Are Angels Preferred Venture Investors?

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Abstract

We examine the impact of business angels on 182 Series A financings and subsequent company outcomes. Our studied rounds have a varied mix of business angel and formal venture capital investors (VCs). We find that when only angels participate in a financing round and VCs are absent, control rights are more entrepreneur-friendly, legal expenses are lower, and investors are more geographically proximate to the company. Such angel-backed companies are less likely to fail and are more likely to have a successful liquidity event. We find that companies financed exclusively by VC investors also perform well, particularly when deals are large. Companies financed by both angels and VCs experience inferior outcomes. Our results suggest that entrepreneurs consider business angels to be preferred investors and VCs investing in small deals face adverse selection. For larger deals, where deeper-pocket VC participation is required, these roles reverse and angels face adverse selection when investing alongside powerful VC syndicates.

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I Introduction

Private equity investments of individuals (business angels) are believed to represent the lion's share of investments in de-novo startups. 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). For instance, the conventional wisdom is that angels tend to invest in early-stage deals, hold common stock, and exert influence through social networks rather than imposing formal control rights.

We provide several new insights on angel investing by analyzing a unique sample of stock purchase agreements and other legal documents pertaining to over 182 "Series A" private equity deals. 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).[1] We find new relationships between investor mix and liquidation rights, redemption rights, investor proximity and attorney billable hours. We also find that investor mix has a systematic association with success.

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 competed. Several characteristics of our data allow us to overcome this limitation. First, the companies in our sample, including those financed by angels, inhabit the traditional VC domains of information-technology and biotechnology. Second, Brobeck, which handled all deals in our sample, was highly prominent. This suggests that the deals surpassed a minimum quality threshold in the sense that Brobeck "certified" the opportunity. Megginson and Weiss (1991) and Brav and Gompers (1997) use a similar logic to explain the link between VC financing and successful IPOs. 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. Finally, we focus exclusively on Series A deals. Thus, for a large share of the deals in our sample, entrepreneurs had a meaningful choice between both investor types. This allows us to understand how angels compete with VCs, how they participate on the margin, and the implications of their participation.

The prevailing belief that angels simultaneously invest in very early stage deals but demand fewer controls over their investments is particularly intriguing considering that investments in small private firms are beset by problems of information asymmetry and

[1] This is a key distinction between our work and Wong (2002), who conditions on angel participation in a deal. Analyses of private equity investment returns by Cochrane (2005), Hall and Woodward (2006), Hochberg, Ljungqvist, and Lu (2007), Kaplan and Schoar (2005), Ljungqvist and Richardson (2003) and Moskowitz and Vissing-Jorgensen (2002) are based generally on investments by VCs or holdings of small privately-held businesses.

misaligned incentives. The literature on venture capital financing has documented the use of complex contractual instruments (Gompers 1997; Kaplan and Stromberg 2003), as well as staging (Gompers 1995), as ways to mitigate these problems. However, similar contractual and staging arrangements are believed to be absent from angel deals (Wong 2002). We find that this belief, in its strictest form, does not properly characterize Series A financings. In Series A rounds, angels typically take preferred shares alongside VC investors. However, angel participation is also associated with less restrictive control rights. In part, this may be because the implementation of sophisticated control mechanisms is not cost-effective for small deals. However, we find that when angels buy preferred stock in Series A rounds, they systematically have weaker control rights than VCs, even controlling for size. We also find, controlling for deal size, that angels are more geographically proximate to their investment targets and that exclusively angel deals have lower legal costs.[2] Both geographic proximity and less reliance on legal services suggest that angel deals are associated with fewer asymmetric information problems. In particular, geographic proximity is likely associated with stronger social networks. This will likely lead to less contentious deals, less negotiation, and less use of billable attorney hours. Our results suggest that angels forgo strong legal controls because they are less cost-effective for smaller deals and because angels have stronger social ties to the entrepreneurs in whose companies they invest.[3]

Given a choice between either angel or VC financing, entrepreneurs may favor angels because they demand weaker control covenants and may be more patient.[4] This implies a "pecking-order" in which angels are preferred investors. To the degree that angels are informed, VCs will face an adverse selection problem because they are second in the pecking order. Supportive of this story, we find that angel-only deals have superior outcomes as measured either by survival, or alternatively, by the likelihood of a successful liquidity event (acquisition or IPO). This result is contrary to the conventional wisdom that VC financing disproportionately enhances success probabilities (Timmons 1994), but consistent with evidence that VC backing does not improve survival rates (cf., Goldfarb, Kirsch, and Miller 2007). Moreover, this adverse selection may help explain why VCs tend to avoid smaller investment deals and indicates a well-functioning angel capital market. Thus, our findings suggest that public policy interventions in this private equity market may not necessarily

[2]Freear et al. (2002), based on survey data, find that angels invest in firms close to their homes, but are unable to compare angels to VCs.

[3]Angels may also recognize that restrictive terms could create obstacles to VC funding in later rounds, thus handicapping the long-term success of the venture (Ibrahim 2007; Wilmerding 2003).

[4]Stricter control covenants imposed by VCs may be due to greater impatience stemming from pressures to deliver returns to limited partners on an accelerated schedule (Jones and Rhodes-Kropf 2004; Sahlman 1990). In addition, Inderst, Muller, and Munnich (2007) show that entrepreneurs have stronger incentives to exert effort when investors are more constrained, since they must compete for limited funding in future rounds. This can lead to an equilibrium in which high-quality managers would select shallow-pocket investors. It is reasonable to assume that angels will likely be the most constrained funding source.

be welfare enhancing (see also Lerner 1998).

If angels enjoy a preferential position in the entrepreneur's pecking order, it is natural to ask why they do not scale their investment strategy further and crowd out venture capital financiers. Our findings that angels are more proximate to the firms they invest in, and that angel-only financing is only observed for smaller transactions, suggests that angels cannot scale their investment strategies because they face two important limitations: (1) their informational advantage is primarily localized to a small number of proximate firms, and (2) when deals are large, angels do not have sufficient assets to fully fund an investment (at least without taking overly concentrated investment positions).

It follows that for larger transactions, entrepreneurs must seek at least some funding from deeper-pocket VCs. Given the considerable complexity involved with negotiations that include diverse sets of investors, and given the potential for agency problems that could reduce investment viability in subsequent rounds, high quality entrepreneurs likely have a preference to focus exclusively on VC financing for these larger deals. Furthermore, high quality VCs will recognize good opportunities, and will try to capture them in entirety for themselves and their syndicates. Hence, for larger transactions, angels might face adverse selection and only receive allocations when the opportunity has less potential. These dynamics will result in less demand for weaker deals, which will require the broadest set of investors including both VCs and angels. Consistent with these arguments, we find that both companies in which either angels invest alone and companies in which VCs invest alone, are more successful than deals in which VCs and angels co-invest. Moreover, angel-only deals are possible, and thus outperform, only when the transaction is small. VC-only deals outperform most when deals are larger (i.e. when angel-only financing is not possible).

If VCs provide managerial expertise (Gompers and Lerner 2000, Ch 8, Hellman and Puri 2002), this may also explain our findings regarding outcomes, and our finding that VC-dominant deals have stricter control rights. In particular, when managerial expertise is needed, VCs may only be willing to invest under strict terms. The relationship between outcomes and strict VC-only investor composition might also arise because VCs may try to prevent angels from free-riding on their costly managerial efforts.[5]

We further document the extent to which contractual terms may depend on historical market conditions and industry. We find that terms became less entrepreneur-friendly after the market decline that began in March 2000. We also find that biotechnology entrepreneurs tend to retain greater board control.

In the next section, we describe our data sources, and present some descriptive statistics characterizing the companies, deals, and investors covered in our sample. In Section III

[5]Many angels are also valued advisors, see Wetzel (1983). However, the fact that they invest with weaker control provisions suggests that they are less likely to implement more draconian measures such as CEO-replacement.

we provide a more detailed analysis of the investors participating in the different financing deals. In Section IV, we analyze the relationship between control rights and the investor mix. Section V presents regression results that show an association between the outcome of the companies and the composition of their investors. Section VI provides further insights on the complexities of deals by analyzing attorney billable hours. Section VII concludes the paper.

II Data Description

A Preservation of the Brobeck Digital Corpus and Social Science

Our data are derived from the electronic records of the now defunct law firm Brobeck, Phleger & Harrison (Brobeck). 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 (Kostal 2003; Murphy, Dillman, and Johnston 2005). 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. 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. By 2000, the firm had nearly doubled the number of its attorneys in little more than three years. Average annual partner compensation increased, surpassing $1 million in 2000. However, as the technology economy slowed, Brobeck's underlying costs could not be scaled back to reflect shrinking revenue, and average income per partner fell to $611,000. A self-reinforcing cycle of defections and falling revenues pitched the firm into a "death spiral." In 2002, the firm's final full year of operation, Brobeck maintained multiple offices, had more than 160 partners, and still employed hundreds of associates and staff. Annual revenues remained strong at $320 million, but lease obligations and other fixed costs had soared as a percentage of revenue. This drove average income per partner down to $245,000, which in turn caused key partners and practice groups to leave for other law firms with less debt. The firm decided to cease operations in February 2003. Seven months later, creditors forced the liquidating firm to seek protection in bankruptcy court where 1,145 creditors alleged liabilities of $258 million.[6]

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

[6]Since 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 bankruptcy trustee is also highly relevant (Murphy et al. 2005).

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. Only aggregated or redacted data are allowed to leave the secure area. It is hoped that this solution balances the need to safeguard legal confidentiality while still supporting approved scholarly access.

B Sample Description

With offices in the heart of Silicon Valley, Austin and the East Coast, Brobeck represented both new ventures and investors. We focus on first round (Series A) investments. 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 focused on six categories of Brobeck representations (matters) that had usable documents concerning relevant deals for the purposes of this study.[7]Matters that lacked electronic documents were dropped from the sample (most of these were prior to the coverage period of the electronic database), as were those with few billable hours (where the deals did not close). Each remaining matter was hand inspected to ascertain the contents of the representation. Our query identified 182 Series A funding rounds with complete electronic records.

For each record, we observed three types of information: firm characteristics, investor characteristics and deal characteristics. For each firm, we collected complete histories and outcomes based on public sources including Lexis-Nexis, Hoovers, SEC-filings, and the Internet Archive (archive.org). In particular, we have a record of each firm's internet presence

[7]Each matter was categorized and also contained a short description of the nature of that particular legal representation. The categories for whom 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).

(from 1996) 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, mergers, IPOs, and major company milestones such as strategic alliances and product releases.

