as it improves the efficacy of firm governance.

If angels are present, and their preferences are more closely aligned with entrepreneurs than are VCs, this may affect firm governance. Because angels typically invest less than VCs in the Series A financing, we do not expect potential conflicts of interest to be driven by direct battles of control among the Series A investors. Instead, we expect that angel investors may form coalitions with the founders that might be pitted against the interest of the VCs. Because the founders typically control the majority of the common shares, and VCs control the majority of the Series A shares, we expect these potential conflicts of interest to arise when founder-friendly angel investors are present, and board seats are close to evenly split between common and preferred shareholders.³³ Fortunately, sufficient data

on the strict purity investor identification. Since the lowest VC share in the mixed deal group is 26.3%, there are no “near angel-only deals”. In contrast, there are a number of mixed deals that have relatively minor angel participation (“near VC-only deals”); for instance, there are 62 deals that have at least 95% VC share Series A participation, which is dramatically larger than the 38 that are pure VC-only deals. Hence, there is some clustering near the VC-only extreme. In examining robustness to these less stringent definitions of “VC-only”, we find only minor changes in our results.

³³It is worthwhile to consider why an angel’s preferences might be more closely aligned with entrepreneurs than with VCs. One clear reason is that venture capital firms are known to seek liquidation within a fixed time frame, are often more pre-disposed to liquidate, and lead venture capitalists generally to seek to influence the way the firm is being run. In contrast, angel investors may prefer a slower and more certain resolution, may have strong opinions on management style given their technical expertise, and may still have other perspectives given they are often industry experts or friends of the founder. (Friends of the founder are often referred to as “family & friends”, while angels are sometime considered “outside” private equity. We are unable to distinguish between these two categories in our data.) Indeed, some surveys of angels ascribe non-pecuniary motivations (in a way that have been labeled “guardian angels” Linde et al., 2000). These characteristics may generate goal conflicts between the investors, or between the investors and the founder(s), or both. We conjecture that if angel preferences are more aligned with entrepreneurs than are VCs, the inferior performance of mixed composition deals noted in the last section should be more likely

exist to identify whether board seats are allocated to common or preferred shareholders, although we are unable to reliably identify if a board seat is occupied by a specific VC or angel investor.³⁴

One strategy to separate between the selection (or certification) and preferences explanation is to try to control for firm quality directly. While it is quite difficult for the econometrician to measure quality, we can make some (admittedly limited) progress on this front. For example, if the explanation is one of simple certification, we might expect characteristics of the entrepreneurs to be associated with investor composition. In particular, we should see relationships between investor composition and performance, and managerial characteristics. In particular, CEOs with more refined personal networks may be more likely to attract angel financing, and in turn, these managerial links may jointly explain investor composition and performance. Supportive of the first part of this prediction, Table X shows that managers who have an MBA, or those who worked at prior startups, might be more savvy and attract VC investors. The observation count for this test, which is also based only on large deals, is reduced to 66 due to the availability of CEO data to include in this study. To examine whether this link can explain outcomes, we examine if our performance results are robust to controls for these managerial characteristics in the outcome regressions.

Table XI examines the above predictions of the preferences and selections arguments. Following Table IX, we use probit regressions in which the merger/IPO dummy is the dependent variable. However, we restrict attention to large deals as our goal is to explain the results in Table IX regarding the superior performance of large VC-only transactions. The first column reproduces the key result from Table IX, but now based on the smaller subsample of 77 large deals for which we have board data. We find that the key VC-only variable is positive and significant in this subsample.

The second column adds the split-control dummy. We further distinguish between investor composition and split control by adding an interaction term between the split-control dummy and the VC-only dummy as well as an interaction term between one minus the split-control dummy and the VC-only dummy. The second column shows that only the former

when the firm's governance is most sensitive to conflicts of interest. This problem will manifest when board seats are more evenly balanced between common shareholders and preferred Series A shareholders.

³⁴We thus define a split-control dummy as being equal to one if preferred shareholders hold between one third and two thirds of board seats (inclusive of the boundaries), and zero otherwise. Close to half of the firms in our sample qualify as split-control under this designation, indicating that we have ample power to test this hypothesis. Of course, a finding of a correlation between split-control and firm performance does not necessarily imply causality. For example, even though our results suggest it may be harmful to do so, VCs may work to create cleaner governance structures including split boards that alleviate potential issues with entrenchment or agency problems related to private benefits of full control. Alternatively, firms with split control might reflect the need for more diverse advice and skills. These types of firms may be more difficult to bring to successful exit.

term is positive and significant. In contrast, the second term is negative and insignificant. The third column restates the same result as in the second column using a level plus cross term approach. These findings suggest that the superior performance of VC-only deals relative to mixed investor composition deals is most extreme for deals that have a board composition reflecting split control between founders and VCs. This result is consistent with both the strong and weak forms of the selection argument. If these deals are indeed better ex-ante, then savvy entrepreneurs will match with VCs and refuse to match with angels. Given the high deal quality they will have greater bargaining power and VCs will invest with fewer protections. The weaker form of the argument would suggest that VC preferences are more strongly aligned with these entrepreneurs than in other deals in which angels are involved. This would suggest that the presence of angels either creates more conflict between the entrepreneurs and VCs, or angels were invited by the entrepreneurs because of better preference alignment, and weaker alignment with VCs.

The fourth column of Table XI explores one dimension in which preferences might diverge. The hypothesis is that the time to resolution should also be longer if angels preferences differ in terms of time horizons. In particular, we thus predict that the same variables that predict merger or IPO outcomes in the first three columns should be negatively related to the time to resolution. We focus in particular on the Split Control x VC Only cross term. The results show that this variable is indeed negatively related to the time to resolution, and this result is significant at the 5% level. As was the case in the outcomes regression, the split control dummy and the separate VC only levels variable are not significant. We conclude that the same mixed and VC-only deals that have inferior outcomes that are related to split control also indeed have longer times to resolution. Note that while a selection argument based on angel naïveté also predicts that angel associated deals should have inferior outcomes, this inferiority should be associated with the presence of angels generally, and not large deals that also have VCs involved.

To the degree that entrepreneur's characteristics are associated with deal quality, the fifth column of Table XI further examines the selection hypothesis. Although some managerial characteristics are related to outcomes (managers who have an MBA are less likely to exit via merger or IPO, significant only at the 10% level), the key finding in this specification is that these controls do not subsume the VC-only variable. In fact, when compared to the first column, the VC-only coefficient actually becomes stronger when managerial characteristics are added. VC-only is also significant at the 1% level, as compared to the 5% level in column one. Thus if VCs are selecting higher quality deals, these characteristics are not easily measured by the econometrician.

We caution that this is a small sample and hence only a small number of deals fall into these sub-categories. Testing whether large deals that are also VC-only with split control

have differing performance is pushing the limits of the information in the data. As such, we should interpret our results regarding exits as interesting, and have a bit more confidence in our results regarding time to resolution as this is a more high-fidelity measure. This contrasts with our results regarding investor rights, which is tested on several different control and cashflow rights measures.

Our final test is indirect. If angels are either naive or preferences are more closely aligned with entrepreneurs, and this drives the weaker investor rights in angel deals, this should be reflected in the use of legal representation in these deals. A unique characteristic of our sample is that we can observe billable hours. We can test whether there will be fewer billable hours due to contract simplicity and the likelihood that angel investors will raise fewer legal issues than institution-minded venture capital investors.

Table XII displays results of regressions where the natural logarithm of total hours billed (specifically due to the Series A financing) is the dependent variable. The table shows that angel-only transactions indeed generate fewer billable hours. This result is significant at the 10% level and thus only weakly supports the expanded hypothesis. In small deals, VC-only deals are associated with significantly more billable hours. Thus, the presence of angels is associated with less legal representation in these smaller deals. Taking into account the similar outcomes in smaller deals, it does not appear that the angels are making poor investment decisions relative to VCs. However, we do note that the presence of angels is associated with fewer billable hours in larger deals. Thus, this test provides mixed support for our hypothesis.³⁵

We also consider one additional test of the different preferences hypothesis that focuses on angel and founder coalitions in particular, which we do not report to conserve space. We note that 33 of the deals in our large firm subsample have more than one closing date for the Series A financing. The interesting question is whether angels or VCs participate more aggressively in the first closing as compared to the second closing. If angels participate more aggressively in the first closing, it is more likely that the particular angels in the deal were

³⁵The table also documents that size, concentration (c4) of angel investors (in small deals) the number of closings, and the existence of warrants are positively correlated with the number of billable hours. These variables likely proxy for deal complexity, as more complex transactions likely require additional legal protection. Regarding size, potential reputation and legal risk for a law firm may be more significant when dealing with larger companies (otherwise, there are less benign explanations for why larger clients are associated with higher billed hours). These findings lend some indirect support to Rajan and Winton (1995)'s hypothesis that a commons problem leads to fewer investor rights. While not reported, the relationship between angel-only and billable hours is robust to the inclusion of the control rights measures *Liquidation*, *Redemption*, *Cumulative* and *Common or VC Board seats*. The table also shows that billable hours are negatively correlated with the fraction of the firm being sold. This result might be driven by firm maturity, as firms selling a larger fraction might be younger firms, which in turn require less legal expertise due to their simpler corporate structures. Alternatively, naive entrepreneurs may simultaneously sell large shares of their firm and not negotiate hard on terms. Finally, note that billable hours increase somewhat in the later periods of the sample, and are significantly higher for Californian start-ups.

invited to participate by the founder. In this case, the conflicts of interest we propose, in particular those associated with the founder and the angels acting as a coalition potentially opposing the VCs, is more likely to apply. We thus predict that deals having this “angels lead and VCs follow” pattern in the multiple closings are more likely to experience inferior outcomes and longer times to resolution as we found in the above tests. Analogously, if VCs lead in the first closing, and angels invest more in the second closing, it is more likely that the VCs invited the given angels to participate in the deal, and the given configuration would thus be less consistent with our preferences hypothesis rooted in angel and founder coalitions. We thus do not predict any abnormal performance for these “VCs lead and angels follow” transactions. Of the 33 deals with multiple closings, we find that 5 are “angels lead and VCs follow” and 12 are “VCs lead and angels follow”. Although these samples are small and power is limited, we find suggestive support for our preferences hypothesis. In particular, we find that the deals in which “angels lead and VCs follow” indeed experience inferior outcomes. All five of these deals fail, and overall this status is correlated with less successful exit and also a longer time to resolution, both being statistically significant despite the small sample. This status also correlates positively with having a split board, but in this case the significance level is just below the 10% level with a p -value of 14%. Analogously, we do not find any significant results for the 12 deals that are “VCs lead and angels follow”.

Overall, we find support for the preferences hypothesis. This suggests that VCs do not simply certify deals, but that investor composition itself might also improve the governance quality of the deal. We also test whether another set of observables, in particular entrepreneurial characteristics, can subsume our VC only coefficient results and find that it cannot. This final result suggests that if our results are due to VC certification, it is likely that the VCs are certifying based on more difficult to observe firm *intangibles*.

D Additional Robustness

There are other potential explanations for our key finding that VC-only deals have a higher incidence of successful liquidation vis a vis mixed deals. The superior performance of larger VC-only deals might also arise if some deals require more VC-coaching effort than others, and if VCs seek to disallow angels from free-riding when the cost of their managerial effort is high. This hypothesis is consistent with the stronger control rights we observe for VC-only deals, as greater control might be necessary to leverage the effectiveness of this effort. This greater effort, in turn, can explain the superior outcomes we observe, and can also explain why these outcomes are only superior for larger deals where the incentives to provide effort are greatest. However, we view this as being nested within the preference-differences hypothesis described in the last section. The issue of free riding versus reward

for managerial effort is a specific form of conflict of interest. Because we find some support for hypothesis that angel preferences differ from VCs, our findings are not inconsistent with this more specific hypothesis.