To assess the representativeness of our sample, we compared the characteristics of our sample with first round financings of US-based firms recorded in the Thomson Financial Venture Economics database and occurring between 1993 and 2002; which corresponds to the years represented in our sample. We excluded buyout deals and all deals that Venture Economics classified as "non-standard". The characteristics of firms in the Brobeck sample are summarized in Table I, while corresponding statistics from Venture Economics are described in the text. Our data over-samples recent rounds, has a locational bias that reflects Brobeck's business activities, but is similar with respect to investment size and firm industrial categories. 16% of the deals occurred before 1998, 34% between January 1998 and March 2000, and 49% from April 2000 through the end of 2002. This contrasts with Venture Economics where 26% of deals occurred before 1998, 35% occurred between January 1998 and March 2000, and 38% occurred between April 2000 and December 2002. Thus, we over-sample from the most recent period.

However, our sample does not differ by industrial classification. 61% of the sample deals (111 of 182) appear in the VentureXpert database. We used the Venture Economic Industrial Classifications (VEIC) to identify industries and classified the deals that were absent from Venture Economics using information from the Brobeck corpus and the World Wide Web. 80% of sample firms are classified as Information Technology firms, 11% are classified as Medical/Health/Life Science, and the remainder are either non-high technology or unclassified. In contrast, of the 15,620 US-based companies that reported receiving first round financing from 1994 through 2002 reported in VentureXpert, 70% are classified as Information Technology, 13% are classified as Medical/Health/Life Science, and 17% are non-high technology. Our data are thus quite representative with respect to industry.

Reflecting the geographic footprint of Brobeck's activities, our sample has a distinct locational bias. 53% of our observed investment targets are from California, 21% are from Texas, 7% 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. In contrast, 51% of first round venture deals as recorded by Venture Economics during the same time period are equally distributed between the California and the Northeast Corridor, only 2% of deals are in Colorado, and 7% of deals are in Texas. Thus, we systematically over-sample deals from California, Colorado and Texas at the expense of other locations. Therefore, our sample is not geographically representative of the United States. This bias may affect our results if there are systematic differences in control rights between the East and West coasts. Gupta (2000) suggests that East Coast deals tend

to have greater control rights, perhaps reflecting a stronger "entrepreneurial culture" on the West Coast (Saxenian 1994). We control for location in our analysis to ensure that such systematic differences are not linked with investor composition in such a way as to impact our results.

The mean of the natural log of investment size is 14.98 in the Brobeck sample, which is quite close to the mean log size of 14.73 in the Venture Economics sample.[8] Our sample reflects very early stage firms: the average age is 1.62 years, and most firms did not achieve milestones prior to funding - only 13% had products and 10% had strategic alliances.[9] Note that Brobeck represented the company about twice as often (62 % of the time) as they did the investor for the deals in our sample.

Our sample is unique in that it includes both angel-backed and VC-backed deals. In the capitalization tables, we observe the names of each investor. We classified each investor as a venture capitalist, a founder, or otherwise as an angel. 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 and (2) any other shareholder holding at least 30% as many shares as the largest common shareholder is also identified as a founder, and (3) any common shareholder holding the position of president or CEO is also identified as a founder. Founders ubiquitously hold common shares. Venture capitalists were identified by cross-referencing investor names with investors appearing in the Venture Economics database, or if the names in our data included the terms "venture", "L.P." or "L.L.P.".

There is considerable variation in the literature and in practice regarding the definition of angel investors. We define angels as non-founder, non-VC investors. Because we define VC-investors as those appearing in the Venture Economics database, we are thus careful to classify both corporate VCs and traditional VCs as venture firms, and hence not as angel investors.[10] Because we cannot accurately identify family and friends, we include them in our definition of angels, which is in contrast to some others such as Fenn and Liang (1998),

[8]The statistics for the size of our deals are as follows: mean size is 6.1 million dollars (in Table I); median size is 3.50 million; and the 25th and 75th percentile of size in our sample are 1.49 million, and 6.96 million, respectively. In contrast in the Venture Economics universe, the mean deal size is 6.2 million dollars; the median is 3.0 million, and the 25th and 75th percentiles as 1.0 million and 6.4 million respectively.

[9]Given the relative lack of heterogeneity amongst our sample firms' ages, we find that this age variable lacks significant predictability with respect to outcomes and the other variables we study below.

[10]There were a few occasions where investors had the word "venture" in their names but were not in Venture Expert 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 and the entities could not be found on the World Wide Web. These small investment organizations are often set up for estate planning purposes, or to consolidate many small investors into one legal entity for the purpose of a single investment. We classified these investors as angels.

who specifically exclude them from their definition of angels.[11] In our sample, the mean investment by an angel is $174,000, while the median investment size is $27,100, thus representing a highly skewed distribution which likely reflects the diverse set of investors captured in our angel category. Although we cannot accurately identify friends and family, we note that investors with the same name as founders are not uncommon, though they appear to represent a relatively small proportion of the angels and the overall angel investment in our sample. There are also a small number of specific investors whose categorization may be subject to debate. For example, there are five angel investment groups in our sample, and though angels are the main source of capital for these large groups, we put them into the VC category given that their typical organizational structure closely resembles the delegated monitoring mechanism under which VCs operate. Brobeck itself is an investor in some deals, and we categorize them as an angel investor given that they are not in the delegated money management business. While we believe our categorizations are reasonable, we perform robustness checks described later in the analysis to ensure that our results are not driven by how we categorize these special classes of investors, and find that our results are indeed quite robust.

The literature suggests that angels are a diverse group. Wong (2002) 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. Of these, some take on an active role while others invest passively. Angels do have some commonalities in that the "typical" angel has a college degree and active angels (those that provide business advice as well as capital) are often successful entrepreneurs (Prowse 1998). Prowse also suggests that these active angels tend to focus on early stage firms and, occasionally, invest alongside institutional investors. Unfortunately, we do not observe investor demographics at this level in our data. However, we believe that angels in our sample generally are "active", as they obtain preferred stock and often invest alongside VCs.

Venture capital firms invest in the majority of deals in our sample. To ascertain the degree to which our sample is related to the broader sample of venture capital deals, we compare the attributes of the venture capital firms that are represented in our sample to those that are not along several dimensions. Data were collected from the Venture Economics database. We then identified each private equity fund that invested in a company represented in the Brobeck sample. As our paper advances a theory of VC-decision making, we aggregate

[11] Extrapolating 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.

this fund-level information to the VC firm level. We refer to the private equity firm managing each fund as a "Brobeck PE Firm". We compare the size and location attributes of Brobeck PE Firms and the rest of the private equity firm universe. We excluded firms whose last investment occurred prior to 1993 (the first investment year in our sample) and firms whose first investment occurred after December 31st 2002 (Brobeck ceased operations in February 2003). We report summary statistics in Table II.

Brobeck PE firms are older, have raised more venture funds, and have managed more capital. They are more likely to manage US-based funds and, in particular, California-based funds. Brobeck PE firms are more likely to manage early stage funds, but not seed stage funds. They are more likely to manage VC funds and less likely to manage buyout funds. Although their average investment round and average total company investment is larger than average, their minimum round size is smaller than average.

To explore the robustness of these conclusions, we consider a multivariate analysis predicting whether a PE firm becomes affiliated with a Brobeck Series A deal in Table III, and this analysis yields similar conclusions. In Model 1 we omit firm vintage controls, in Model 2 we include an age variable, and in Model 3 we include year-level dummies to control for firm vintage. This multivariate analysis reveals several key facts. First, not surprisingly, Brobeck PE firms are more likely to be US-based and conditional on being US-based, are more likely to manage Northern California based funds. Second, they are more likely to manage venture capital funds than buyout funds. Third, after controlling for the total number of funds, Brobeck PE firms have not managed a greater amount of aggregate capital, and do not have larger average fund sizes (although this figure is less likely to be reported for Brobeck PE firms). However, Brobeck PE firms tend to invest larger amounts of money in individual companies, and at the same time, the minimum total company investment of a Brobeck PE firm's fund is smaller. We might expect this result given that participation in a Series A investment round is a pre-condition for inclusion in the sample.[12]

Figure 1 and Table IV provide details of the investor composition of deals in our sample. The top panel of Figure 1 depicts a histogram of the share of investors who are angels. We observe a well-balanced mix in terms of investors - and it is this feature of our data that allows us to explicitly compare angel and VC investments. As also reported in Table IV, 18% of deals involve only business angels, 21% involve only venture capitalists, and the remainder are mixed. However, the bottom panel of Figure 1 indicates that venture capitalists systematically invested more money. Across all deals, VCs purchased on average 67% of Series A shares (reported in Table IV).[13] After the close of the Series A round, founders

[12]The final three models in the table demonstrate that these results are robust to i) selecting on firms that never reported managing a buyout fund, ii) selecting on firms that reported managing at least one venture capital fund, and iii) selecting on firms that reported managing at least one US-based fund.

[13]All of the ownership percentages reported are based on shares issued in the seed and Series A round,

retain 46% of the company on average, VCs hold 37%, and angels hold the remaining 17%, some of which was purchased in the seed round (about 8% of seed round shares).[14] Note that only 15% of the angels in the Series A round previously invested in the seed round.

These features of the data suggest that sampling on Series A deals from a prominent source, such as Brobeck, provides a unique opportunity to explore the influence of investor composition on outcomes and deal characteristics. This allows us to focus on deals where entrepreneurs have a meaningful choice between both investor types. Since the source of the data is a law firm that represents both investors and companies, our sample does not favor deals with a VC presence, as is the case when databases are constructed from VC firms as in (Kaplan and Stromberg 2003).

We calculate Herfindahl indices to ascertain investor concentration. Consistent with the premise that angels are capital constrained, VCs are more concentrated even though they invest in larger deals (see Table IV). We only observe addresses for investors from 136 of the sample firms. We find that investors were generally in the same geographic locales: 60% were within 3 hours of driving time from target firms, and 18% were within the same zip code. Brobeck itself invested in 24% of the deals.

With three exceptions, preferred stock was sold in all observed rounds. However, as reported in Table V, warrants were sold in 15% of the rounds while employee option plans were set up in 69% of the rounds. Interestingly, we observe multiple within-round closings in 45% of the deals - a phenomenon referred to by Kaplan and Stromberg (2003) as "ex-ante staging". This practice, in which investors purchase more shares of the company at identical terms over a period of time, takes place over an average of 165 days (average time between first and second closings).[15] Although this phenomenon is interesting, we can report that the presence of multiple closings correlates little with investor composition and success likelihood. However, multiple closings are related to higher legal fees.

Two additional characteristics of our data are unique to the literature. First, the Brobeck corpus allows us to associate billed legal hours to deal characteristics. The mean deal in our sample billed 169 hours (the median is 144 hours). This allows us to test, for example, whether angel financing results in less expensive legal fees, all else equal. Second, and more importantly, our data permit us to relate deal characteristics to venture outcomes. The

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 below, 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.

[14]We assume that founders retained all their stock in the seed round in the 16 cases where no explicit founder data was identified. While the average fraction of Series A shares purchased by the founder appears as zero in Table IV, it is in fact slightly positive (.0014), indicating that on rare occasions founders do put in additional capital in order to purchase small amounts of Series A shares.

[15]The maximum time between first and second closings reflects an outlier where $25,000 was invested approximately two and a half years after the initial close of a $2M deal.

majority of ventures in our sample have had successful outcomes as measured by survival (60%). We can also report that 31% were acquired, and 8 firms sold stock in IPOs. This allows us to evaluate which characteristics are associated with higher deal quality, as revealed by ex-post outcomes.

In Table VI, we summarize the rights associated with the Series A preferred stock. Gompers (1997) 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. 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 these rights.[16]

As shown in Table VI, VCs and common shareholders each have roughly the same representation (45%) on the boards of companies in our sample. This classification was done 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. Because our investors have already been classified as angels, VCs, and founders, this procedure also identified which board seats were specifically occupied by VC affiliates as opposed to angel affiliates.

Turning to cashflow rights, we find that 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. Cumulative dividends are in general seen as an investor-friendly term in a Series A financing.

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

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

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 also 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 that when the company value upon liquidation is sufficiently high, preferred stockholders waive their liquidation rights, and convert their stock to common.

Finally, we find that preferred shareholders may 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.

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 many important respects. Our data represent 182 series A investments made by 346 distinct venture capital firms in 182 separate 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 versus the 17% in our sample. In general, the deals in our sample involve weaker control right provisions.[17] 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.[18] 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.[19]

To better understand the differences between angel, VC, and other investors, we examine descriptive statistics for subsets of our data identified by investor composition. In particular,

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

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

[19] Gompers (1997) notes certain characteristics of his sample of fifty VC private placement agreements which appear consistent with our sample. For instance, 51.4% of board seats are controlled by venture investors, which is slightly more than the 45.3% 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.

we explore the differences between angel-only deals, VC-only deals, and mixed deals. We report mean characteristics for each group in Table VII. These statistics are based on 33 angel-only deals, 38 VC-only deals, and 111 mixed deals, and are displayed in columns one to three, respectively. VC-only deals are more than three times larger than angel-only deals, and the median (not reported) VC deal is roughly twice the size of angel-only deals. Angel-only deals also have more investors, supporting the notion that angels are not as wealthy as VC firms, and more angel investors are often needed to fully fund a given Series A round relative to scenarios in which only VCs invest. Mixed deals, intuitively, have the largest number of investors, but interestingly, are also larger in size.[20] The relative size of deals in the three investor composition categories can be seen most clearly in Figure 2. The figure highlights that angel-only deals tend to be concentrated in a size range that is not densely populated by VC-only deals, and vice-versa. In contrast, there are numerous mixed deals in all segments of the size range.

Finally, Table VII also shows that angel-only deals are somewhat more likely to be in the IT industry, and less likely to involve firms with strategic alliances. They also involve fewer billable hours on average and include more founder-friendly control rights.

III Investor Composition

We now use our information regarding firm, investor and deal characteristics, along with location and investment patterns to better understand which characteristics are most likely to result in angel-only financing, VC-only financing, and stronger overall VC participation levels. We consider probit models to examine the likelihood of angel-only and VC-only financing, and we use an OLS model to examine the fraction of investment dollars provided by VC investors. Table VIII displays regression coefficients with t-statistics in parentheses.

We use standardized independent variables (except for dummy variables) throughout our study, and we display marginal effects for all probit regressions. This gives our regression coefficients a natural interpretation, as they indicate how much one standard deviation of the given variable impacts the dependent variable. We find that smaller deals, and deals involving the sale of a smaller fraction of the firm, are more likely to be funded by angels alone. For example, a firm that is one standard deviation smaller is 9% more likely to be angel-only financed, and 9% less likely to be VC-only financed. A firm with a larger fraction being sold is 11% less likely to be angel only financed and is likely to have 11% more of the deal financed by VCs. These findings are consistent with angels having relatively tight budget constraints. In particular, these budget constraints imply that angel-only deals are

[20]The median sizes of angel-only, VC-only and mixed deals (in millions of dollars) are 1.18, 3.53 and 4.55, respectively.

possible only when they are relatively small, and when a smaller fraction of a firm is being sold. In contrast, VC-only financing is more common not only for larger deals, but also for deals with fewer overall investors, consistent with the higher VC concentration in VC-only deals. Our findings regarding the percent VC dollars (column 3) show that the same characteristics that drive angel-only and VC-only financing (the end points of the percent VC dollars variable) also affect the overall investor mix. When interpreting our later results, it is important to keep in mind that, because we control for these characteristics throughout this study, they cannot explain our broad findings. Finally, note that when Brobeck invests in a deal, it generally does so alongside VCs.

Our hypothesis that angels are preferred investors leads us to ask whether they are also more proximate (i.e. live closer) to the founder. For example, angel investors might include friends, family, and business contacts, all of whom might live close to the founder. To answer this question, we measure how far each investor lives from the firm's corporate headquarters (which proxies for the founder's home), and we consider two dummy variables for each investor: (1) does the investor live inside the corporate headquarter's zip code, and (2) does the investor live less than three hours away from the corporate headquarter's zip code (measured using Mapquest.com)? For each firm in our sample, we compute the average of both dummy variables over the investors in each firm's Series A financing. Table IX displays regressions in which the dependent variable is either of these two investor distance measures.

The table shows that financings involving angel-only investors are 14% to 16% more likely to be comprised of investors living in the same zip code as the firm's corporate headquarters. In contrast, VC investors are 19% to 23% less likely to live within a three hours drive from the corporate headquarters. These findings support the conclusion that angels are more proximate than VCs, and thus more likely have the opportunity to accept or reject an investment before it is offered to VC investors. If these same angels are informed (being proximate makes it more likely that they are), then angel-only deals will perform well in relative terms, and deals being offered to VCs will suffer from an adverse selection problem. In particular, VCs will tend to have the opportunity to provide financing only if angel investors choose not to invest. Because angel investors suffer from tight budget constraints, this dichotomy will exist primarily for smaller transactions. Our findings regarding outcomes (reported later) support the conjecture that angel-only financings experience superior ex-post performance.

Table IX also shows that larger VC-only deals are especially likely to have investors living outside the firm's zip code, and deals with more investors are 11% to 13% more likely to be funded by investors who more generally live further away. We also find that investors are 11% more likely to live within a three hours drive when the investor base is highly concentrated, 16% more likely to do so when Brobeck was hired by the company rather

than by an investor, and around 27% to 30% more likely when the firm is headquartered in California.

IV Control Rights

We hypothesize that angels are preferred investors, and enjoy an earlier ranking in the founder's pecking order regarding sources of financing. To test this hypothesis further, we examine whether angel investors accept more founder-friendly deal terms relative to VC investors. To be thorough, we also explore the role of numerous control variables, and whether terms have changed over time with market conditions during our sample period.

We begin this task by reviewing the securities purchase agreements of all the firms in our sample. This initial analysis revealed that four key terms experience significant variation across our sample: liquidation preferences, redemption rights, cumulative dividend rights, and seats on the board of directors. Table X reports the results of probit models predicting the likelihood of investor-friendly liquidation rights and redemption privileges. Table XI reports the results of a probit model predicting the occurrence of cumulative dividend rights, and an OLS model predicting the fraction of board seats allocated to common shareholders. As before, 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.

Table X and Table XI both illustrate that angel investors are associated with more founder friendly deal terms. In particular, angel-only status implies a 38% lower likelihood of having strong liquidation privileges for Series A investors, and a 20% reduced likelihood of having redemption features. In contrast, a larger VC share of the Series A round is associated with a higher likelihood of both liquidation and redemption rights. These results are highly significant at the 1% or 5% level. Both liquidation rights and redemption rights, when in place, grant valuable rights to Series A investors generally at the cost of common shareholders including the founder. The negative relationship between angel investors and Series A control rights is consistent with a founder preference for angels over VC investors.

Table X also shows that strict liquidation privileges became 29% to 35% more likely following the collapse of the internet bubble (March 2000). This supports the notion that start-up financing became more stringent as investors were less willing to invest in risky firms following these events. Interestingly, deals in which Brobeck invested had stronger liquidation rights, suggesting that they either encouraged terms that were more investor-friendly, or were more likely to invest when terms appeared to be more favorable to investors. Redemption rights appear to be less frequent in deals involving Californian companies.

Table XI shows that investor composition is generally unrelated to whether or not cu-

mulative dividends are specified in the securities purchase agreement. However, we find that investors in firms that previously announced product releases (i.e., mature firms) are roughly 16% more likely to seek cumulative dividend rights. This finding is consistent with dividends only being relevant when firms generate positive cashflows, as the ultimate use of the cash received from future sales is material only when sales actually exist.

We find some evidence, almost significant at the 10% level, that angel-only financings cede 15% greater board control to common shareholders. The table also shows, intuitively, that common shareholders receive greater board control (roughly 12% more per standard deviation) when a smaller fraction of the firm is being sold. Biotechnology firms are associated with 23% to 27% more board control for common shareholders, perhaps due to the more knowledge-intensive nature of this business.

V Outcomes

Perhaps the most relevant test of any adverse selection hypothesis is a test of outcomes. If angel investors are preferred investors, and they leave VC investors with "lemons", then angel-only transactions should experience superior outcomes. Similarly, if powerful VC syndicates have first priority over larger deals, then large VC-only transactions should also have superior outcomes. We employ two tests of outcomes in this section to evaluate this hypothesis. We also explore more broadly whether other deal characteristics also affect outcomes.

To test for outcomes, we first classify the 182 firms in our final sample into three groups: (1) failed, (2) surviving but still independent and private, and (3) merger or IPO.[21] This is accomplished using hand searches based on Google, press releases from Lexis/Nexis and the internet archive (www.archive.org). Our first test is based on a simple probit model, where the dependent variable is zero for failed firms and one for all other surviving firms. Our second test is an ordered probit model in which we allow the model to fit based on all three outcome groups in the above specified order. Although we display marginal effects for the simple probit model as before, we are unable to do so for the ordered probit model due to the fact that this model has more than one outcome level. Hence, although significance levels for the ordered probit model are relevant, the coefficients do not have a straightforward interpretation.[22]

[21] Since 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.

[22] The interpretation of the ordered probit model is subtle as the effect of a change in an independent variable can simultaneously affect the probability of failure and the probability of merger/ipo in opposite directions. Hence, we simply report the ordered probit coefficients and later provide an intuitive graphical view of their implied predicted values.

Table XII displays the results of both specifications, and the first two columns display the results of the basic survival probit regression. We find that angel-only financed deals are 33% to 36% more likely to survive relative to other deals (at the 5% significance level), consistent with the notion that angel investors are both informed and also preferred investors and hence they can pick and choose which deals they actually invest in.