It is also possible that VC-only deals outperform in the large deal sample because such deals attract higher quality VCs. This hypothesis rooted in heterogeneous VC quality is distinct from the earlier discussed hypothesis suggesting that full VC participation in itself serves as a separate form of certification. Higher quality VCs may simultaneously demand more investor friendly terms, and due to their greater abilities, are also able to better guide the project post-financing. Hsu (2004) finds evidence that entrepreneurs will pay more for high status VCs. However, in contrast to the findings of Bengtsson and Sensoy (2011), additional tests reveal that the outperformance of VC-only deals in the large deal sample likely cannot be attributed to certification. Based on a number of measures including age, size, successful exit rates of investments targets, and centrality (Piskorski and Anand 2007), we do find that VCs investing on their own have slightly higher prestige than those co-investing with angels. However, the difference in prestige between VCs investing in VC-only and mixed deals is rather small relative to the very large difference in prestige between VCs investing in Brobeck deals relative to the non-Brobeck VCs in Venture Economics. This likely explains the contrasting findings to Bengtsson and Sensoy. Hence, it is perhaps not surprising that (in unreported regressions) we find that the prestige of the VCs investing in a company is not significantly related to control rights, liquidation rights or outcomes. Moreover, the VC-only variable remains significant when we include various controls for prestige and ability.³⁶ This result is also inconsistent with a bargaining power hypothesis if we expect that top VCs simply demand greater rights as in Hsu (2004).

It is also possible that mixed deals with split boards are inherently more complex than others, and because of this, experience inferior outcomes. If so, this would be a phenomenon isolated among larger deals, which is not a clear prediction, as we fail to find any analogous results for smaller deals. Nevertheless, our analysis alone cannot rule out this selection argument.

VII Conclusion

This experimental project stemming from the proposed Brobeck archive provides a unique opportunity to better understand the role of angels in financing startups. Two unique features of our sample make it ideally suited to examine how VCs and angels interact when

³⁶We use a variety of different prestige variables constructed from the statistics in Panel B of Table III, as well as an index based on these measures. The VC prestige for each of the 150 firms' Series A deals in which there is non-zero VC investment is based on a dollar weighted average or an equal weighted average of the prestige scores for the VCs investing in the deal.

both groups are active investors in the same group of transactions. First, our sample offers a high degree of heterogeneity in investor composition. Second, entrepreneurs in these deals have a meaningful choice between both investor types.

Consistent with conventional wisdom, we also find that angels make smaller investments than do venture capitalists while obtaining weaker control and cashflow rights (Ibrahim 2008; Wiltbank and Boeker 2007; ?). However, our results do not fully support the conventional wisdom that angels tend to invest only in common stock, and exert influence mainly through social networks rather than through formal control rights (Ibrahim 2008; Wilmerding 2003). We find that angels frequently invest alongside VC firms, purchase the same preferred stock as VCs, and do obtain some formal control rights by doing so.

We interpret our results as supporting a hypothesis that, on average, angel investors' preferences are more aligned with entrepreneurs than with VCs. This can explain why angels invest with weaker investor rights than do VCs. Simply put, weaker conflicts of interests require fewer protections. Thus, we offer a simple explanation to an apparent paradox that angels invest with weaker rights than VCs, even under greater uncertainty. We cannot rule out all alternative explanations, and in particular all selection arguments. However, our results are best interpreted in the light of the extensive survey evidence, as summarized in Shane (2008a) which describes the diversity of motives of angel investors. While some seek only profit, most have longer time horizons, and seek non-pecuniary rewards from their investment activities. Thus, it should not be surprising that such investors are also willing to forgo draconian contracts.

Appendix: Sample Comparisons to VentureXpert Data

A Target Firm Comparison

From Panel A of Table I, one can see that our sample has a locational bias consistent with Brobeck’s geographical footprint, with a much higher concentration of deals associated with firms based in California (53% vs 36%) and Texas (21% vs 6%). In the “other states” category, 7% of the Brobeck firms are from Colorado, 8% are from the Northeast Corridor (Pennsylvania, New York and New England), and the remaining 11% are scattered in the Midwest, South, Mid-Atlantic, and Washington State, while over 20% of the Venture Economics deals are from the Northeast Corridor and only 2% are from Colorado. However, there are no statistically significant differences in location across the two size subsamples and the three investor composition subsamples.

We use the Venture Economic Industrial Classifications (VEIC) to identify industries, and classify the 71 deals from our sample that were not also in Venture Economics using information from the Brobeck corpus, the World Wide Web and press accounts. We classify 73% of our sample firms as Information Technology firms, as compared to 69% for the Venture Economics firms. Another 12% of our sample firms are Medical/Health/Life Science companies versus 13% of the Venture Economics firms. The remainder of our firms are either non-high-technology or unclassified. Overall, our sample firms are quite representative in terms of the concentration in technology and life science industries found for new ventures tracked by Venture Economics. Furthermore, there are no significant differences in industry classification across the size and investor composition subsamples.

In Panel B of Table I, we show that our sample over-represents deals from the most recent subperiod of our study. Half of our Series A rounds occurred after March 2000 (when the Nasdaq index began its precipitous drop), as compared to 35% for the subset of Venture Economics firms we examine (with a comparable proportion during the boom period of 1998 to 2000). This may reflect a deliberate surge in Brobeck’s business from 2000 to 2002, or alternatively, an increasing reliance on electronic record keeping. Note also that smaller deals are more concentrated in the earlier periods, which likely reflects the propensity to favor larger deals over time (in part due to the fact that deal size is in nominal dollars). However, we do not find any significant increasing or decreasing trends in the occurrence of angel-only or VC-only deals over time.

With respect to deal size, the mean investment size for Series A deals in our sample is \$6.14 Million, which is statistically smaller than the mean of \$7.15 Million for the Venture Economics firms. While not shown in the table, key percentiles of the deal size distribution for the Brobeck firms (and Venture Economics firms in parenthesis) are: 25th percentile is \$1.49 Million (\$1.5 Million); median is \$3.50 million (\$3.89 Million); and 75th percentile

is \$6.96 Million (\$8.0 Million), so there is a marked similarity between the low end of the distribution of deal size within our sample relative to the Venture Economics sample, but the right tail of the Venture Economics sample is longer. As was also shown in Figure 2, angel-only deals are much smaller than mixed deals. There is no statistically significant size difference between VC-only and mixed deals. Because we also have information regarding the fraction of each firm that is sold at the time of the Series A deal, we also can report that the average post-money valuation of firms in our sample is \$14.9 million, as compared to \$24.4 million in Venture Economics. This number is also smaller for angel-only deals (\$6.1 million) versus either VC-only or mixed deals (roughly \$16.5 million for both groups).

In terms of age, our sample is overwhelmingly composed of firms that are true start-ups with very recent incorporation dates. The average age is 1.8 years (we can only identify incorporation dates for 85% of the firms in our sample). In contrast, firms experiencing Series A rounds in Venture Economics over the same time period have an average age of 3.1 years (97% of firms have available data). Hence, it appears that Brobeck represented firms that were somewhat less mature than Venture Economics firms.³⁷ In the Venture Economics sample, deal size and valuations are correlated with firm age. Hence the differences in age in the samples is consistent with the differences in deal size and post-money valuations.

We find that angel-only deals are just under two months older than VC-only deals on average (2.1 years vs 1.8 years), and three months older than mixed deals (1.7 years). Thus, the fact that Venture Economics does not track angel-only deals does not explain the higher average age for the Venture Economics firms relative to the firms in our sample. We observe age for 28 of the 32 angel-only deals. At time of funding, the youngest quartile of firms is less than 4.6 months old, the median firm is 9 months old, while the top quartile is over 1.5 years old. The oldest angel-only backed firm is 24 years old, reflecting a skewed distribution. For the 95 mixed deals for which we observe age, the youngest quartile, median, oldest quartile, and maximum age are two months, 6.5 months, 1.2 years and 34.5 years, respectively. Finally, for the 32 venture only deals, these four statistics are 5 weeks, 4 months, 1.75 years and 15 years, respectively. A cautionary note is in order. Based on public sources, it is often not possible to ascertain the date of founding with precision. The Venture Economics database commonly assigns January 1st as a founding date when only the founding year is

³⁷To calculate age for companies in the Brobeck sample we first looked to documents in the Brobeck collection, which often included incorporation dates. When dates were absent from the Brobeck records, we consulted public sources such as company websites, the Internet Archive (www.archive.org) and press releases. Finally, we relied on Venture Economics if the firm was venture backed and we were unable to date the company based on other sources. To check if this caused any biases, we compared the age in Venture Economics to that from the other sources for 102 of the companies for which we observe age from both sources. Based on Venture Economics, these companies were approximately six months older at time of financing than based on the other sources. However, this difference is not statistically significant. Hence, biases in the data sources do not explain the age differences between the Brobeck sample and the Venture Economics sample.

known. To maintain comparability, we followed this convention.

Our sample is thus quite representative relative to firms with Series A deals in the Venture Economics database in terms of industry, but there are also systematic differences with regards to timing, size, age and location. Biases associated with sample selection could affect our results if, for example, there are systematic differences in control rights between the East and West coasts, as suggested by Gupta (2000), or changes in the structure of deals following the peak in new technology venture creation in 2000. We thus control for firm characteristics in the multivariate regressions we present later, both to ensure that the unique characteristics of our sample do not drive any of our results, as well as to see whether the cross-sectional variation in these characteristics within our sample are systematically related to the structure of deals and company success.

VC-Firm Comparison

Since most of the VCs investing in Brobeck deals are included in the Venture Economics database, we can provide a more in-depth comparison of the VCs that invest in the 150 Brobeck deals involving VCs relative to the other VCs tracked by Venture Economics. Table III documents various attributes of these VC firms, and highlights any differences between VCs investing in small versus large deals, or in VC-only versus mixed deals. All data, except the centrality measures, are obtained directly from the Venture Economics database.³⁸ For each private equity fund that invested in one of our sample deals, we aggregate the fund-level information to the VC firm level (and identify this as a “Brobeck VC Firm”). For the universe of Venture Economics VC firms, we exclude firms whose last investment occurred prior to 1993 or whose first investment occurred after 2002 (i.e., outside of our sample period), which yields 5,585 “Non-Brobeck” VC firms.

Panel A of Table III shows that VCs participating in Brobeck deals are more likely to manage US-based funds, in particular California-based funds. They are also more likely to manage early stage funds, but not seed stage funds. In addition, these private equity managers are more likely to manage VC funds and less likely to manage buyout funds. Private equity firms investing in VC-only deals are more likely to manage US funds and with slightly less of an early stage VC focus, as compared to those investing in mixed deals in our sample (while VCs in small and large deals are fairly similar across all these dimensions). We find that Brobeck VC firms are older, and particularly those investing in VC-only deals.³⁹

³⁸We thank Mikolaj Jan Piskorski for sharing centrality measures based on Venture Economics data. Piskorski and Anand (2007) calculate eigenvector centrality (Bonacich 1972) through 1999. We matched Piskorski and Anand’s 1999 centrality measures to VC firms in our sample.

³⁹We have also conducted a multivariate analysis predicting whether a VC firm becomes affiliated with

Because age is likely related to long-term success as well as greater VC experience, it appears that VC firms investing in Brobeck deals have higher prestige. Panel B of Table III includes other variables that may proxy for prestige. For example, we find that VC firms that invest in Brobeck deals have a higher incidence of IPOs and acquisitions across all of the companies they invested in through all of their funds.⁴⁰ We also find that Brobeck PE firms have raised more venture funds, have managed more capital (per fund and overall), and have a higher centrality measure. While VCs participating in large vs small Brobeck deals do not differ across these dimensions, those investing in VC-only deals in our sample have higher success through liquidity events, more funds under management, and more total capital raised than those in mixed deals. Overall, this suggests that VC firms investing in Brobeck deals, and particularly in deals where there are no angels, appear to have high prestige. This is consistent with our belief that Brobeck's reputation allowed it to attract higher quality clients – both more prominent VCs, and higher quality start ups.

a Brobeck Series A deal, and this analysis yields similar conclusions to those indicated by the univariate statistics.