The results of the ordered probit are displayed in the second two columns of Table XII. Figure 3 depicts the predicted probabilities of failure, merger / IPO, and ongoing survival as a private firm as a function of investment size in the top, middle and bottom graphs, respectively. Predictions are displayed for each of the three investor composition categories. All variables are held at their means with the exception of the mutually exclusive investor composition category dummies. Investment size is logged and normalized, and hence the x-axis can be read as the number of standard deviations of the logged size of Series A investment. The angel-only lines are censored at 0.5 standard deviations as this reflects the largest angel-only deal in the sample. VC-only deals are much more likely to fail when they are small, and to be successful when they are large (through a merger or IPO), and angel-only deals are most likely to succeed when they are small. Mixed deals perform worse than either type. We should note that the predictions for VC-only deals that are one standard deviation below the mean deal size are based on few observations (as illustrated in Figure 2), and should thus be interpreted with caution.

These results suggest that, among smaller transactions where angel investors likely have sufficient proceeds to invest, transactions flowing to VC investors are more likely to be "lemons". This front-running by angels leads to an adverse selection problem for VCs in smaller deals. In turn, this adverse selection might lead VC investors to demand greater protection in the form of liquidation and redemption rights (consistent with our earlier results). From the founder's perspective, this further cements the status of VC investors as being second to angels in the pecking order.

It is also possible that the results for angel-only financings are related to the managerial expertise VC firms provide. In particular, it is well known that VC firms often participate in managing the firm, serving on its board of directors, and in some cases, replacing the CEO (Hellman and Puri 2002). The strict control rights we observe for VC backed transactions (reported earlier) are necessary for VCs to accomplish this assistance as it is most necessary when firms perform poorly. However, our results suggest that these controls are insufficient to overcome the adverse-selection problem.

In total, our results suggest that both angel-only and VC-only transactions outperform mixed deals where both investor types participate.[23] The positive coefficient for the cross

[23]We have conducted many robustness checks to ensure that our categorization of investors (e.g. for angel investment groups, corporations, and Brobeck itself) does not affect our results. These tests confirm the robustness of our results, not only with respect to the outcome regressions, but also with respect to our

term (*VC-only x log size*) (significant only in the ordered probit regression) indicates that the success of deals that are VC-only is most prevalent for larger transactions.[24]

The success of VC-only transactions could be explained by numerous hypotheses. A popular explanation for the superior performance of VC backed IPOs is the certification hypothesis (Megginson and Weiss 1991). As all our deals are from a prominent law firm (Brobeck), our sample likely includes only higher quality deals. Hence, our sample contains a natural control for certification, making it less likely that the certification hypothesis explains our results. The certification hypothesis also cannot explain why a cross term multiplying VC-only status and firm size is positive and significant, as the value of certification should be larger for smaller transactions where information asymmetry is likely to be largest.

A second explanation of our VC-only result is that for some deals, especially larger deals, skilled entrepreneurs must seek VC financing due to the large amount of capital needed. In such cases, both the VCs and the entrepreneurs may desire to exclude angels as they complicate negotiations, particularly when angel participation in the Series A round could make subsequent financing rounds more difficult.[25] Also, VCs may want to prevent angels from free-riding on their costly managerial efforts.

Finally, the superior performance of large VC-only backed transactions may be rooted in the strong market power of VC syndicates. Hence, in large transactions, angel investors face adverse selection and only receive allocations when the deal is less favorable. This explanation is especially consistent with the superior performance of large VC-only backed transactions, and suggests that VC investors effectively squeeze angels out of a transaction when the deal is a highly favorable one, and when they have sufficient market power to do so.

Table XII also shows that larger deals are 15% to 18% more likely to survive, and mature deals (as measured by the existence of a product that can actually be sold) are 27% more likely to survive. We also find that firms engaging in strategic alliances are 36% less likely to survive, firms with a higher degree of investor concentration are roughly 11%

other regressions reported in other sections.

[24] A similar cross term for angel-only financings is not significant.

[25] We examined the impact of using cutoffs other than 100% when categorizing deals as angel-only or VC-only to see whether our results depend 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 that the VC-Only x size term loses significance in the outcome regressions, suggesting that defining VC-Only in a pure fashion does matter (it also has some minor effects on the control rights and proximity regressions). (In contrast, adding a quadratic term for VC share into the regression does not similarly impact the regression results, so the angel participation effect is truly discontinuous, and not simply due to non-linearities). We conclude that for larger deals, even minor angel participation might unnecessarily complicate a deal, and this practice would thus be eschewed by high-quality managers and VCs.

less likely to survive and firms with a larger fraction being sold are less likely to succeed in the ordered probit model. California companies were also 20% more likely to succeed.[26] The concentration result might be due to firm maturity, as firms with more concentrated ownership are likely to be earlier in their development and thus more likely to fail due to the higher risks facing earlier startups. This variable might also proxy for deal syndication, as larger syndicates will generate less investor concentration. Here, syndication might generate superior outcomes because of the improved informational environment associated with the syndicate's collective signal.

Although we do not have data regarding the terms of Series B financings, using a combination of Venture Economics, press releases, and the Brobeck archives, we can report that 100 of the 182 firms in our sample have experienced a VC-backed Series B round by mid 2007 and that most of these were identified using Venture Economics. We can also report that the incidence of Series B financing is not significantly related to our key Series A variables. The only variable that reliably predicts Series B financing is the percent of the firm sold in the Series A round. Firms selling more are more likely to experience a Series B round, consistent with percent sold possibly proxying for capital intensive businesses.[27]

VI Billable Hours

In this section, we explore the determinants of how many hours are billed by the attorneys preparing the documents for each transaction. Our main hypothesis is that angel-only financings will be associated with fewer billed hours. In particular, we noted earlier that angel investors are associated with more founder friendly liquidation and redemption provisions. Our expanded hypothesis is that the founder friendly stance of angel investors will also generate 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 XIII 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 5% level and supports the conclusion that angels operate in a fashion that is more founder friendly.

[26] Although not shown in the table, we also examine whether the following variables affect outcome: Brobeck corporate representation, %VC Share in Series A (a measure of heterogeneity amongst the mixed deals), Warrants and Option Pool dummies, control rights variables (Liquidation, Redemption, Cumulative dividends), Nasdaq returns over the last month (rather than year), and IPO volume over the last year (rather than three years). None of these variables have a significant impact on outcomes.

[27] The analysis of Series B rounds likely suffers from an important selection problem. Because our primary source of Series B incidence is the Venture Economics database, we should not expect to observe angel-only Series B deals since they are unlikely to be reported in this database.

The table also documents that size, 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. 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*. Our interpretation is that angel-only deals require fewer billable hours because they are less contentious, and not because these deals are simpler from a legal drafting perspective.

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 in the later periods of the sample, and are significantly higher for Californian start-ups.

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 allow us to explore differences between VCs and angels on the margin in an environment where both are competitive financing choices. First, our sample's investor mix has a wide distribution ranging from angel-only deals to VC-only deals. Second, entrepreneurs in these deals have a meaningful choice between both investor types. This allows us to identify the relationship between investor composition, deal terms, and outcomes.

We find evidence consistent with a pecking order whereby, for smaller deals, angels are preferred investors who are able to select the highest quality deals. Entrepreneurs prefer dealing with angels given the less stringent terms imposed on them through liquidation, redemption and other control rights. Our results further suggest that angels accept more entrepreneur-friendly terms in part because they are better informed about the nature of these deals. In contrast, for larger deals, where VC participation is required due to the large amount of capital needed, powerful VC syndicates demand the best opportunities in their entirety.

Consistent with these notions, we find that among smaller transactions, angel-only deals are most successful. This supports the notion that within the set of deals that could potentially be financed only by angels (who are capital constrained), VCs face adverse selection and only receive investment opportunities when they are less favorable. When deals are larger, and cannot be easily financed only by angels, our results suggest that more suc-

cessful entrepreneurs seek pure-VC financing. Hence, angel investors might face adverse selection when investing alongside VC syndicates in larger deals. This latter result might also arise because either mixed angel-VC deals involve greater complexity, or because VCs seek to preclude angels from free-riding on their potentially costly managerial efforts.

Lerner (1998) has raised the important issue of whether angel investment in early-stage companies should be encouraged through public policy interventions. This debate presumably stems from a complaint that entrepreneurs have difficulty raising capital. Our results suggest that there is a well-functioning market in which angels reject lower quality opportunities. Thus, it is not clear that turning "latent" angels into active angels would have clear societal benefits. However, there is no question that additional research will help to further inform this debate.

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

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

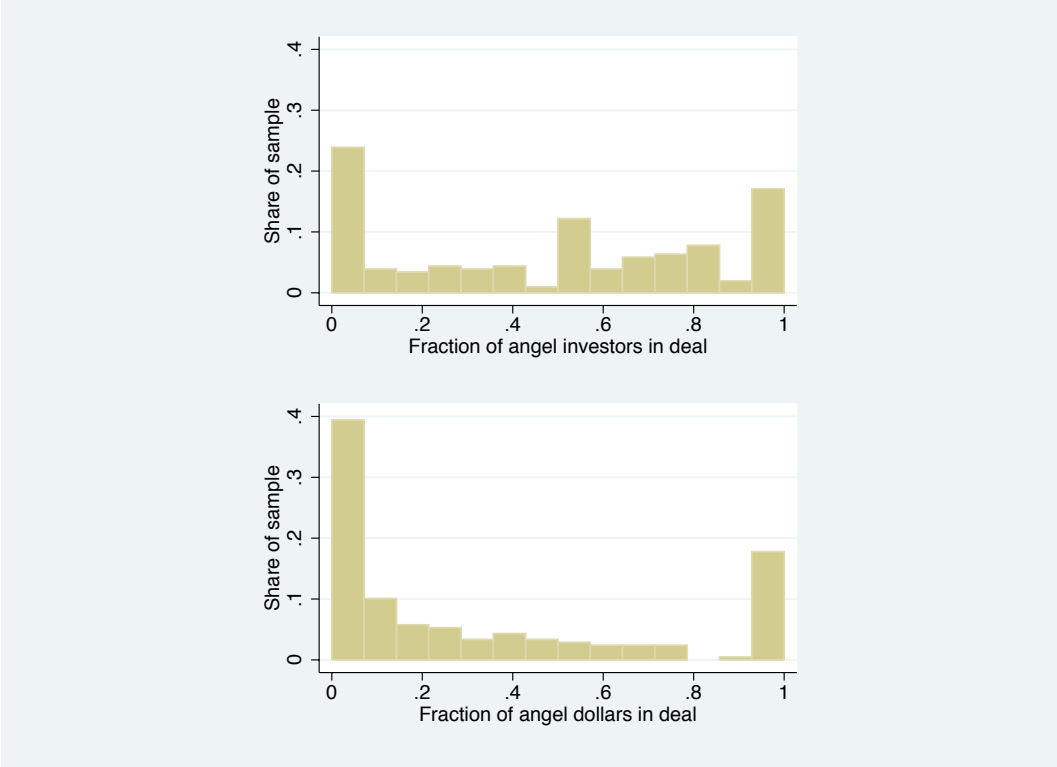

Figure 2: **Investment size distribution by investor composition**

The figure depicts the distribution of investment size for 33 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 as the natural log of millions of dollars, and then normalized to have a mean of zero for the entire sample. The size of each of the sub-samples appear under the label, and the distribution of the 20th, 40th, 60th, 80th and 90th percentiles are noted by p20, p40, p60, p80 and p90 respectively. The number of deals of magnitude at or below the 80th percentile of angel-only deals for each of the investor composition groups appears to the left of the vertical line in the middle of the figure.

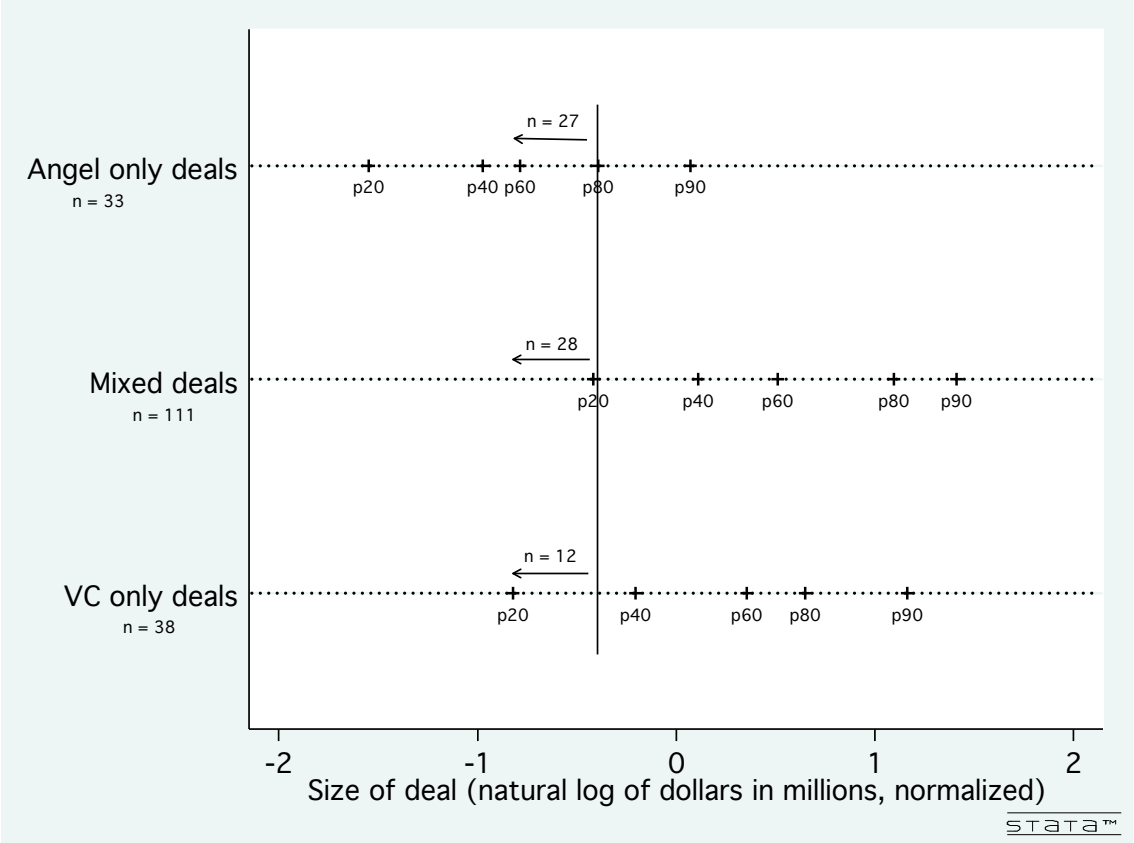

Figure 3: **Effect of deal size on predicted outcome probabilities by investor composition**

The figure depicts the predicted probabilities of failure, merger / IPO, and ongoing survival as a private firm, for investment targets as a function of investment size in the top, middle and bottom graphs respectively. Predictions are displayed for each of the three investor composition categories: deals in which angels and VCs invested side-by-side ("mixed"), deals which included only VCs ("VC only") and deals which included only angels ("angel only"). Predictions are based on the final ordered probit model in Table XII. All variables are held at their means with the exception of the mutually exclusive investor composition category dummies. Investment size is logged and normalized and hence the x-axis can be read as standard deviations of the natural logs of Series A investment size. The angel-only lines are censored at 0.5 standard deviations as this reflects the largest angel-only deal in the sample. The predictions for VC-only deals one standard deviation below the mean deal size are based on few observations and should be interpreted with caution.

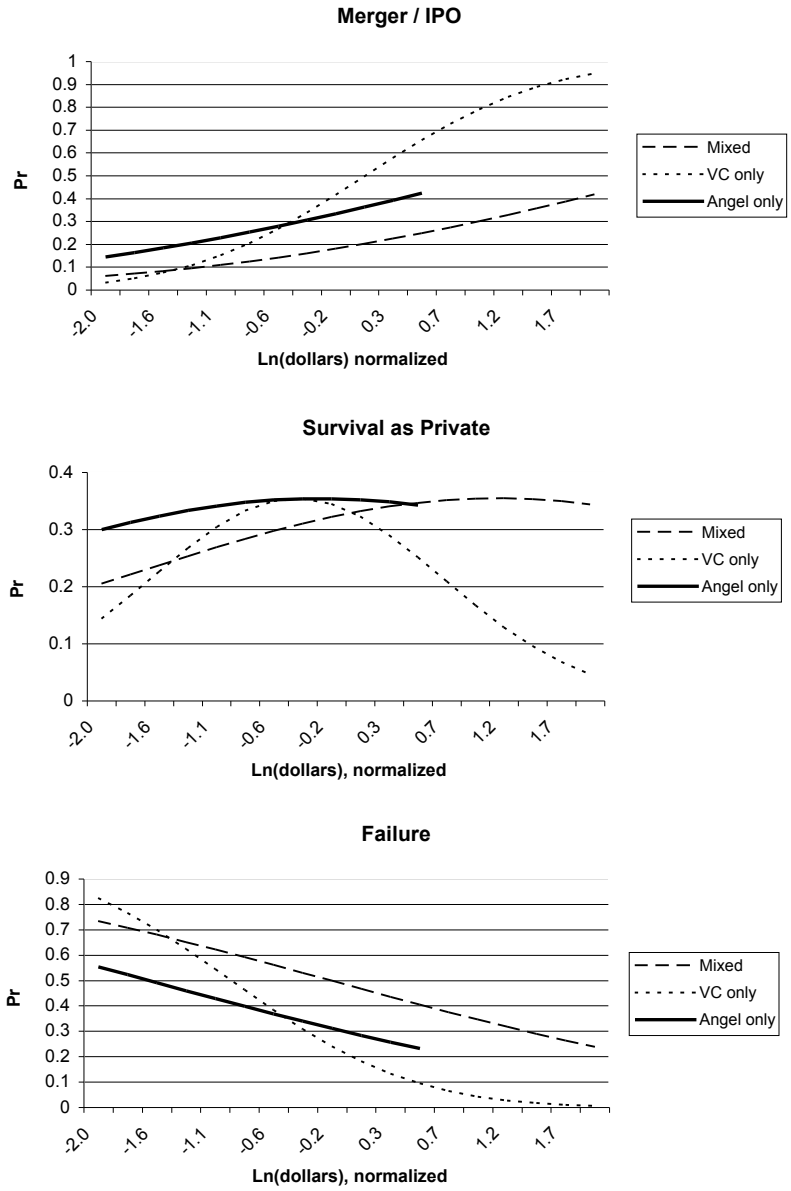

Table I: Summary Statistics for Firms in Sample

The table summarizes characteristics of sample firms. Period dummies reflect date of first closing. Firm industry classifications are 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. State dummies are based on location of headquarters. *Size* (and its natural log *Log Size*) are measured based on investment dollars. *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). *Company matter* takes the value of 1 if Brobeck did not label the representation "Venture Financing/Investor Side". *Strategic Alliance* and *Product Release* indicate whether the firm issued a press release describing an alliance or product prior to the observed round.

Variable	Mean	Std Dev	Minimum	Maximum	Obs.
Pre 1998 Dummy	0.16	0.37	0.00	1.00	182
1998 to 3/2000 Dummy	0.34	0.48	0.00	1.00	182
Post 3/2000 Dummy	0.49	0.50	0.00	1.00	182
IT Industry	0.80	0.40	0.00	1.00	182
Medical/Bio–Tech Industry	0.11	0.31	0.00	1.00	182
California Dummy	0.53	0.50	0.00	1.00	136
Texas Dummy	0.21	0.41	0.00	1.00	136
Other States	0.26	0.44	0.00	1.00	136
Size (Millions of Series A Dollars)	6.139	7.926	0.072	54.3	182
Log Size	14.98	1.20	11.19	17.81	182
Firm Age (years)	1.62	3.97	0.00	34.60	144
Company Matter	0.62	0.49	0.00	1.00	182
Strategic Alliance	0.10	0.31	0.00	1.00	182
Product Release	0.13	0.33	0.00	1.00	182

Table II: Characteristics of Brobeck VC Firms: Descriptive Statistics

The table displays summary statistics with t-statistics in parenthesis. The sample includes all private equity firms who 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. All fund statistics are aggregated at the VC firm level. *# funds under firm management* is the number of funds ever managed under the private equity firm's management. *Ln(total capital raised)* is the natural log of the total capital (in millions of US dollars) raised by these funds. *Ln(fund size, $M)* is the mean capital raised for each fund under a private equity firm's management. *First investment year* is the first year that firm invested. *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 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. *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 funds not reporting round company investment levels* is the share of the firm's funds for which company investment data are missing. *Ln(average company investment by fund, $M)* is the natural log of the fund's mean total company investment in millions of USD, averaged over all funds under a given firm's management. *Share of funds not reporting minimum investment* is the firm's share of funds for whom minimum investment data is missing. *Ln(minimum round investment by fund, $M)* is the natural log of the minimum round investment, averaged over funds under a firm's management. *Ln(minimum company investment by fund, $M)* is the natural log of the minimum company investment, averaged over funds under a firm's management. *Age* is measured relative to 2002. Final column reports the results of t-tests of the difference in means with unequal variance.