⁴⁰Ivanov, Krishnan, Masulis, and Singh (2008) find a positive relationship between IPO rates and VC reputation.

References

- Aghion, P. and P. Bolton (1992). An incomplete contracts approach to financial contracting. *The Review of Economic Studies* 59(3), 473–494.
- Aghion, P. and J. Tirole (1994). The management of innovation. *The Quarterly Journal of Economics* 109(4), 1185–1209.
- Bengtsson, O. (2011). Covenants in venture capital contracts. *Management Science* 57(11), 1926–1943.
- Bengtsson, O. (2012). Financial contracting in U.S. venture capital: Overview and empirical evidence. *The Oxford Handbook of Venture Capital*, 509–541.
- Bengtsson, O. and B. A. Sensoy (2011). Investor abilities and financial contracting: Evidence from venture capital. *Journal of Financial Intermediation* 20(4), 477–502.
- Bernstein, L. (1995). The Silicon Valley lawyer as transaction cost engineer. *Oregon Law Review* 74, 239.
- Bonacich, P. (1972). Factoring and weighting approaches to status scores and clique identification. *Journal of Mathematical Sociology* 2, 113–120.
- Brav, A. and P. Gompers (1997). Myth or reality? The long-run underperformance of initial public offerings: Evidence from venture capital and nonventure capital-backed companies. *Journal of Finance* 52, 1791–1822.
- Broughman, B. and J. Fried (2010). Renegotiation of cash flow rights in the sale of vc-backed firms. *Journal of Financial Economics* 95(3), 384–399.
- Casamatta, C. (2003). Financing and advising: Optimal financial contracts with venture capitalists. *The Journal of Finance* 58, 2059–2085.
- Chemmanur, T. and Z. Chen (2006). Angels, venture capitalists, and entrepreneurs: a dynamic model of private equity financing. *Unpublished working paper, Boston College, Boston, MA*.
- Cochrane, J. (2005). The risk and return of venture capital. *Journal of Financial Economics* 75, 3–52.
- Da Rin, M., T. Hellmann, and M. Puri (2013). A survey of venture capital research. In *Handbook of the Economics of Finance*. Elsevier.

- Dessein, W. (2005). Information and control in ventures and alliances. *Journal of Finance* 60(5), 2513–2549.
- Dzienkowski, J. and R. Peroni (2002). The decline in lawyer independence: Lawyer equity investments in clients. *Texas Law Review* 81, 405.
- Fairchild, R. (2011). An entrepreneur’s choice of venture capitalist or angel-financing: A behavioral game-theoretic approach. *Journal of Business Venturing* 26(3), 359–374.
- Fenn, G. W. and N. Liang (1998). New resources and new ideas: Private equity for small business. *Journal of Banking and Finance* 22, 1077–1094.
- Fenn, G. W., N. Liang, and S. Prowse (1995). The economics of the private equity market. Technical report.
- Freear, J., J. E. Sohl, and W. Wetzel (2002). Angles on angels: financing technology-based ventures - a historical perspective. *Venture Capital: An International Journal of Entrepreneurial Finance* 4(4), 275–287.
- Freear, J., J. E. Sohl, and W. E. Wetzel Jr (1995). Angels: personal investors in the venture capital market. *Entrepreneurship & Regional Development* 7(1), 85–94.
- Gompers, P. (1995). Optimal investment, monitoring, and the staging of venture capital. *Journal of Finance* 50(5), 1451–1490.
- Gompers, P. (1999, January). Ownership and control in entrepreneurial firms: An examination of convertible securities in venture capital investments. Working Paper, Harvard University.
- Gompers, P., A. Kovner, and J. Lerner (2009). Specialization and success: Evidence from venture capital. *Journal of Economics and Management Strategy* 18(3), 817–844.
- Gupta, U. (2000). *Done deals: Venture capitalists tell their stories*. Cambridge, Mass.: Harvard Business School Press.
- Hall, R. and S. Woodward (2007, April). The incentives to start new companies: Evidence from venture capital. Working Paper 13056, National Bureau of Economic Research.
- Hellmann, T. (2002). A theory of strategic venture investing. *Journal of Financial Economics* 64(2), 285–314.
- Hochberg, Y., A. Ljungqvist, and Y. Lu (2007). Whom you know matters: Venture capital networks and investment performance. *Journal of Finance* 62(1), 251–301.

- Hölmstrom, B. (1979). Moral hazard and observability. *The Bell Journal of Economics*, 74–91.
- Hsu, D. (2004). What do entrepreneurs pay for venture capital affiliation? *The Journal of Finance* 59(4), 1805–1844.
- Ibrahim, D. M. (2008). The (not so) puzzling behavior of angel investors. *Vanderbilt Law Review* 61, 1405–1452.
- Ivanov, V., C. Krishnan, R. Masulis, and A. Singh (2008, February). Does venture capital reputation matter? Evidence from successful IPOs. Working Paper, Case Western University.
- Jensen, M. C. and W. H. Meckling (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics* 3(4), 305–360.
- Jovanovic, B. and B. Szentes (2007, January). On the return to venture capital. Working Paper 12874, National Bureau of Economic Research.
- Kaplan, S. and A. Schoar (2005). Private equity performance: Returns, persistence and capital flows. *Journal of Finance* 60(4), 1791–1823.
- Kaplan, S. N. and P. Stromberg (2003). Financial contracting theory meets the real world: An empirical analysis of venture capital contracts. *Review of Economic Studies* 70, 281–315.
- Kaplan, S. N. and P. Stromberg (2004). Characteristics, contracts, and actions: Evidence from venture capitalist analyses. *The Journal of Finance* 59(5), 2177–2210.
- Kerr, W. R., J. Lerner, and A. Schoar (2011). The consequences of entrepreneurial finance: Evidence from angel financings. *Review of Financial Studies*.
- Kostal, S. (2003, July). The Brobeck mutiny. *San Francisco Magazine*, 73ff.
- Lacetera, N. (2009). Different missions and commitment power in R&D organization: Theory and evidence on industry-university alliances. *Organization Science* 20(3), 565–582.
- Lerner, J. and R. P. Merges (1998). The control of technology alliances: An empirical analysis of the biotechnology industry. *Journal of Industrial Economics* 46(2), 125–156.
- Linde, L., A. Prasad, K. Morse, M. Utterback, H. Stevenson, and M. Roberts (2000). Venture support systems project: angel investors. *Unpublished manuscript, MIT Entrepreneurship Center*.

- Ljungqvist, A. and M. Richardson (2003, January). The cash flow, return and risk characteristics of private equity. Working Paper 9454, National Bureau of Economic Research.
- Meggison, W. and K. Weiss (1991). Venture capitalist certification in initial public offerings. *Journal of Finance* 46(3), 879–903.
- Moskowitz, T. and A. Vissing-Jorgensen (2002). The returns to entrepreneurial investment: A private equity premium puzzle? *The American Economic Review* 92(4), 745–778.
- Murphy, B. J., K. D. Dillman, and J. O. Johnston (2005, February 18). re: Brobeck, Phleger and Harrison L.L.P., debtor, motion for order (a) approving settlement agreements with 189 former partners of the debtor... (Case 03-32715-DM7 Bankruptcy N.D. California).
- Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of financial economics* 5(2), 147–175.
- Piskorski, M. J. and B. Anand (2007). Status without resources? Evidence from the venture capital industry. Working Paper, Harvard University.
- Prowse, S. (1998). Angel investors and the market for angel investments. *Journal of Banking and Finance* 22, 785–792.
- Puri, M. (1996). Commercial banks in investment banking conflict of interest or certification role? *Journal of Financial Economics* 40(3), 373–401.
- Rajan, R. and A. Winton (1995). Covenants and collateral as incentives to monitor. *The Journal of Finance* 50(4), 1113–1146.
- Reynolds, P. (2005). *Entrepreneurship in the United States: The future is now*. Miami: Florida International University.
- Robb, A. M. and D. T. Robinson (forthcoming). The capital structure decisions of new firms. *Review of Financial Studies*.
- Sappington, D. (1983). Limited liability contracts between principal and agent. *Journal of Economic Theory* 29(1), 1–21.
- Schwiebacher, A. (2007). A theoretical analysis of optimal financing strategies for different types of capital-constrained entrepreneurs. *Journal of Business Venturing* 22(6), 753–781.
- Shane, S. (2008a). *Fool's Gold?: The Truth Behind Angel Investing in America*. Oxford University Press.

- Shane, S. (2008b). *The Illusions of Entrepreneurship: The Costly Myths that Entrepreneurs, Investors and Policy Makers Live by*. Yale University Press.
- Smith Jr, C. W. and J. B. Warner (1979). On financial contracting: An analysis of bond covenants. *Journal of financial economics* 7(2), 117–161.
- Vronsky, P. M. (2007, November). Venture Capital Law Firms: An Analysis of Equity Investment and Networks. Available at SSRN: <http://ssrn.com/paper=1088545D>.
- Wilmerding, A. (2003). *Term Sheets & Valuations: An inside look at the intricacies of term sheets & valuations*. Aspatore.
- Wiltbank, R. and W. Boeker (2007, November). Returns to angel investors in groups. Available at SSRN: <http://ssrn.com/paper=1028592>.
- Wong, A., M. Bhatia, and Z. Freeman (2009). Angel finance: The other venture capital. *Strategic Change* 18(7-8), 221–230.
- Woodward, S. and R. Hall (2004, January). Benchmarking the returns to venture. Working Paper 10202, National Bureau of Economic Research.

Figure 1: **Angel share of deals by number of investors and dollars.**

The figure depicts how deals vary in their investor composition. Top panel: frequency of different investor compositions (fraction of angel investors in deal), unweighted by investment amounts. Bottom panel: frequency of different investor compositions weighted by dollars invested. Both graphs are based on the entire sample (182 firms).

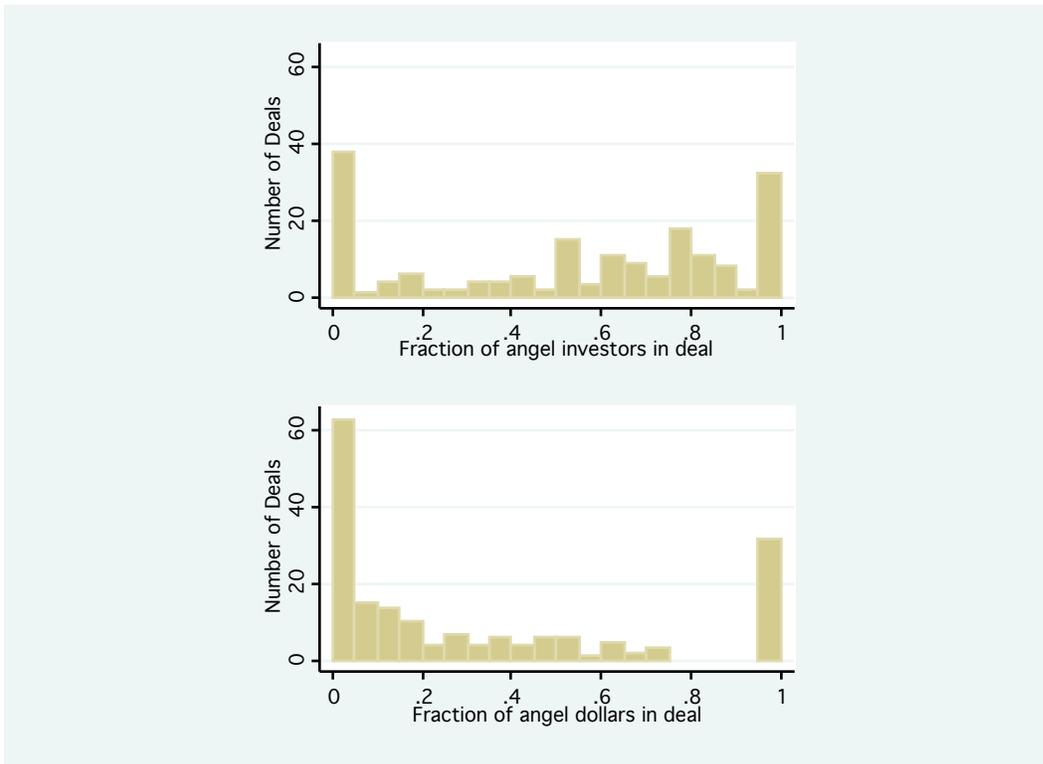


Figure 2: Investment size distribution by investor composition

The figure depicts the distribution of investment size for 32 deals where only angels participated (angel-only deals), 111 deals where both angels and VCs participated (mixed deals) and 38 deals in which only VCs participated (VC-only deals). The size of the deal is measured in millions of dollars. The distribution of the 20th, 40th, 60th, 80th and 90th percentiles are noted by 20, 40, 60, 80 and 90 respectively. The number of deals of magnitude above or below the 50th percentile of all deals for each of the investor composition groups appears to either side of the median deal size vertical line.