	Not Represented by Brobeck			Represented by Brobeck			
	mean	std. dev.	n	mean	std. dev.	n	t-statistics (H0: $\Delta > 0$)
# funds under firm management	1.96	1.88	5472	5.33	5.79	346	-10.80 [a]
Ln(total capital raised '000$M)	2.41	2.53	5472	4.76	2.77	346	-15.36 [a]
Share of funds hq in northern CA	0.09	0.29	5472	0.33	0.46	346	-9.37 [a]
Share of funds hq in US	0.63	0.48	5472	0.89	0.30	346	-14.92 [a]
Share of funds with Seed Stage Focus	0.06	0.23	5194	0.03	0.15	339	3.17 [a]
Share of funds with Early Stage Focus	0.22	0.38	5194	0.35	0.41	339	-5.70 [a]
Share of VC funds	0.82	0.37	5471	0.88	0.28	346	-4.08 [a]
Share of buyout funds	0.12	0.31	5194	0.06	0.20	339	4.85 [a]
Share of funds reportiting capital raised (fund size)	0.61	0.49	5472	0.83	0.38	346	-9.89 [a]
Ln(fund size, '000$M)	2.14	2.22	5472	3.81	2.10	346	-14.27 [a]
Share of funds not reporting investment levels	0.04	0.20	5472	0.00	0.05	346	9.84 [a]
Ln(average company investment by fund, $M)	7.33	2.00	5472	8.15	0.91	346	-14.71 [a]
Ln(minimum round investment by fund, $M)	6.06	2.11	5472	5.79	1.79	346	2.76 [b]
Ln(average company investment by fund, $M)	6.37	2.07	5472	6.28	1.63	346	1.01
age	6.98	6.39	5472	10.33	7.60	346	-8.04 [a]

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

Table III: Characteristics of Brobeck VC Firms: Robustness

The table displays Logit model marginal effects with t-statistics in parenthesis. All independent variables (except dummy variables) are standardized to clarify exposition. The sample includes all private equity firms who made investments between 1/1/1993 and 12/31/2002 that are included in the Thomson Financial Venture Economics database. The statistics includes the histories of these private equity firms, including funds that were managed outside the 1993-2002 time frame. The dependent variable in all specifications is a dummy variable taking the value one if the given private equity firm is in the Brobeck sample. The analysis is run on four samples. The first three models include the entire sample and explore robustness to vintage controls. The last three models, respectively, exclude firms that ever managed a buyout fund, include firms that ever managed a VC fund and include only firms that ever managed a US-based fund. All fund statistics are aggregated at the VC firm level. *# funds under firm management* is the number of funds ever managed under the private equity firm's management. *Ln(total capital raised)* is the natural log of the total capital (in millions of US dollars) raised by these funds. *Ln(fund size, $M)* is the mean capital raised for each fund under a private equity firm's management. *First investment year* is the first year that firm invested. *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. *Firm's share of VC funds* and *Share of buyout funds* represent the share of funds under the VC firm's management reporting that they are venture capital or buyout funds. *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 funds not reporting round company investment levels* is the share of the firm's funds for which company investment data are missing. *Ln(average company investment by fund, $M)* is the natural log of the fund's mean total company investment in millions of USD, averaged over all funds under a given firm's management. *Share of funds not reporting minimum investment* is the firm's share of funds for whom minimum investment data is missing. *Ln(minimum round investment by fund, $M)* is the natural log of the minimum round investment, averaged over funds under a firm's management. *Ln(minimum company investment by fund, $M)* is the natural log of the minimum company investment, averaged over funds under a firm's management. *Age* is measured relative to 2002.

Independent Variables	Logit Model, Dep. Variable = Brobeck PE Firm					
		Full Sample		Excluding firms w/ buyout funds	Only firms w/ VC funds	US firms only
# funds under firm management	1.23 (4.83)^a	1.24 (5.00)^a	1.26 (5.15)^a	1.35 (4.75)^a	1.24 (4.66)^a	1.35 (3.78)^a
Ln(total capital raised)	1.05 (0.23)	1.13 (0.60)	1.05 (0.22)	0.91 (–0.37)	1.05 (0.21)	1.01 (0.05)
Share of funds hq in northern CA	2.49 (6.02)^a	2.46 (5.93)^a	2.49 (5.93)^a	2.44 (5.53)^a	2.57 (5.95)^a	2.46 (5.49)^a
Share of funds hq in US	3.36 (6.02)^a	3.62 (6.26)^a	3.52 (6.07)^a	3.69 (5.85)^a	3.59 (5.97)^a	1.42 (0.40)
Share of funds w/ Seed Stage Focus	1.03 (0.07)	0.96 (–0.10)	1.01 (0.03)	1.07 (0.16)	1.13 (0.30)	1.33 (0.62)
Share of funds w/ Early Stage Focus	1.52 (2.50)^b	1.42 (2.06)^b	1.44 (2.08)^b	1.41 (1.91)^c	1.52 (2.38)^b	1.45 (1.94)^c
Share of VC funds	3.00 (3.25)^a	3.04 (3.30)^a	3.11 (3.33)^a	2.89 (3.03)^a		
Share of buyout funds	0.33 (–2.52)^b	0.35 (–2.37)^b	0.36 (–2.30)^b		0.10 (–3.12)^a	
Share of funds reporting capital raised	0.39 (–2.91)^a	0.46 (–2.34)^b	0.47 (–2.23)^b	0.48 (–2.07)^b	0.42 (–2.40)^b	0.65 (–1.12)
Ln(fund size, $M)	1.39 (1.53)	1.25 (1.02)	1.34 (1.28)	1.54 (1.61)	1.41 (1.45)	1.30 (0.84)
Share of funds not reporting investments	2.30 (0.70)	2.12 (0.63)	2.13 (0.63)	3.29 (0.96)	3.86 (1.09)	6.69 (1.43)
Ln(average investment by fund, $M)	1.80 (6.58)^a	1.84 (6.77)^a	1.81 (6.48)^a	1.88 (6.23)^a	1.87 (6.13)^a	1.98 (5.68)^a
Ln(minimum round investment levels	0.90 (–1.20)	0.88 (–1.45)	0.88 (–1.45)	0.88 (–1.37)	0.86 (–1.55)	0.89 (–1.05)
Ln(minimum company investment levels	0.76 (–2.76)^a	0.75 (–2.92)^a	0.75 (–2.80)^a	0.76 (–2.50)^b	0.79 (–2.18)^b	0.71 (–2.83)^a
Age		0.98 (–1.94)^c				
Median Vintage Controls	No	No	Yes	Yes	Yes	Yes
Observations	5,532	5,532	5,532	4,751	4,651	2,756

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

Table IV: Summary Statistics for Investors

The table summarizes descriptive statistics of investor composition and investor deal-share variables. *Seed Founder Ownership* and Seed Angel Ownership break down the two components of initial ownership in the company. *Founder Series A*, Angel Series A and VC Series A break down ownership within the Series A round. *Final Angel Ownership*, *Final Founder Ownership*, and *Final VC Ownership* represent the respective ownership shares post-money (before any subsequent dilution from options). All other composition variables reflect ownership shares, as opposed to *Fraction Sold*, which shows the percentage of the company sold to investors in the Series A round. *Angel Only* (*VC only*) are dummy variables equal to one if all investors in the deal are angels (VC firms). *Repeat Angel Flag* takes the value of 1 if an angel who invested prior to the Series A also invested in the Series A round. *# Investors* is a count of investors in the deal. Repeat investments by the same investor (generally across rounds) are counted as a single investor (*Log # Investors* is the natural log.) *VC HHI* and *Investor HHI* are the Herfindahl indices of VC share concentration and overall investor share concentration, in the Series A round, respectively. The *Brobeck Investor Dummy* is one if Brobeck invested in the given 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.

Variable	Mean	Std Dev	Minimum	Maximum	Obs.
Seed Founder Ownership (fraction)	0.92	0.15	0.14	1.00	182
Seed Angel Ownership (fraction)	0.08	0.15	0.00	0.86	182
Founder Series A (fraction)	0.00	0.01	0.00	0.09	182
Angel Series A (fraction)	0.32	0.37	0.00	1.00	182
VC Series A (fraction)	0.67	0.37	0.00	1.00	182
Final Angel Ownership (fraction)	0.17	0.18	0.00	1.00	182
Final Founder Ownership (fraction)	0.46	0.23	0.00	0.92	182
Final VC Ownership (fraction)	0.37	0.28	0.00	1.00	182
Fraction Sold	0.46	0.22	0.08	1.00	182
Angel Only	0.18	0.39	0.00	1.00	182
VC Only	0.21	0.41	0.00	1.00	182
Repeat Angel Flag	0.15	0.36	0.00	1.00	182
# Investors	12.17	13.48	1.00	110	182
Log # Investors	2.00	1.06	0.00	4.70	182
VC HHI	0.49	0.29	0.06	1.00	149
Investor HHI	0.26	0.15	0.04	0.85	182
Brobeck Investor Dummy	0.24	0.43	0.00	1.00	182
Average % Investors Within 3 Hours	0.60	0.36	0.00	1.00	136
Average % Investor in Same Zip Code	0.18	0.31	0.00	1.00	136

Table V: Summary Statistics for Deals and Outcomes

The table summarizes deal and outcome characteristics. *Warrants Dummy* takes the value 1 if warrants were issued in the Series A Financing. and *Options Dummy* takes the value 1 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* is a dummy variable that takes the value 1 if there was more than one closing. *Average Days to Second Closing* is the time in days between the first and second closings, conditional on it occurring. All preceding variables are taken from the electronic record of the closing documents in the Brobeck corpus. *Billed Hours* and its natural log *Log billed Hours* reflect the total billed hours associated with Brobeck's representation of either the company or its investors in the deal, and is extracted from Brobeck's billing database. *Outcome Based on Survival* is a dummy variable that takes the value of 1 if the firm was conducting business as either an independent entity or as part of a larger firm in July 2007. Survival was ascertained by cross-referencing current World Wide Web presence with company histories as determined through archival sources. *Outcome Merger or IPO* is a dummy variable that takes the value of 1 if a liquidity event occurred either as a merger or as an IPO. Mergers were determined using archival sources, primarily based upon press releases. 9 firms in our sample had IPOs.

Variable	Mean	Std Dev	Minimum	Maximum	Obs.
Warrants Dummy	0.15	0.36	0.00	1.00	182
Options Dummy	0.69	0.47	0.00	1.00	182
# Closings	1.77	1.19	1.00	7.00	182
Multiple Closings Flag	0.45	0.50	0.00	1.00	182
Average Days to Second Closing	165	158	3.00	862	67
Billed Hours	169	116	0	693	182
Log Billed Hours	4.88	0.82	1.25	6.54	182
Outcome based on survival	0.60	0.49	0.00	1.00	182
Outcome Merger or IPO	0.31	0.46	0.00	1.00	182

Table VI: Summary Statistics for Cashflow and Control Rights

The table summarizes the control rights associated with Series A financings. Control rights and terms are extracted from closing documents from the Brobeck Corpus. *VC BOD seats* and *Common BOD Seats* are the share of board seats held by VCs and common share holders respectively. Seat ownership is either directly stated in closing documents (generally the "voting rights agreement"), or when specific parties are named, by cross-referencing these names with the classified investors. *Cumulative Dividend Flag* is a dummy variable that takes the value 1 if preferred shareholders have a right to dividends that accumulate over the time of their investment. *Liquidation* is a dummy variable that takes the value 1 when preferred shareholders have liquidation rights exceeding the value of their initial investment. *Cap on Preferred* is a dummy variable that takes the value 1 if preferred stock liquidation rights are capped at a multiple of the initial investment. *Cap on Common* is a dummy variable that takes the value 1 if common stock liquidation rights are capped at a multiple of the investment. *Redeemable Flag* is a dummy variable that takes the value 1 when when preferred shareholders can demand that the firm repurchase their shares. *Time to 1st Redemption* is a dummy variable that takes the value 1 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	Mean	Std Dev	Minimum	Maximum	Obs.
VC BOD Seats (fraction)	0.45	0.36	0.00	1.00	147
Common BOD Seats (fraction)	0.46	0.33	0.00	1.00	147
Cumulative Dividend Flag	0.09	0.28	0.00	1.00	182
Liquidation	0.42	0.49	0.00	1.00	182
Cap on Preferred	0.47	0.50	0.00	1.00	76
Cap on Common	0.02	0.14	0.00	1.00	106
Redeemable Flag	0.24	0.43	0.00	1.00	182
Time to 1st Redemption	0.95	0.21	0.00	1.00	43
% Series A Req. to Vote	57.56	8.41	50.00	67.00	33

Table VII: Summary Statistics for Deals by Investor Type

The table summarizes mean deal characteristics for transactions with varying investor compositions. The first column reports mean characteristics for 33 deals in which only angels participated in the Series A financing. The second column reports mean characteristics for 38 deals in which only VCs participated in the Series A financing. The third column reports mean characteristics for 111 deals in which both angels and VCs participated in the Series A financing. See Tables I to VI for specific variable definitions.

Variable	Angel Only	VC Only	Mixed
Size (Series A Dollars)	1.621	5.756	7.613
# Investors	12.79	4.76	14.52
Final Founder Ownership	0.62	0.46	0.42
Fraction Sold	0.30	0.44	0.52
Angel Ownership from Series A	0.30	0.00	0.12
Investors Within 3 Hours	0.65	0.51	0.62
Investors in Same Zip Code	0.30	0.27	0.12
California Dummy	0.57	0.42	0.55
Brobeck Investor Dummy	0.09	0.08	0.33
IT Industry	0.82	0.74	0.81
Medical/Bio–Tech Industry	0.12	0.16	0.09
Strategic Alliance	0.03	0.11	0.13
Product Release	0.12	0.16	0.12
Outcome based on survival	0.73	0.66	0.54
Outcome Merger or IPO	0.24	0.45	0.28
Billed Hours	114	185	180
Common BOD Seats (fraction)	0.68	0.52	0.40
Cumulative Dividend Flag	0.00	0.16	0.09
Liquidation	0.12	0.58	0.45

Table VIII: Investor Composition versus Characteristics

The table displays Probit model marginal effects and OLS model coefficients with t-statistics in parenthesis. All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in the three models (one model per column) is an angel-only dummy, a VC-only dummy, and the percentage of dollars funded by VC investors (% VC dollars), respectively. The angel-only dummy is one if none of the Series A stock investors are identified as venture capital firms. The VC-only dummy is one if all of the Series A stock investors are identified as VC firms. The % VC dollars is equal to the total dollar investments in Series A stock made by VC firms divided by the total dollars invested in Series A stock by all investors. The independent variables include other investor characteristics, firm characteristics, industry dummies, and time dummies, and are described in Tables I to VI.

Independent Variables	Probit Model Dep. Variable= Angel Only	Probit Model Dep. Variable= VC Only	OLS Model Dep. Variable= Fraction VC Dollars
Log # Investors	0.03 (1.50)	–0.20 (–5.30)^a	–0.09 (–3.23)^a
Log Size	–0.09 (–3.64)^a	0.09 (2.37)^b	0.12 (3.91)^a
Fraction Sold	–0.11 (–3.75)^a	0.00 (0.11)	0.11 (3.57)^a
Seed Angel Ownership	–0.03 (–1.50)	0.01 (0.46)	0.05 (1.85)^c
Strategic Alliance	–0.06 (–1.14)	0.01 (0.06)	0.14 (1.40)
Product Release	0.02 (0.29)	0.05 (0.51)	–0.05 (–0.50)
Log One Plus Firm Age	–0.02 (–0.67)	0.01 (0.29)	0.04 (1.38)
3–Year IPOs	0.04 (1.30)	–0.03 (–0.94)	–0.01 (–0.22)
IT Industry	0.06 (1.08)	–0.02 (–0.16)	–0.02 (–0.26)
Medical/Bio–Tech Industry	0.20 (1.45)	0.08 (0.62)	–0.13 (–1.10)
1998 to 3/2000 Dummy	0.00 (–0.02)	–0.13 (–1.73)^c	–0.04 (–0.47)
Post 3/2000 Dummy	0.10 (1.46)	–0.14 (–1.47)	–0.13 (–1.39)
California Dummy	–0.01 (–0.19)	–0.02 (–0.29)	0.02 (0.29)
Missing Location Data	–0.01 (–0.18)	0.02 (0.30)	–0.01 (–0.18)
Brobeck Investor Dummy	–0.08 (–2.00)^b	–0.02 (–0.23)	0.13 (1.99)^b
Observations	182	182	182

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

Table IX: Proximity: average investor distance and drive times versus characteristics

The table displays OLS model coefficients with t-statistics in parenthesis. All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in the first two models (displayed in the first two columns) is the percentage of Series A stock investors who live in the same zip code as the corporate headquarters. The dependent variable in the second two models (displayed in the last two columns) is the percentage of Series A stock investors who live within a three mile drive of the corporate headquarters (identified using mapquest.com). The independent variables include an angel-only dummy, a VC-only dummy, and cross term multiplying the VC-only dummy by Log Size (the logarithm of the total dollar proceeds raised by Series A stock investors). The angel-only dummy is one if none of the Series A stock investors are identified as venture capital firms. The VC-only dummy is one if all of the Series A stock investors are identified as VC firms. The other independent variables include additional investor and firm characteristics, and industry and time dummies, and are described in Tables I to VI.

Independent Variables	OLS Model Dep. Variable= % Same Zip	OLS Model Dep. Variable= % Same Zip	OLS Model Dep. Variable= % in 3 Hrs Drive	OLS Model Dep. Variable= % in 3 Hrs Drive
Angel Only	0.14 (1.68)^c	0.16 (1.88)^c	–0.11 (–1.18)	–0.13 (–1.32)
VC Only	0.11 (1.38)	0.10 (1.25)	–0.19 (–2.08)^b	–0.23 (–2.61)^a
VC Only x Log Size	–0.16 (–2.11)^b	–0.15 (–1.92)^c	–0.12 (–1.39)	–0.10 (–1.10)
Log Size	–0.01 (–0.31)	0.00 (–0.12)	–0.02 (–0.54)	–0.01 (–0.30)
Log # Investors	–0.08 (–2.55)^b	–0.08 (–2.19)^b	–0.13 (–3.52)^a	–0.11 (–2.74)^a
Fraction Sold	0.04 (1.40)	0.05 (1.52)	0.00 (0.11)	0.03 (0.96)
1998 to 3/2000 Dummy	0.08 (0.96)	0.06 (0.76)	0.13 (1.36)	0.08 (0.91)
Post 3/2000 Dummy	0.05 (0.63)	0.03 (0.33)	0.07 (0.81)	0.01 (0.11)
California Dummy	0.04 (0.67)	0.03 (0.54)	0.30 (4.25)^a	0.27 (3.77)^a
Texas Dummy	0.09 (1.20)	0.11 (1.38)	0.15 (1.70)^c	0.14 (1.59)
Investor HHI		0.02 (0.62)		0.11 (3.04)^a
Company Matter		0.06 (1.06)		0.16 (2.57)^b
Strategic Alliance		0.18 (1.93)^c		0.02 (0.16)
Product Release		0.03 (0.36)		0.08 (0.81)
IT Industry		–0.02 (–0.27)		0.14 (1.66)^c
Communic. Industry		–0.07 (–0.78)		0.13 (1.26)
Medical/Bio–Tech Industry		0.04 (0.44)		0.10 (0.87)
Observations	136	136	136	136

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

Table X: Control Rights (Liquidation and Redemption)

The table displays Probit model marginal effects with t-statistics in parenthesis. All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in the first two models (displayed in the first two columns) is a dummy variable indicating whether the liquidation preference of the Series A stock favors the Series A investors relative to common stockholders. In the event of a liquidation, a value of one indicates that all proceeds go to Series A shareholders up to a multiple of the initial Series A investment. A value of zero indicates that Series A liquidation privileges are limited to the initial investment. The dependent variable in the second two models (displayed in the last two columns) is a dummy variable identifying whether the Series A shares are redeemable (ie they can be returned to the firm in exchange for cash). The independent variables include an angel-only dummy, a VC-only dummy, a cross term multiplying the VC-only dummy by Log Size (the logarithm of the total dollar proceeds raised by Series A stock investors), and % VC dollars. The angel-only dummy is one if none of the Series A stock investors are identified as venture capital firms. The VC-only dummy is one if all of the Series A stock investors are identified as VC firms. % VC dollars is equal to the total dollar investments in Series A stock made by VC firms divided by the total dollars invested in Series A stock by all investors. The additional independent variables include additional investor characteristics, firm characteristics, industry dummies, and time dummies, and are described in Tables I to VI.