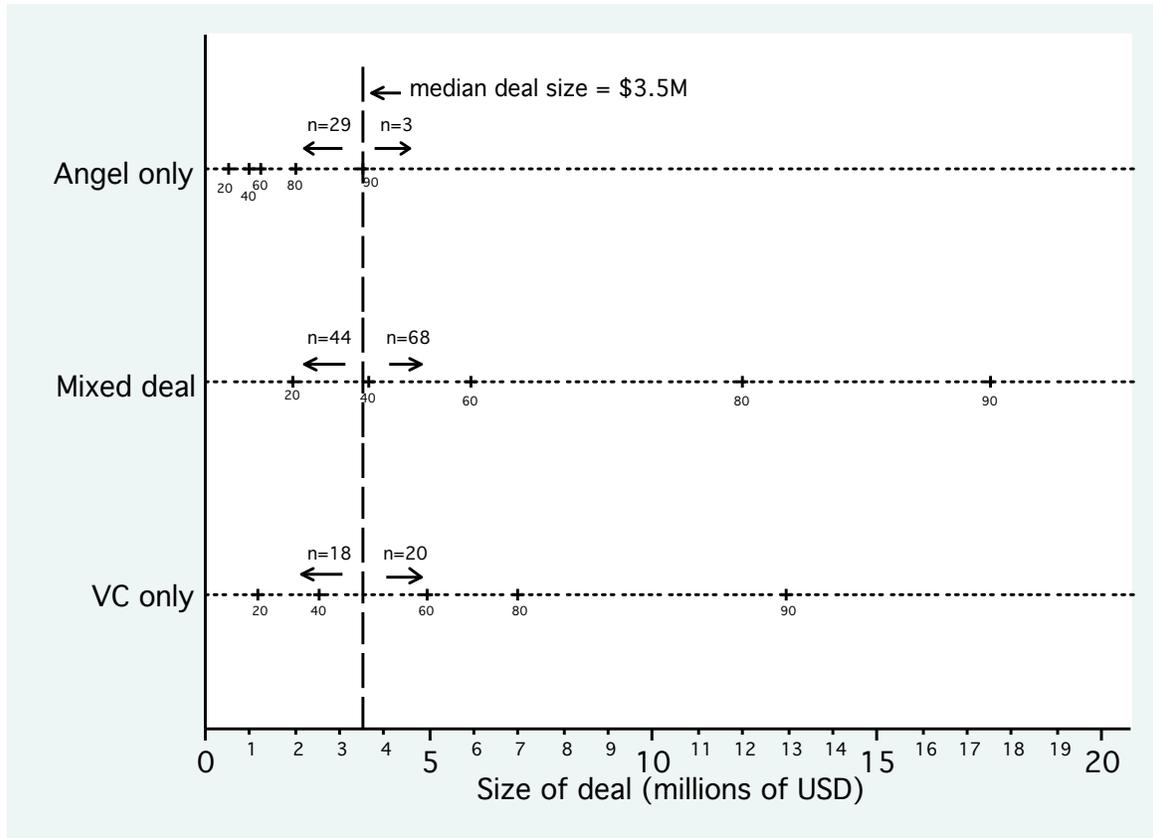


Figure 3: **Composition of Angels**

The figure depicts the average frequency of angel investor types using a deal weighted average (over all deals having at least one angel, angel-only deals, and mixed deals) and a dollar weighted average over all deals having at least one angel. A company is an investor that is incorporated. A small company is an investor that is not incorporated, for example, investors containing the suffixes LLC, LLP or LTD. Angels categorized as others include universities, non-profit organizations, government, and institutions. Unknown are ambiguous investors that we were not able to classify.

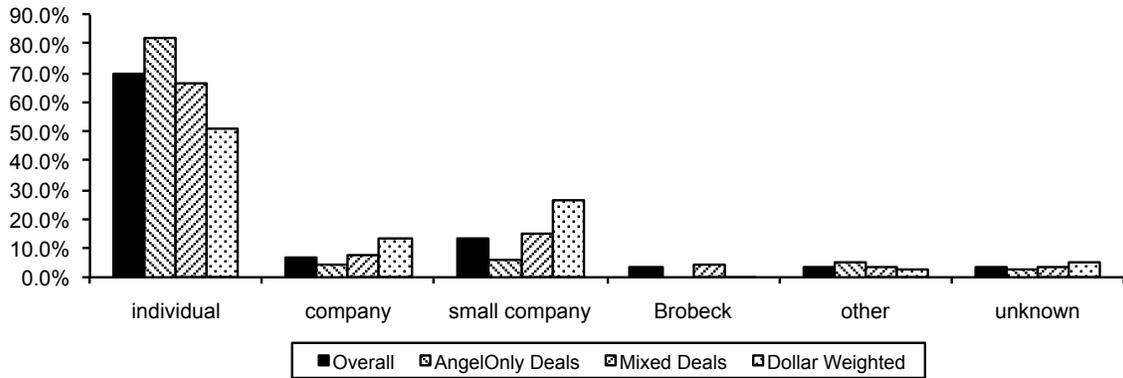


Table I: Summary Statistics for Firms in Sample

The table displays mean characteristics with standard deviations in parentheses. Demographic information shown in Panel A includes location (state dummies which are based on location of company headquarters) and industry classifications, based upon Thomson Financial Venture Economic's proprietary industrial codes (VEIC). *IT Firm* indicates an information technology firm. *Medical/Bio-Tech Firm* indicates firms classified as "Medical/Health/Life Sciences." For deals that did not appear in Venture Economics, classifications were determined according to Brobeck records and public archival sources. Firm characteristics shown in Panel B, such as time period dummies, are based on the date of first closing. *Size* (and its natural log *Log Size*) is measured based on investment dollars, while *Post-Money Valuation* reflects valuation subsequent to the investment in the firm. *Firm Age* is the number of years between the firm's founding date and the date its Series A preferred stock issue closes (computed as number of days divided by 365.25). *Strategic Alliance* and *Product Release* indicate whether the firm issued a press release describing an alliance or product prior to the observed round. *Company matter* takes the value of 1 if Brobeck did not label the representation "Venture Financing/Investor Side." The Venture Economics sample includes US-based private equity investment targets founded after 1967 with the first investment between 1993 and 2002. Private Equity disbursements labeled as buyout, acquisition, other or unknown were eliminated. Statistics of the Venture Economics sample are weighted to reflect the distribution of deal origination dates in the Brobeck sample, period dummies notwithstanding.

Variable	All Deals		Small Deals		Large Deals		Angel-Only Deals		VC-Only Deals		Mixed Deals		Venture Economics Deals	
Panel A: Demographics														
California Dummy	0.529 (0.50)	0.587 (0.49)	0.479 (0.50)	0.565 (0.50)	0.423 (0.50)	0.552 (0.50)	0.360 (0.48) ^a							
Texas Dummy	0.206 (0.40)	0.190 (0.39)	0.219 (0.41)	0.217 (0.42)	0.231 (0.43)	0.195 (0.39)	0.060 (0.24) ^a							
Other States Dummy	0.265 (0.44)	0.222 (0.41)	0.301 (0.46)	0.217 (0.42)	0.346 (0.48)	0.253 (0.43)	0.581 (0.49) ^a							
IT Industry	0.731 (0.44)	0.670 (0.47) ^b	0.791 (0.40) ^b	0.750 (0.44)	0.658 (0.48)	0.750 (0.43)	0.692 (0.46) ^a							
Medical/Bio-Tech Industry	0.115 (0.32)	0.121 (0.32)	0.110 (0.31)	0.156 (0.36)	0.158 (0.37)	0.089 (0.28)	0.127 (0.33)							
Panel B: Firm Characteristics at time of Series A financing														
Pre 1998 Dummy	0.165 (0.37)	0.231 (0.42) ^a	0.099 (0.30) ^a	0.156 (0.36)	0.211 (0.41)	0.152 (0.36)	0.272 (0.44) ^a							
1998 to 3/2000 Dummy	0.341 (0.47)	0.429 (0.49) ^a	0.253 (0.43) ^a	0.406 (0.49)	0.289 (0.46)	0.339 (0.47)	0.384 (0.49)							
Post 3/2000 Dummy	0.495 (0.50)	0.341 (0.47) ^a	0.648 (0.48) ^a	0.438 (0.50)	0.500 (0.50)	0.509 (0.50)	0.345 (0.48) ^a							
Size (Series A Millions)	6.139 (7.92)	1.554 (0.90) ^a	10.72 (9.11) ^a	1.633 (1.53) ^a	5.756 (8.93)	7.556 (8.19)	7.15 (12.15) ^{b,*}							
Log Deal Size	14.98 (1.20)	14.02 (0.77) ^a	15.94 (0.66) ^a	13.94 (0.87) ^a	14.98 (1.07)	15.27 (1.16)	15.08 (1.22) [*]							
Post Money Valuation (Millions)	14.82 (22.9)	4.951 (3.27) ^a	24.69 (29.1) ^a	6.068 (4.64) ^a	16.37 (23.7)	16.80 (25.1)	24.4 (42.1) ^{a,†}							
Firm Age (years)	1.795 (4.23)	1.924 (5.03)	1.674 (3.34)	2.069 (4.48)	1.831 (3.60)	1.702 (4.39)	3.14 (4.7) ^{a,‡}							
Missing Age Dummy	0.148 (0.35)	0.176 (0.38)	0.121 (0.32)	0.125 (0.33)	0.158 (0.37)	0.152 (0.36)	0.032 (0.18) ^a							
Strategic Alliance	0.104 (0.30)	0.066 (0.25) ^b	0.143 (0.35) ^b	0.031 (0.17) ^a	0.105 (0.31)	0.125 (0.33)								
Product Release	0.126 (0.33)	0.110 (0.31)	0.143 (0.35)	0.125 (0.33)	0.158 (0.37)	0.116 (0.32)								
Company Matter	0.621 (0.48)	0.648 (0.48)	0.593 (0.49)	0.719 (0.45)	0.500 (0.50)	0.634 (0.48)								
# Firms in Group	182	91	91	32	38	112	9901							

* a, b, and c denote significant differences in means at the 1%, 5%, and 10% levels, respectively. The footnotes depicted in columns 2 and 3 are based on tests of differences in means across small versus large firms (column 2 vs 3). The footnotes depicted in column 4 (angel-only) are based on tests of angel-only deals versus mixed deals (column 4 vs column 6). The footnotes depicted in column 5 (VC-only) are based on tests of VC-only deals versus mixed deals (column 5 vs column 6). The footnotes in column 7 (Venture Economics Deals) are based on tests of All Deals (from Brobeck) versus the Venture Economics Deals (column 1 vs column 7). * 9,345 observations; † 3,791 observations; ‡ 9,498 Observations

Table II: Summary Statistics for Investors

The table displays mean characteristics with standard deviations in parentheses. Pre Series A investor characteristics are in Panel A. *Pre Series A Founder, Angel, and VC Ownership* break down the components of initial ownership in the company. *Pre Series A Common Round* is a dummy variable that is one if a pre Series A financing based on common stock is observed. Series A investor characteristics are in Panel B. *Angel-Only (VC-only)* are dummy variables equal to one if all investors in the deal are angels (VC firms). *Fraction Sold* shows the percentage of the company sold to investors in the Series A round. *% Founder Series A, % Angel Series A* and *% VC Series A* break down investment in the Series A round. *# Investors* is a count of investors in the deal. Repeat investments by the same investor (generally across multiple closings) are counted as a single investor (*Log # Investors* is the natural log). *Repeat Angel Flag* takes the value of 1 if an angel who invests in the Series A round had previously invested in the firm. The *Brobeck Investor Dummy* is one if Brobeck invested in the firm (either common or preferred shares). *% Investors Within 3 Hours* is the share of investors (unweighted by dollars invested) who are within three hours driving distance. Distance is measured from zip-code center to zip-code center using an automated Mapquest query. *% Investors in Same Zip Code* is the share of investors (unweighted by dollars invested) in the same zip code. In Panel C, *Final Angel Ownership, Final Founder Ownership, and Final VC Ownership* represent the respective ownership shares post-money, i.e., after the Series A round closes (before any subsequent dilution from options).

Variable	All		Small		Large		Angel-Only		VC-Only		Mixed	
	Deals	Deals	Deals	Deals	Deals	Deals	Deals	Deals	Deals	Deals	Deals	Deals
Panel A: Pre Series A Investor Characteristics												
Pre Series A Founder Ownership	0.895 (0.21)	0.902 (0.16)	0.888 (0.26)	0.927 (0.12)	0.832 (0.35)	0.907 (0.17)						
Pre Series A Angel Ownership	0.076 (0.15)	0.076 (0.14)	0.076 (0.16)	0.066 (0.10)	0.091 (0.20)	0.074 (0.14)						
Pre Series A VC Ownership	0.029 (0.10)	0.022 (0.08)	0.036 (0.12)	0.007 (0.04)	0.077 (0.19) ^b	0.018 (0.06)						
Number of Founders	2.775 (2.46)	2.374 (1.54) ^a	3.176 (3.08) ^a	1.969 (1.06) ^a	2.895 (3.64)	2.964 (2.22)						
% with Founder Data	0.907 (0.29)	0.890 (0.31)	0.923 (0.26)	0.844 (0.36)	0.921 (0.27)	0.920 (0.27)						
Pre Series A Common Round	0.253 (0.43)	0.286 (0.45)	0.220 (0.41)	0.219 (0.42)	0.263 (0.44)	0.259 (0.44)						
Panel B: Series A Investor Characteristics												
Angel-Only	0.176 (0.38)	0.319 (0.46) ^a	0.033 (0.18) ^a	1.000 (0.00)	0.000 (0.00)	0.000 (0.00)						
VC-Only	0.209 (0.40)	0.198 (0.40)	0.220 (0.41)	0.000 (0.00)	1.000 (0.00)	0.000 (0.00)						
Fraction Sold	0.462 (0.22)	0.363 (0.15) ^a	0.561 (0.23) ^a	0.303 (0.16) ^a	0.436 (0.24) ^b	0.516 (0.21)						
% Angel Series A	0.319 (0.36)	0.464 (0.40) ^a	0.174 (0.24) ^a	0.996 (0.01) ^a	0.000 (0.00) ^a	0.234 (0.21)						
% Founder Series A	0.001 (0.00)	0.002 (0.01)	0.001 (0.00)	0.004 (0.01)	0.000 (0.00) ^a	0.001 (0.00)						
% VC Series A	0.679 (0.36)	0.533 (0.41) ^a	0.825 (0.24) ^a	0.000 (0.00) ^a	1.000 (0.00) ^a	0.764 (0.21)						
# Investors	12.12 (13.4)	10.80 (14.4)	13.45 (12.3)	12.81 (20.7)	4.763 (5.62) ^a	14.42 (11.9)						
Log # Investors	1.994 (1.06)	1.762 (1.15) ^a	2.227 (0.92) ^a	1.711 (1.30) ^a	1.044 (0.99) ^a	2.398 (0.73)						
Repeat Angel Flag	0.093 (0.29)	0.121 (0.32)	0.066 (0.25)	0.188 (0.39)	0.000 (0.00) ^a	0.098 (0.29)						
Repeat VC Flag	0.071 (0.25)	0.055 (0.22)	0.088 (0.28)	0.000 (0.00) ^a	0.105 (0.31)	0.080 (0.27)						
Brobeck Investor Dummy	0.236 (0.42)	0.165 (0.37) ^a	0.308 (0.46) ^a	0.063 (0.24) ^a	0.079 (0.27) ^a	0.339 (0.47)						
% Investors within 3 Hours	0.604 (0.36)	0.657 (0.35)	0.558 (0.37)	0.649 (0.35)	0.514 (0.47)	0.619 (0.32)						
% Investors in Same Zip Code	0.179 (0.30)	0.248 (0.36) ^a	0.120 (0.23) ^a	0.302 (0.39) ^a	0.272 (0.40) ^b	0.119 (0.22)						
Panel C: Other Characteristics												
Final Angel Ownership	0.173 (0.17)	0.206 (0.18) ^a	0.140 (0.16) ^a	0.377 (0.20) ^a	0.039 (0.09) ^a	0.160 (0.13)						
Final Founder Ownership	0.461 (0.23)	0.560 (0.18) ^a	0.362 (0.23) ^a	0.615 (0.20) ^a	0.448 (0.27)	0.422 (0.20)						
Final VC Ownership	0.366 (0.27)	0.233 (0.22) ^a	0.498 (0.26) ^a	0.007 (0.04) ^a	0.513 (0.28) ^b	0.418 (0.21)						
# Firms in Group	182	91	91	32	38	112						

* a, b, and c denote significant differences in means at the 1%, 5%, and 10% levels, respectively. The footnotes depicted in columns 2 and 3 are based on tests of differences in means across small versus large firms (column 2 vs 3). The footnotes depicted in column 4 (angel-only) are based on tests of angel-only deals versus mixed deals (column 4 vs column 6). The footnotes depicted in column 5 (VC-only) are based on tests of VC-only deals versus mixed deals (column 5 vs column 6).

Table III: Summary Statistics for VC Firms in Sample

The table displays mean characteristics with standard deviations in parentheses. The sample includes all private equity firms which made investments between 1/1/1993 and 12/31/2002 that are included in the Thomson Financial Venture Economics database. The statistics include the histories of these private equity firms, including funds that were managed outside the 1993-2002 time frame. Statistics are reported by whether the firm was represented in the Brobeck Sample (columns 1 and 2, conditional on inclusion in Venture Economics), whether the firm was associated with a small or large deal in our sample (columns 3 and 4), and whether the firm was associated with a mixed or VC-only deal (columns 5 and 6). All fund statistics are aggregated at the VC firm level. *Share of funds hq in northern CA* and *Share of funds HQ in US* represent the share of funds under the private equity firm's management that report headquarters in northern California and the United States respectively. *Share of funds with Seed Stage Focus* and *Share of funds with Early Stage Focus* represent the share of funds under the firm's management that report a focus on seed stage deals or early stage deals. *Share of VC funds* and *Firm's share of buyout funds* represent the share of funds under the VC firm's management reporting that they are venture capital or buyout funds. *# funds under firm management* is the number of funds ever managed under the private equity firm's management. *Log total capital raised* is the natural log of the total capital (in millions of US dollars) raised by these funds. *Log fund size (\$ M)* is the mean capital raised for each fund under a private equity firm's management. These latter two variables reflect a smaller sample size than some variables as only 87% of our sample VCs report these statistics. *Age* is measured relative to 2002. *IPO rate* and *Acquisition rate* are the share of the VC's investment targets that reach the mutually exclusive categories IPO or merged/acquired, respectively. Rates are calculated as the share of investment targets in these outcome categories, as reported in Venture Economics. *Centrality* is eigenvector centrality (Bonacich 1972).

	Brobeck VC firms	Non-Brobeck VC firms	Small deal VCs	Large Deal VCs	VCs in mixed deals	VC in VC-only deals
Panel A: Demographics						
Share of funds hq in northern CA	0.414 (0.49)	0.095 (0.29) ^a	0.403 (0.48)	0.418 (0.49)	0.410 (0.49)	0.428 (0.49)
Share of funds hq in US	0.909 (0.29)	0.639 (0.48) ^a	0.916 (0.28)	0.906 (0.29)	0.891 (0.31)	0.972 (0.17) ^a
Share of funds w/ Seed Stage Focus	0.038 (0.13)	0.061 (0.23) ^a	0.022 (0.10)	0.044 (0.14) ^c	0.043 (0.15)	0.021 (0.05) ^b
Share of funds w/ Early Stage Focus	0.417 (0.40)	0.223 (0.39) ^a	0.417 (0.38)	0.417 (0.40)	0.443 (0.40)	0.326 (0.37) ^a
Share of VC funds	0.935 (0.20)	0.818 (0.37) ^a	0.927 (0.22)	0.938 (0.19)	0.945 (0.20)	0.901 (0.21) ^c
Share of buyout funds	0.035 (0.15)	0.118 (0.31) ^a	0.056 (0.20)	0.029 (0.12)	0.031 (0.14)	0.053 (0.15)
Panel B: Prestige/Prominence						
# funds under firm management	7.658 (6.84)	2.040 (2.18) ^a	7.073 (6.23)	7.858 (7.04)	7.178 (6.74)	9.358 (6.95) ^a
Log total capital raised	5.300 (2.91)	2.482 (2.57) ^a	4.980 (2.82)	5.410 (2.94)	5.137 (2.82)	5.877 (3.17) ^b
Log fund size	3.924 (2.05)	2.191 (2.24) ^a	3.713 (1.94)	3.996 (2.08)	3.841 (2.01)	4.220 (2.17)
Age	13.137 (8.13)	7.041 (6.43) ^a	13.350 (7.97)	13.064 (8.19)	12.431 (8.21)	15.64 (7.31) ^a
IPO rate	0.150 (0.13)	0.118 (0.21) ^a	0.154 (0.16)	0.149 (0.13)	0.141 (0.13)	0.182 (0.13) ^a
Acquisition rate	0.313 (0.17)	0.221 (0.27) ^a	0.322 (0.20)	0.310 (0.16)	0.303 (0.18)	0.347 (0.14) ^a
Centrality	0.074 (0.14)	0.002 (0.02) ^a	0.105 (0.19)	0.063 (0.12) ^b	0.065 (0.14)	0.106 (0.16) ^b
Observations	482	5585	123	359	376	106

* a, b, and c denote significant differences in means at the 1%, 5%, and 10% levels, respectively. These are based on tests of differences in means across Non-Brobeck VC firms and Brobeck VC firms (footnotes displayed in column 2), VCs affiliated with small versus large deals (displayed in column 4), and VCs affiliated with VC-only deals versus mixed deals (displayed in column 6).

Table IV: Summary Statistics for Deals

The table displays mean characteristics with standard deviations in parentheses. *Warrants Dummy* is one if warrants were issued in the Series A Financing. *Options Dummy* is one if an option plan was set up concurrent with the Series A Financing. *# closings* is the number of separate executed closings under the Series A terms (*Multiple Closings* indicates more than one). *Average Days to Second Closing* is the days between the first and second closings. All preceding variables are taken from the electronic record of the closing documents in the Brobeck corpus. *Billed Hours* reflects the total billed hours associated with Brobeck's representation of either the company or its investors in the deal. Control rights in Panel B and terms are extracted from closing documents from the Brobeck corpus. *% Common BOD Seats* is the share of board seats held by common shareholders (from the "voting rights agreement", or when specific parties are named, by cross-referencing with investors). *Cumulative Dividend Flag* is a dummy equal to one if preferred shareholders have a right to dividends that accumulate over the time of their investment. *Liquidation Flag* is a dummy equal to one when preferred shareholders have liquidation rights exceeding the value of their initial investment. *Cap on Preferred* is a dummy equal to one if these additional preferred stock liquidation rights are capped at a multiple of the initial investment. *Cap on Common* is a dummy equal to one if common stock liquidation rights are capped at a multiple of the investment. *Redeemable Flag* is a dummy equal to one when preferred shareholders can demand that the firm repurchase their shares. *Delayed Redemption* is a dummy equal to one if preferred stockholders' redemption rights are time-delayed. *% Series A Req. to Vote* is the percentage of Series A shareholders required to invoke a redemption.