Independent Variables	Probit Model Dep. Variable= Liquidation	Probit Model Dep. Variable= Liquidation	Probit Model Dep. Variable= Redemption	Probit Model Dep. Variable= Redemption
Angel Only	–0.38 (–3.27)^a		–0.20 (–2.09)^b	
VC Only	0.29 (2.38)^b		0.16 (1.62)	
VC Only x Log Size	0.04 (0.36)		–0.04 (–0.46)	
% VC Series A		0.16 (3.06)^a		0.10 (2.26)^b
% VC Share x Log Size		–0.06 (–1.07)		–0.03 (–0.77)
Seed Angel Ownership	–0.08 (–1.70)^c	–0.08 (–1.72)^c	–0.04 (–1.20)	–0.05 (–1.35)
Fraction Sold	–0.04 (–0.67)	–0.05 (–0.89)	–0.02 (–0.58)	–0.03 (–0.75)
Log Size	–0.12 (–2.10)^b	–0.09 (–1.63)	0.00 (0.05)	0.01 (0.17)
Log # Investors	0.09 (1.51)	0.04 (0.90)	0.01 (0.16)	–0.01 (–0.24)
3–Year IPOs	0.02 (0.43)	0.00 (–0.04)	0.00 (–0.10)	–0.02 (–0.46)
Strategic Alliance	0.16 (0.99)	0.15 (0.99)	0.20 (1.53)	0.20 (1.52)
Product Release	0.19 (1.28)	0.20 (1.41)	0.07 (0.63)	0.08 (0.72)
IT Industry	–0.16 (–1.14)	–0.19 (–1.31)	–0.14 (–1.25)	–0.16 (–1.36)
Medical/Bio–Tech Industry	0.04 (0.24)	0.05 (0.29)	0.02 (0.14)	0.04 (0.26)
1998 to 3/2000 Dummy	0.19 (1.41)	0.15 (1.17)	0.22 (1.89)^c	0.20 (1.73)^c
Post 3/2000 Dummy	0.35 (2.26)^b	0.29 (1.92)^c	0.12 (1.03)	0.10 (0.83)
California Dummy	0.06 (0.64)	0.06 (0.58)	–0.15 (–2.21)^b	–0.16 (–2.37)^b
Missing Location Data	–0.07 (–0.61)	–0.06 (–0.52)	–0.20 (–3.00)^a	–0.20 (–2.88)^a
Brobeck Investor Dummy	0.24 (2.15)^b	0.23 (2.14)^b	0.13 (1.51)	0.14 (1.56)
Observations	182	182	182	182

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

Table XI: Control Rights (Cumulative Dividends and Common BOD Seats)

The table displays Probit model marginal effects and OLS model coefficients with t-statistics in parenthesis. All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in the first two models (displayed in the first two columns) is a dummy variable indicating whether the Series A stockholders have cumulative dividend rights. The dependent variable in the second two models (displayed in the last two columns) is the fraction of board seats that are allocated to common shareholders (board of directors data is only available for 147 firms). The independent variables include an angel-only dummy, a VC-only dummy, a cross term multiplying the VC-only dummy by Log Size (the logarithm of the total dollar proceeds raised by Series A stock investors), and % VC dollars. The angel-only dummy is one if none of the Series A stock investors are identified as venture capital firms. The VC-only dummy is one if all of the Series A stock investors are identified as VC firms. % VC dollars is equal to the total dollar investments in Series A stock made by VC firms divided by the total dollars invested in Series A stock by all investors. The additional independent variables include additional investor characteristics, firm characteristics, industry dummies, and time dummies, and are described in Tables I to VI.

Independent Variables	Probit Model Dep. Variable= Cumulative	Probit Model Dep. Variable= Cumulative	OLS Model Dep. Variable= Common Seats	OLS Model Dep. Variable= Common Seats
Angel Only	–0.08 (–1.18)		0.15 (1.65)^{c}	
VC Only	0.04 (0.74)		0.05 (0.67)	
VC Only x Log Size	–0.03 (–0.54)		–0.07 (–0.98)	
% VC Series A		0.05 (1.83)^{c}		–0.02 (–0.70)
% VC Share x Log Size		0.00 (0.06)		0.02 (0.56)
Seed Angel Ownership	0.02 (1.03)	0.02 (0.80)	0.04 (1.46)	0.03 (1.18)
Fraction Sold	–0.03 (–0.93)	–0.03 (–1.16)	–0.12 (–3.41)^{a}	–0.13 (–3.76)^{a}
Log Size	0.04 (1.52)	0.04 (1.34)	–0.02 (–0.50)	–0.03 (–0.96)
Log # Investors	–0.01 (–0.34)	–0.01 (–0.45)	0.02 (0.49)	0.00 (–0.08)
3–Year IPOs	0.01 (0.40)	0.01 (0.31)	0.00 (–0.02)	0.00 (0.06)
Strategic Alliance	0.03 (0.33)	0.02 (0.29)	–0.01 (–0.16)	–0.02 (–0.26)
Product Release	0.16 (2.22)^{b}	0.17 (2.28)^{b}	0.14 (1.51)	0.16 (1.76)^{c}
IT Industry	0.08 (1.11)	0.07 (0.97)	0.07 (0.86)	0.08 (0.94)
Medical/Bio–Tech Industry	0.02 (0.17)	0.02 (0.27)	0.23 (2.04)^{b}	0.27 (2.43)^{b}
1998 to 3/2000 Dummy	0.06 (0.90)	0.05 (0.87)	0.09 (1.07)	0.08 (0.98)
Post 3/2000 Dummy	0.07 (0.95)	0.07 (0.94)	0.02 (0.26)	0.02 (0.25)
California Dummy	–0.06 (–1.17)	–0.06 (–1.29)	–0.07 (–1.10)	–0.07 (–1.12)
Missing Location Data	–0.13 (–2.37)^{b}	–0.12 (–2.24)^{b}	–0.02 (–0.29)	–0.02 (–0.28)
Brobeck Investor Dummy	–0.07 (–1.31)	–0.07 (–1.36)	0.00 (0.02)	0.00 (0.06)
Observations	182	182	147	147

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

Table XII: Outcomes versus deal characteristics (Angel-only and VC-only)

The table displays Probit model marginal effects and ordered Probit model coefficients with t-statistics in parenthesis. All independent variables (except dummy variables) are standardized to clarify exposition. The dependent variable in the first two models (displayed in the first two columns) is a dummy variable indicating whether the firm is still a going concern as of July 2007. More specifically, firms that went public, firms that were acquired, and firms that have a visible web presence are all assigned a value of one. The dependent variable in the second two models (displayed in the last two columns) is an ordered variable taking three possible values: 3 if IPO or acquisition, 2 if firm is a going concern but did not experience an IPO or an acquisition, and 1 for other firms (assumed to be failed firms). The independent variables include an angel-only dummy, a VC-only dummy, and cross term multiplying the VC-only dummy by Log Size (the logarithm of the total dollar proceeds raised by Series A stock investors). The angel-only dummy is one if none of the Series A stock investors are identified as venture capital firms. The VC-only dummy is one if all of the Series A stock investors are identified as VC firms. The additional independent variables include other investor characteristics, firm characteristics, industry dummies, and time dummies, and are described in Tables I to VI.

Independent Variables	Probit Model Dep. Variable= Survival	Probit Model Dep. Variable= Survival	Ordered Probit Model Dep. Variable= Ordered Outcome	Ordered Probit Model Dep. Variable= Ordered Outcome
Angel Only	0.36 (3.30)^a	0.33 (2.98)^a	0.61 (2.22)^b	0.49 (1.74)^c
VC Only	0.29 (2.51)^b	0.32 (2.58)^a	0.83 (2.99)^a	0.80 (2.79)^a
VC Only x Log Size		0.24 (1.46)		0.55 (1.75)^c
Log Size	0.18 (3.12)^a	0.15 (2.56)^b	0.41 (3.37)^a	0.34 (2.66)^a
Fraction Sold	–0.08 (–1.60)	–0.08 (–1.59)	–0.30 (–2.60)^a	–0.33 (–2.74)^a
Log # Investors	0.04 (0.66)	0.03 (0.61)	0.01 (0.08)	0.00 (0.00)
Investor HHI	–0.11 (–2.22)^b	–0.11 (–2.18)^b	–0.34 (–2.89)^a	–0.33 (–2.81)^a
Strategic Alliance	–0.36 (–2.10)^b	–0.36 (–2.09)^b	–0.60 (–1.62)	–0.63 (–1.68)^c
Product Release	0.27 (2.03)^b	0.27 (1.99)^b	0.67 (2.01)^b	0.65 (1.93)^c
1–Year Nasdaq	–0.05 (–1.08)	–0.05 (–1.06)	–0.08 (–0.84)	–0.08 (–0.79)
3–Year IPOs	–0.06 (–1.02)	–0.07 (–1.12)	–0.05 (–0.42)	–0.06 (–0.45)
IT Industry	–0.03 (–0.24)	–0.03 (–0.22)	–0.01 (–0.02)	0.01 (0.04)
Medical/Bio–Tech Industry	0.04 (0.19)	0.06 (0.32)	–0.26 (–0.62)	–0.21 (–0.50)
1998 to 3/2000 Dummy	–0.14 (–1.12)	–0.14 (–1.10)	–0.34 (–1.20)	–0.35 (–1.23)
Post 3/2000 Dummy	–0.14 (–0.89)	–0.13 (–0.88)	–0.52 (–1.57)	–0.52 (–1.55)
California Dummy	0.20 (2.08)^b	0.20 (2.07)^b	0.56 (2.53)^b	0.55 (2.47)^b
Missing Location Data	–0.07 (–0.65)	–0.04 (–0.40)	–0.20 (–0.86)	–0.14 (–0.60)
Observations	182	182	182	182

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

Table XIII: Billable Hours

The table displays OLS model coefficients with t-statistics in parenthesis. 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 an angel-only dummy, a VC-only dummy, and cross term multiplying the VC-only dummy by Log Size (the logarithm of the total dollar proceeds raised by Series A stock investors). The angel-only dummy is one if none of the Series A stock investors are identified as venture capital firms. The VC-only dummy is one if all of the Series A stock investors are identified as VC firms. The additional independent variables include other investor characteristics, firm characteristics, industry dummies, and time dummies, and are described in Tables I to VI.

Independent Variables	OLS Model Dep. Variable= Log Billed Hours	OLS Model Dep. Variable= Log Billed Hours	OLS Model Dep. Variable= Log Billed Hours	OLS Model Dep. Variable= Log Billed Hours
Log Size	0.21 (2.93)^a	0.21 (2.85)^a	0.20 (2.63)^a	0.20 (2.53)^b
Log # Investors			0.05 (0.67)	0.05 (0.69)
Warrants Dummy	0.44 (2.68)^a		0.39 (2.40)^b	0.39 (2.40)^b
# Closings		0.15 (2.54)^b	0.13 (2.19)^b	0.13 (2.16)^b
Log # Investors			0.05 (0.67)	0.05 (0.69)
Angel Only	–0.41 (–2.26)^b	–0.36 (–2.01)^b	–0.40 (–2.23)^b	–0.39 (–2.11)^b
Fraction Sold	–0.13 (–1.94)^c	–0.15 (–2.20)^b	–0.16 (–2.25)^b	–0.15 (–2.22)^b
VC Only	0.01 (0.09)	0.01 (0.04)	0.09 (0.54)	0.10 (0.57)
1998 to 3/2000 Dummy	0.33 (1.77)^c	0.27 (1.45)	0.34 (1.83)^c	0.34 (1.82)^c
Post 3/2000 Dummy	0.32 (1.78)^c	0.28 (1.53)	0.32 (1.78)^c	0.32 (1.77)^c
IT Industry	0.00 (0.00)	–0.05 (–0.30)	–0.03 (–0.15)	–0.02 (–0.13)
Communic. Industry	0.01 (0.05)	–0.05 (–0.25)	–0.02 (–0.08)	–0.01 (–0.06)
Medical/Bio–Tech Industry	0.13 (0.57)	0.06 (0.27)	0.08 (0.33)	0.07 (0.31)
California Dummy	0.25 (2.05)^b	0.22 (1.79)^c	0.22 (1.70)^c	0.22 (1.71)^c
VC Only x Log Size				–0.04 (–0.23)
Observations	182	182	182	182

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