Variable	All Deals	Small Deals	Large Deals	Angel-Only Deals	VC-Only Deals	Mixed Deals
Panel A: Deal Characteristics						
Warrants Dummy	0.154 (0.36)	0.198 (0.40) ^b	0.110 (0.31) ^b	0.250 (0.44)	0.079 (0.27)	0.152 (0.36)
Options Dummy	0.687 (0.46)	0.571 (0.49) ^a	0.802 (0.40) ^a	0.594 (0.49)	0.658 (0.48)	0.723 (0.44)
Multiple Closings Flag	0.445 (0.49)	0.407 (0.49)	0.484 (0.50)	0.375 (0.49)	0.237 (0.43) ^a	0.536 (0.50)
# Closings	1.769 (1.19)	1.736 (1.29)	1.802 (1.09)	1.750 (1.36)	1.553 (1.40)	1.848 (1.05)
Average Days to Second Closing	153.4 (157)	103.7 (89.4) ^a	197.9 (190) ^a	138.2 (93.5)	232.9 (149)	144.5 (166)
Billed Hours	169.0 (115)	147.3 (103) ^a	190.7 (123) ^a	109.1 (70.9) ^a	185.4 (155)	180.6 (105)
Log Billed Hours	4.878 (0.82)	4.737 (0.85) ^a	5.017 (0.76) ^a	4.488 (0.78) ^a	4.901 (0.88)	4.977 (0.78)
Panel B: Control Rights						
% Common BOD Seats	0.464 (0.33)	0.579 (0.33) ^a	0.359 (0.29) ^a	0.675 (0.31) ^a	0.522 (0.39)	0.398 (0.29)
Cumulative Dividend Flag	0.088 (0.28)	0.044 (0.20) ^a	0.132 (0.34) ^a	0.000 (0.00) ^a	0.158 (0.37)	0.089 (0.28)
Liquidation Flag	0.418 (0.49)	0.374 (0.48)	0.462 (0.50)	0.125 (0.33) ^a	0.579 (0.50)	0.446 (0.49)
Cap on Preferred	0.474 (0.50)	0.441 (0.50)	0.500 (0.50)	0.500 (0.57)	0.364 (0.49)	0.520 (0.50)
Cap on Common	0.019 (0.13)	0.035 (0.18)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.032 (0.17)
Redeemable Flag	0.236 (0.42)	0.209 (0.40)	0.264 (0.44)	0.031 (0.17) ^a	0.368 (0.48)	0.250 (0.43)
Delayed Redemption	0.225 (0.41)	0.209 (0.40)	0.242 (0.43)	0.031 (0.17) ^a	0.368 (0.48)	0.232 (0.42)
% Series A Req. to Vote	57.55 (8.40)	57.12 (8.54)	57.87 (8.52)	50.00 (0.00)	54.16 (7.53) ^a	59.96 (8.35)
# Firms in Group	182	91	91	32	38	112

* a, b, and c denote significant differences in means at the 1%, 5%, and 10% levels, respectively. The footnotes depicted in columns 2 and 3 are based on tests of differences in means across small versus large firms (column 2 vs 3). The footnotes depicted in column 4 (angel-only) are based on tests of angel-only deals versus mixed deals (column 4 vs column 6). The footnotes depicted in column 5 (VC-only) are based on tests of VC-only deals versus mixed deals (column 5 vs column 6).

Table V: Cashflow Rights

The table displays Probit model marginal effects with robust t -statistics in parenthesis. We report results for the whole sample, as well as for small and large deal subsamples as noted in the table header (small and large deals have below and above median deal size, respectively). All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in columns 1 and 5 is a dummy variable indicating whether the Series A stockholders have cumulative dividend rights (the cumulative dividend regression cannot be run for the small firm subsample because only 9 firms in this subsample had cumulative dividend rights). The dependent variable in columns 2, 4 and 6 is a dummy variable indicating whether preferred shareholders have liquidation rights exceeding the value of their initial investment. The independent variables include various investor and firm characteristics, as well as industry and time dummies, and are described in Tables I and II.

Independent Variables	<i>All Deals</i>			<i>Small Deals</i>			<i>Large Deals</i>		
	Probit Model	Probit Model	Probit Model	Probit Model	Probit Model	Probit Model	Probit Model	Probit Model	
	Dep. Var.= Cumulative	Dep. Var.= Liquidation	Dep. Var.= Cumulative	Dep. Var.= Cumulative	Dep. Var.= Liquidation	Dep. Var.= Cumulative	Dep. Var.= Liquidation	Dep. Var.= Liquidation	
Angel Only	-0.10 (-1.92) ^c	-0.37 (-2.50) ^b	N/A	-0.35 (-2.05) ^b		0.08 (0.79)	0.73 (4.64) ^a		
VC Only	0.03 (0.39)	0.31 (2.38) ^b		0.25 (1.13)		-0.42 (-1.78) ^c	-1.41 (-2.79) ^a		
Preferred Investor C4	-0.13 (-0.84)	-0.28 (-0.84)		0.05 (0.08)		-0.04 (-0.98)	-0.45 (-3.77) ^a		
Pre Series A Angel Ownership	0.01 (0.35)	-0.11 (-2.29) ^b		-0.03 (-0.58)		-0.04 (-0.75)	-0.09 (-1.12)		
Fraction Sold	-0.01 (-0.18)	0.00 (0.03)		0.13 (1.33)		-0.02 (-0.26)	-0.56 (-3.58) ^a		
Log Deal Size	0.03 (1.15)	-0.13 (-2.37) ^b		-0.23 (-2.78) ^a		-0.04 (-0.86)	0.25 (1.74) ^c		
Log # Investors	-0.04 (-1.01)	0.03 (0.39)		-0.04 (-0.28)		0.13 (1.93) ^c	0.27 (2.89) ^a		
Log One Plus Firm Age	0.07 (2.28) ^b	0.07 (1.55)		0.06 (1.17)		0.05 (1.05)	-0.05 (-0.72)		
Log Number of Founders	0.03 (1.15)	0.08 (1.69) ^c		0.29 (4.00) ^a		-0.01 (-0.09)	0.18 (1.04)		
Pre Series A Common Round	0.03 (0.71)	0.09 (0.89)		0.00 (0.02)		0.27 (1.74) ^c	0.72 (3.63) ^a		
Strategic Alliance	0.02 (0.22)	0.21 (1.40)		0.31 (1.36)		-0.14 (-0.73)	-0.43 (-1.76) ^c		
Product Release	0.15 (1.34)	0.23 (1.39)		0.50 (2.51) ^b		-0.01 (-0.06)	-0.63 (-3.10) ^a		
IT Industry	-0.01 (-0.20)	-0.32 (-2.78) ^a		-0.37 (-2.36) ^b		-0.07 (-0.44)	-0.08 (-0.27)		
Medical/Bio-Tech Industry	-0.06 (-0.83)	-0.08 (-0.55)		-0.21 (-1.38)		0.10 (1.03)	0.63 (2.10) ^b		
1998 to 3/2000 Dummy	0.08 (1.73) ^c	0.24 (1.73) ^c		0.28 (1.67) ^c		0.22 (2.16) ^b	0.76 (3.11) ^a		
Post 3/2000 Dummy	0.07 (1.53)	0.34 (2.59) ^a		0.21 (1.11)		-0.01 (-0.17)	0.24 (1.51)		
California Dummy	-0.02 (-0.41)	0.09 (0.98)		0.03 (0.22)		-0.05 (-0.52)	0.36 (2.14) ^b		
Brobeck Investor Dummy	-0.06 (-1.30)	0.26 (2.50) ^b		0.37 (1.75) ^c		0.05 (1.05)	0.18 (1.04)		
Observations	182	182		91		91	91		

* a, b, and c denote significant differences from zero at the 1%, 5%, and 10% levels, respectively.

Table VI: Control Rights

The table displays Probit model marginal effects and OLS model coefficients with robust t -statistics in parenthesis. We report results for the whole sample, as well as for small and large deal subsamples as noted in the table header (small and large deals have below and above median deal size, respectively). All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in columns 1, 3, and 5 is the fraction of board seats that are allocated to common shareholders (board of directors data is only available for 147 firms). The dependent variable in columns 2, 4, and 6 is a dummy variable identifying whether the Series A shares are redeemable (i.e., whether they can be returned to the firm in exchange for cash). The independent variables include various investor and firm characteristics, as well as industry and time dummies, and are described in Tables I and II.

Independent Variables	<i>All Deals</i>			<i>Small Deals</i>			<i>Large Deals</i>		
	OLS Model	Probit Model							
	Dep. Var.= Common Seats	Dep. Var.= Redeemable							
Angel Only	0.19 (1.92) ^c	-0.21 (-2.85) ^a	0.24 (1.70) ^c	-0.05 (-2.54) ^b	-0.04 (-0.53)	0.39 (2.29) ^b	-0.04 (-0.53)	0.39 (2.29) ^b	
VC Only	0.06 (0.77)	0.17 (1.64)	0.18 (1.13)	0.00 (-0.20)	0.41 (1.90) ^c	-0.09 (-0.25)	0.41 (1.90) ^c	-0.09 (-0.25)	
Preferred Investor C4	0.15 (0.91)	0.10 (0.40)	0.31 (0.81)	-0.01 (-0.71)	0.10 (3.39) ^a	-0.20 (-3.83) ^a	0.10 (3.39) ^a	-0.20 (-3.83) ^a	
Pre Series A Angel Ownership	0.04 (1.63)	-0.05 (-1.39)	0.01 (0.28)	0.00 (2.85) ^a	-0.03 (-0.84)	-0.01 (-0.13)	-0.03 (-0.84)	-0.01 (-0.13)	
Fraction Sold	-0.11 (-3.25) ^a	0.01 (0.17)	-0.13 (-1.47)	0.00 (1.68) ^c	0.07 (1.20)	-0.01 (-0.16)	0.07 (1.20)	-0.01 (-0.16)	
Log Deal Size	-0.01 (-0.41)	0.00 (-0.03)	0.04 (0.52)	0.01 (2.60) ^a	0.01 (0.13)	0.14 (1.87) ^c	0.01 (0.13)	0.14 (1.87) ^c	
Log # Investors	0.02 (0.40)	0.03 (0.54)	0.09 (0.97)	-0.01 (-2.11) ^b	0.05 (1.17)	0.12 (2.05) ^b	0.05 (1.17)	0.12 (2.05) ^b	
Log One Plus Firm Age	-0.02 (-0.58)	0.08 (2.36) ^b	-0.05 (-1.06)	0.00 (2.58) ^a	0.07 (2.55) ^b	0.03 (0.76)	0.07 (2.55) ^b	0.03 (0.76)	
Log Number of Founders	0.05 (2.19) ^b	0.02 (0.56)	0.03 (0.74)	0.00 (-0.06)	0.02 (0.26)	-0.04 (-0.37)	0.02 (0.26)	-0.04 (-0.37)	
Pre Series A Common Round	0.06 (1.15)	0.03 (0.36)	0.10 (1.09)	0.01 (2.20) ^b	0.24 (2.44) ^b	0.73 (3.48) ^a	0.24 (2.44) ^b	0.73 (3.48) ^a	
Strategic Alliance	-0.02 (-0.19)	0.19 (1.51)	-0.22 (-0.98)	0.00 (-0.85)	-0.07 (-0.52)	-0.19 (-1.37)	-0.07 (-0.52)	-0.19 (-1.37)	
Product Release	0.16 (1.70) ^c	0.07 (0.62)	0.11 (0.69)	0.03 (1.85) ^c	-0.05 (-0.59)	-0.26 (-1.37)	-0.05 (-0.59)	-0.26 (-1.37)	
IT Industry	0.04 (0.58)	-0.15 (-1.63)	0.10 (0.89)	-0.03 (-2.34) ^b	0.11 (0.98)	-0.19 (-1.42)	0.11 (0.98)	-0.19 (-1.42)	
Medical/Bio-Tech Industry	0.23 (2.40) ^b	0.00 (0.04)	0.30 (1.86) ^c	0.62 (2.48) ^b	0.04 (0.36)	0.51 (1.99) ^b	0.04 (0.36)	0.51 (1.99) ^b	
1998 to 3/2000 Dummy	0.07 (0.93)	0.23 (2.03) ^b	0.06 (0.50)	0.00 (-0.32)	-0.09 (-0.81)	0.27 (1.66) ^c	-0.09 (-0.81)	0.27 (1.66) ^c	
Post 3/2000 Dummy	-0.02 (-0.21)	0.13 (1.20)	0.05 (0.47)	0.00 (0.75)	-0.05 (-0.80)	-0.05 (-0.49)	-0.05 (-0.80)	-0.05 (-0.49)	
California Dummy	-0.07 (-1.28)	-0.09 (-1.57)	-0.08 (-0.76)	0.00 (-1.11)	0.03 (0.41)	-0.02 (-0.22)	0.03 (0.41)	-0.02 (-0.22)	
Brobeck Investor Dummy	0.00 (-0.05)	0.10 (1.26)	-0.09 (-0.67)	0.65 (3.08) ^a	0.03 (0.41)	0.03 (0.41)	0.03 (0.41)	0.03 (0.41)	
Observations	147	182	70	91	77	91	77	91	

* a, b, and c denote significant differences from zero at the 1%, 5%, and 10% levels, respectively.

Table VII: Summary Statistics of Outcomes for Firms in Sample

The table displays mean characteristics for various dummy variables associated with firm outcomes. *IPO* and *Acquisition* are one if a liquidity event occurred either as an IPO or as an acquisition, respectively (from archival sources, primarily press releases). *Non-exited survival* is one if the firm was still in business as an independent private entity in December 2012 (from World Wide Web presence and archival sources). Firms are tagged as *Failure* if they did not experience a liquidity event and they are not still an ongoing private independent firm. *Ex post VC Financing* is one if the firm secures later financing (after Series A) from venture capital firms as reported by Venture Economics. The Venture Economics sample includes US-based venture capital investment targets founded after 1967 with the first investment between 1993 and 2002. Private Equity disbursements labeled as buyout, acquisition, other or unknown were eliminated. Outcome variables of the Venture Economics sample are as reported in that database, but weighted to reflect the distribution of deal origination dates in the Brobeck sample.

Variable	All Deals				Small Deals		Large Deals		Angel-Only Deals		VC-Only Deals		Mixed Deals		Venture Economics Deals	
IPO	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.031	0.105	0.009	0.057	0.171 ^a				
Acquisition	0.365	0.275 ^a	0.456 ^a	0.156	0.250	0.387	0.117	0.250	0.395	0.387	0.117	0.486				
Non-exited survival	0.144	0.132	0.356 ^a	0.544	0.469	0.550	0.550	0.281 ^a	0.474	0.550	5.541	9,902				
Failure	0.459	0.560 ^a	0.429	5.812	7.208 ^a	32	38	32	38	111						
Ex post VC financing	0.486	0.429	5.949	90	90											
Time to Resolution	5.875	5.949	91	90	90											
# Firms in Group	181	91	90	90	90											

* a, b, and c denote significant differences in means at the 1%, 5%, and 10% levels, respectively. The footnotes depicted in columns 2 and 3 are based on tests of differences in means across small versus large firms (column 2 vs 3). The footnotes depicted in column 4 (angel-only) are based on tests of angel-only deals versus mixed deals (column 4 vs column 6). The footnotes depicted in column 5 (VC-only) are based on tests of VC-only deals versus mixed deals (column 5 vs column 6). The footnotes in column 7 (Venture Economics Deals) are based on tests of All Deals (from Brobeck) versus the Venture Economics Deals (column 1 vs column 7).

Table VIII: Resolution Rate versus Deal Characteristics

The table displays the Cox proportional hazards model (columns 1, 3, 5) and OLS model (columns 2, 4, 6) coefficients, with robust t -statistics in parenthesis, for all deals, small deals, and large deals, respectively. For the Cox model, the coefficient reported is the odds ratio. If it is greater than one (with positive t -statistic), there is a faster hazard rate and quicker resolution, while an odds ratio less than one (with negative t -statistic) implies a longer time to resolution. The OLS specification is based on using the number of years until resolution as the dependent variable, and we report the OLS coefficients. For all hazard models, the hazard to be explained is “resolution”, which occurs when the deal’s outcome is finally known (where outcome is failure, exit via merger, or exit via IPO). All independent variables (except dummy variables) are standardized to clarify exposition. The independent variables include various investor and firm characteristics, as well as industry and time dummies, and are described in Tables I and II.

Independent Variables	<i>All Deals</i>				<i>Small Deals</i>				<i>Large Deals</i>			
	Cox Prop. Hazard Model	OLS Model Dep. Var.= Time to Resolution	Cox Prop. Hazard Model	OLS Model Dep. Var.= Time to Resolution	Cox Prop. Hazard Model	OLS Model Dep. Var.= Time to Resolution	Cox Prop. Hazard Model	OLS Model Dep. Var.= Time to Resolution				
Angel Only	0.45 (-2.87) ^a	2.75 (2.84) ^a	0.33 (-2.55) ^b	3.00 (2.39) ^b	1.03 (0.07)	1.14 (0.93)	0.35 (-2.40) ^b	-3.63 (-1.95) ^c				
VC Only	0.71 (-1.37)	1.34 (1.47)	0.36 (-2.15) ^b	1.94 (1.12)	1.22 (0.74)	-0.57 (-0.63)	1.01 (0.07)	0.14 (0.21)				
Log Size	0.98 (-0.24)	0.09 (0.25)	0.78 (-1.61)	0.93 (1.45)	0.75 (-1.26)	0.82 (0.96)	0.85 (-0.30)	0.17 (0.40)				
Log # Investors	0.65 (-2.97) ^a	1.28 (2.14) ^b	0.54 (-2.23) ^b	1.01 (1.09)	1.77 (2.08) ^b	0.82 (0.96)	1.77 (2.08) ^b	-1.76 (-1.86) ^c				
Fraction Sold	0.94 (-0.52)	0.18 (0.45)	0.67 (-1.85) ^c	1.14 (1.55)	1.29 (0.68)	0.03 (0.06)	1.29 (0.68)	-0.33 (-0.27)				
Strategic Alliance	0.99 (-0.04)	0.20 (0.19)	2.49 (2.23) ^b	-2.87 (-2.06) ^b	0.25 (-1.31)	3.85 (2.22) ^b	0.25 (-1.31)	4.19 (1.39)				
Product Release	1.14 (0.51)	-0.52 (-0.54)	0.72 (-0.80)	0.33 (0.29)	0.58 (-1.62)	0.03 (0.06)	0.58 (-1.62)	2.00 (1.83) ^c				
Log One Plus Firm Age	1.08 (0.83)	-0.28 (-0.80)	1.07 (0.67)	-0.19 (-0.63)	0.18 (-2.82) ^a	2.80 (1.95) ^c	0.18 (-2.82) ^a	5.22 (3.10) ^a				
Missing Age Dummy	1.13 (0.54)	-0.96 (-1.19)	1.15 (0.47)	-0.73 (-0.76)	1.45 (0.85)	3.85 (2.22) ^b	1.45 (0.85)	-0.93 (-0.58)				
Log Number of Founders	0.90 (-1.18)	0.19 (0.58)	0.91 (-0.59)	-0.08 (-0.14)	0.81 (-0.59)	2.80 (1.95) ^c	0.81 (-0.59)	0.81 (0.52)				
Pre Series A Common Round	1.27 (1.31)	-0.73 (-1.08)	1.32 (1.00)	-0.70 (-0.67)	1.77 (2.08) ^b	1.01 (0.07)	1.77 (2.08) ^b	-1.59 (-1.66) ^c				
Brobeck Investor Dummy	1.68 (2.47) ^b	-1.63 (-2.22) ^b	1.77 (1.60)	-1.44 (-1.38)	1.29 (0.68)	0.14 (0.21)	1.29 (0.68)	-0.33 (-0.27)				
Investor Concentration Index	0.30 (-1.85) ^c	3.51 (1.45)	0.25 (-1.12)	1.47 (0.33)	0.25 (-1.31)	0.14 (0.21)	0.25 (-1.31)	4.19 (1.39)				
IT Industry	0.8912 (-0.56)	0.46 (0.63)	0.81 (-0.67)	0.68 (0.65)	0.58 (-1.62)	0.14 (0.21)	0.58 (-1.62)	2.00 (1.83) ^c				
Medical/Bio-Tech Industry	0.61 (-1.67) ^c	1.60 (1.38)	1.04 (0.11)	-0.22 (-0.15)	0.18 (-2.82) ^a	0.14 (0.21)	0.18 (-2.82) ^a	5.22 (3.10) ^a				
1998 to 3/2000 Dummy	1.47 (1.89) ^c	-1.34 (-1.45)	1.61 (1.99) ^b	-1.61 (-1.43)	1.45 (0.85)	3.85 (2.22) ^b	1.45 (0.85)	-0.93 (-0.58)				
Post 3/2000 Dummy	0.88 (-0.56)	0.52 (0.51)	0.83 (-0.56)	0.77 (0.61)	0.81 (-0.59)	2.80 (1.95) ^c	0.81 (-0.59)	0.81 (0.52)				
California Dummy	1.10 (0.58)	-0.36 (-0.56)	0.77 (-0.87)	1.06 (0.91)	1.56 (1.64)	3.85 (2.22) ^b	1.56 (1.64)	-1.59 (-1.66) ^c				
Observations	179	179	91	91	88	88	88	88				

* a, b, and c denote significant differences from zero at the 1%, 5%, and 10% levels, respectively.

Table IX: Outcomes versus Deal Characteristics

The table displays Probit model marginal effects, with robust t -statistics in parenthesis. All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable is a dummy variable indicating whether the firm experienced an Acquisition or IPO by December 2012. The independent variables include various investor and firm characteristics, as well as industry and time dummies, and are described in Tables I and IV.

Independent Variables	<i>All Deals</i>		<i>Small Deals</i>		<i>Large Deals</i>	
	Probit Model Dep. Var.= Merger/IPO					
Angel Only	-0.0528 (-0.380)	0.0099 (0.060)	0.0099 (0.060)	0.5586 (3.330) ^a		
VC Only	0.1923 (1.610)	-0.0980 (-0.580)	-0.0980 (-0.580)	0.0349 (0.280)		
Log Size	0.1202 (2.460) ^b	0.0853 (1.040)	0.0853 (1.040)	0.1649 (1.560)		
Log # Investors	0.0532 (0.740)	0.0053 (0.050)	0.0053 (0.050)	-0.0047 (-0.060)		
Fraction Sold	-0.0538 (-1.130)	-0.1575 (-1.880) ^c	-0.1575 (-1.880) ^c	-0.2502 (-1.110)		
Strategic Alliance	-0.1594 (-1.230)	-0.1645 (-0.920)	-0.1645 (-0.920)	0.2894 (1.230)		
Product Release	0.1685 (1.130)	0.1758 (0.910)	0.1758 (0.910)	0.0770 (0.960)		
Log One Plus Firm Age	0.0585 (1.330)	0.0129 (0.260)	0.0129 (0.260)	-0.0450 (-0.230)		
Missing Age Dummy	-0.0807 (-0.670)	-0.1319 (-0.910)	-0.1319 (-0.910)	-0.1313 (-2.160) ^b		
Log Number of Founders	-0.0167 (-0.410)	0.0483 (0.820)	0.0483 (0.820)	0.0498 (0.330)		
Pre Series A Common Round	0.0231 (0.240)	0.0748 (0.550)	0.0748 (0.550)	-0.0984 (-0.650)		
Brobeck Investor Dummy	-0.0788 (-0.810)	-0.0225 (-0.150)	-0.0225 (-0.150)	-0.2422 (-0.580)		
Investor Concentration Index	0.0885 (0.290)	0.3261 (0.690)	0.3261 (0.690)	-0.1554 (-0.680)		
IT Industry	-0.0366 (-0.320)	-0.1635 (-1.200)	-0.1635 (-1.200)	-0.5123 (-2.170) ^b		
Medical/Bio-Tech Industry	-0.1782 (-1.250)	0.0739 (0.390)	0.0739 (0.390)	0.3177 (1.290)		
1998 to 3/2000 Dummy	-0.0493 (-0.410)	-0.0710 (-0.550)	-0.0710 (-0.550)	0.2378 (1.070)		
Post 3/2000 Dummy	-0.1415 (-1.190)	-0.2430 (-1.800) ^c	-0.2430 (-1.800) ^c	0.2474 (1.820) ^c		
California Dummy	0.2159 (2.600) ^a	0.1926 (1.550)	0.1926 (1.550)			
Observations	181	91	91	90		

* a, b, and c denote significant differences from zero at the 1%, 5%, and 10% levels, respectively.

Table X: Managerial Characteristics and Investor Composition

The table displays Probit model marginal effects, with robust t -statistics in parenthesis. All results are based on the subsample of large deals only. Observations are less than 91 due to missing data on CEO qualifications. All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in all of the probit models is a dummy variable indicating whether the investor composition includes VCs only. The independent variables include various investor and firm characteristics, as well as industry and time dummies, and are described in Tables I and IV. Additionally, we include independent variables relating to CEO qualifications.

Independent Variables	Probit Model		Probit Model		Probit Model	
	Dep. Var.= VC Only	Dep. Var.= VC Only	Dep. Var.= VC Only	Dep. Var.= VC Only	Dep. Var.= VC Only	Dep. Var.= VC Only
CEO Has MBA	-0.211 (-1.65)					-0.255 (-1.93) ^c
Years CEO Experience						-0.001 (-0.10)
# CEO Startups						-0.127 (-1.98) ^b
Log Size	-0.024 (-0.17)		-0.003 (-0.34)			-0.057 (-0.42)
Fraction Sold	-0.066 (-0.93)		-0.021 (-0.15)			-0.068 (-1.03)
Investor HHI	0.035 (0.50)		-0.067 (-0.96)			0.012 (0.16)
Strategic Alliance	-0.069 (-0.24)		0.040 (0.55)			-0.121 (-0.51)
Product Release	0.159 (0.52)		-0.130 (-0.47)			0.193 (0.67)
IT Industry	-0.582 (-2.11) ^b		0.213 (0.81)			-0.761 (-2.53) ^b
Medical/Bio-Tech Industry	-0.487 (-1.48)		-0.379 (-1.50)			-0.657 (-1.72) ^c
1998 to 3/2000 Dummy	-0.279 (-1.34)		-0.268 (-0.73)			-0.299 (-1.47)
Post 3/2000 Dummy	-0.098 (-0.45)		-0.259 (-1.08)			-0.092 (-0.44)
California Dummy	-0.038 (-0.33)		-0.022 (-0.09)			-0.055 (-0.46)
Observations	66		66			66

* a, b, and c denote significant differences from zero at the 1%, 5%, and 10% levels, respectively.

Table XI: Outcomes versus Deal Characteristics (Zoom in on Large Deals)

The table displays Probit model marginal effects, with robust t -statistics in parenthesis. All results are based on the subsample of large deals only. Observations are less than 91 due to missing data on board of directors and resolution dates (first four columns), and missing data on CEO qualifications (fifth column). All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in all of the probit models (all columns except column four) is a dummy variable indicating whether the firm experienced an Acquisition or IPO by March 2008. The dependent variable in column four is the number of years to resolution as computed in Table VIII. The independent variables include various investor and firm characteristics, as well as industry and time dummies, and are described in Tables I and IV. Additionally, we include independent variables relating to whether the Board of Directors is close to split among common and preferred shareholders (Split-Control), and independent variables relating to CEO qualifications.

Independent Variables	Probit Model		Probit Model		OLS Model		Probit Model	
	Dep. Var.= Merger/IPO	Dep. Var.= Merger/IPO	Dep. Var.= Merger/IPO	Dep. Var.= Merger/IPO	Dep. Var.= Time to Resolve	Dep. Var.= Merger/IPO	Dep. Var.= Merger/IPO	
VC Only	0.386 (2.00) ^b				1.587 (0.96)	0.608 (2.74) ^a		
Split Control		-0.098 (-0.57)		-0.207 (-0.96)				
Split x VC Only		1.613 (3.35) ^a		-0.098 (-0.57)		0.673 (0.56)		0.022 (1.49)
Not Split x VC Only		-0.207 (-0.96)		1.819 (3.17) ^a		-4.768 (-2.44) ^b		0.023 (0.21)
CEO Has MBA								0.376 (1.82) ^c
Years CEO Experience								-0.083 (-0.81)
# CEO Startups								-0.208 (-1.51)
Log Size	0.131 (1.12)	0.093 (0.75)	0.093 (0.75)	0.093 (0.75)	0.262 (0.25)			-0.857 (-2.28) ^b
Fraction Sold	-0.025 (-0.33)	-0.017 (-0.22)	-0.017 (-0.22)	-0.017 (-0.22)	-0.994 (-1.79) ^c			-0.746 (-1.94) ^c
Log # Investors	-0.110 (-0.95)	-0.174 (-1.27)	-0.174 (-1.27)	-0.174 (-1.27)	1.654 (2.67) ^a			1.182 (2.68) ^a
Preferred Investor C4	-0.612 (-2.63) ^a	-1.181 (-3.28) ^a	-1.181 (-3.28) ^a	-1.181 (-3.28) ^a	4.120 (1.41)			-0.188 (-1.53)
Strategic Alliance	-0.339 (-1.60)	-0.078 (-0.29)	-0.078 (-0.29)	-0.078 (-0.29)	1.560 (0.89)			-0.812 (-2.40) ^b
Product Release	0.401 (1.67) ^c	0.147 (0.45)	0.147 (0.45)	0.147 (0.45)	-3.298 (-1.88) ^c			1.182 (2.68) ^a
Log One Plus Firm Age	0.057 (0.83)	0.114 (1.43)	0.114 (1.43)	0.114 (1.43)	-0.304 (-0.50)			-0.188 (-1.53)
Missing Age Dummy	-0.015 (-0.08)	0.014 (0.07)	0.014 (0.07)	0.014 (0.07)	0.646 (0.36)			-0.164 (-1.92) ^c
Log Number of Founders	-0.023 (-0.38)	-0.023 (-0.34)	-0.023 (-0.34)	-0.023 (-0.34)	0.756 (1.67)			0.535 (2.67) ^a
Pre Series A Common Round	0.129 (0.90)	0.148 (0.97)	0.148 (0.97)	0.148 (0.97)	-1.913 (-1.75) ^c			0.400 (2.03) ^b
Brobeck Investor Dummy	-0.008 (-0.05)	-0.059 (-0.37)	-0.059 (-0.37)	-0.059 (-0.37)	-2.634 (-2.29) ^b			-0.252 (-0.81)
IT Industry	-0.113 (-0.49)	-0.333 (-1.36)	-0.333 (-1.36)	-0.333 (-1.36)	3.192 (2.64) ^a			-1.170 (-2.21) ^b
Medical/Bio-Tech Industry	-0.555 (-1.67) ^c	-1.262 (-2.87) ^a	-1.262 (-2.87) ^a	-1.262 (-2.87) ^a	6.407 (4.94) ^a			0.348 (1.32)
1998 to 3/2000 Dummy	0.349 (1.28)	1.178 (2.77) ^a	1.178 (2.77) ^a	1.178 (2.77) ^a	-0.797 (-0.50)			-0.271 (-1.16)
Post 3/2000 Dummy	0.123 (0.50)	0.884 (2.24) ^b	0.884 (2.24) ^b	0.884 (2.24) ^b	2.301 (1.65)			0.445 (2.17) ^b
California Dummy	0.429 (3.08) ^a	0.498 (2.80) ^a	0.498 (2.80) ^a	0.498 (2.80) ^a	-2.600 (-2.87) ^a			
Observations	77	77	77	77	73			67

* a, b, and c denote significant differences from zero at the 1%, 5%, and 10% levels, respectively.

Table XII: Billable Hours

The table displays OLS model marginal effects and OLS model coefficients with robust *t*-statistics in parenthesis. We report results for the whole sample, as well as for small and large deal subsamples as noted in the table header (small and large deals have below and above median deal size, respectively). All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in all specifications is the natural logarithm of the total number of hours billed by Brobeck specifically regarding the Series A financing. The independent variables include various investor and firm characteristics, as well as industry and time dummies, and are described in Tables I and II.

Independent Variables	All Firms		Small Firms Only		Large Firms Only	
	OLS Model		OLS Model		OLS Model	
	Dep. Variable= Log Billed Hours		Dep. Variable= Log Billed Hours		Dep. Variable= Log Billed Hours	
Angel Only	-0.37 (-1.90) ^c		-0.08 (-0.32)		-0.18 (-0.68)	
VC Only	0.07 (0.36)		0.70 (2.23) ^b		0.45 (1.56)	
Warrants Dummy	0.34 (2.21) ^b		0.29 (1.31)		-0.15 (-1.55)	
# Closings	0.13 (1.94) ^c		0.24 (3.29) ^a		-0.93 (-1.38)	
Preferred Investor C4	0.07 (0.15)		1.91 (2.59) ^a		0.44 (2.66) ^a	
Log Deal Size	0.18 (2.85) ^a		0.11 (0.74)		-0.06 (-0.41)	
Log # Investors	0.04 (0.40)		0.37 (2.34) ^b		-0.06 (-0.41)	
Log # Investors	0.04 (0.40)		0.37 (2.34) ^b		-0.02 (-0.20)	
Pre Series A Angel Ownership	0.00 (-0.02)		0.01 (0.11)		-0.03 (-0.29)	
Fraction Sold	-0.13 (-1.71) ^c		-0.34 (-1.95) ^c		0.05 (0.45)	
Log One Plus Firm Age	0.06 (0.74)		0.01 (0.07)		0.15 (1.90) ^c	
Log Number of Founders	0.14 (2.27) ^b		0.14 (1.33)		0.25 (1.54)	
Pre Series A Common Round	0.11 (0.82)		-0.06 (-0.26)		0.27 (1.23)	
Strategic Alliance	0.10 (0.55)		-0.09 (-0.38)		0.02 (0.06)	
Product Release	0.18 (1.02)		0.24 (0.86)		-0.19 (-0.73)	
IT Industry	-0.09 (-0.61)		-0.09 (-0.47)		-0.20 (-0.48)	
Medical/Bio-Tech Industry	0.09 (0.34)		-0.05 (-0.13)		0.00 (0.00)	
1998 to 3/2000 Dummy	0.38 (1.47)		0.52 (1.87) ^c		-0.02 (-0.05)	
Post 3/2000 Dummy	0.33 (1.44)		0.52 (2.00) ^b		0.15 (0.79)	
California Dummy	0.23 (1.92) ^c		0.42 (1.96) ^b		-0.05 (-0.32)	
Brobeck Investor Dummy	-0.10 (-0.79)		-0.14 (-0.70)			
Observations	181		90		91	

* a, b, and c denote significant differences from zero at the 1%, 5%, and 10% levels, respectively.