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SKILL VS. LUCK IN ENTREPRENEURSHIP AND VENTURE CAPITAL:  
EVIDENCE FROM SERIAL ENTREPRENEURS

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### ABSTRACT

This paper argues that a large component of success in entrepreneurship and venture capital can be attributed to skill. We show that entrepreneurs with a track record of success are more likely to succeed than first time entrepreneurs and those who have previously failed. Funding by more experienced venture capital firms enhances the chance of success, but only for entrepreneurs without a successful track record. Similarly, more experienced venture capitalists are able to identify and invest in first time entrepreneurs who are more likely to become serial entrepreneurs. Investments by venture capitalists in successful serial entrepreneurs generate higher returns for their venture capital investors. This finding provides further support for the role of skill in both entrepreneurship and venture capital.

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## 1. Introduction

What makes entrepreneurs successful? Is it skill or luck? Knight (1921, part III, ch. IX, ¶ 10) argues that an important component of entrepreneurship is the willingness of the “venturesome to ‘assume’ or ‘insure’ the doubtful and timid by guaranteeing to the latter a specified income in return for an assignment of the actual results.” In this view, luck is a big determinant of entrepreneurial success. According to Kihlstrom and Laffont (1979), luck is the *only* determinant of entrepreneurial success: in their model entrepreneurs are simply less risk averse individuals who are willing to guarantee workers’ wages and bear residual risk. Schumpeter (1934, p. 137) argues just the opposite, claiming that “the entrepreneur is never the risk bearer,” but rather an innovator, one who discovers new production processes, finds new markets, creates new types of organizations, or introduces new products. Entrepreneurial success, in this view, flows from innovative skill. Only suppliers of capital bear risk.

In this paper, we empirically reject the Kihlstrom and Laffont hypothesis that entrepreneurs are just efficient risk bearers in favor of the view, emphasized by Schumpeter, that skill is an important component of entrepreneurship. At the same time, we present evidence that suppliers of capital are not just efficient risk bearers in the entrepreneurial process, as Schumpeter suggests, but rather bring their own set of capabilities to identifying skilled entrepreneurs and helping them build their businesses.

Our approach to identifying skill in entrepreneurship is to examine the performance of venture-capital backed serial entrepreneurs. We try to answer the following simple question: Are successful entrepreneurs more likely to succeed in their next ventures than first-time entrepreneurs and entrepreneurs who previously failed? Our

answer is yes. Our empirical model indicates that entrepreneurs who succeeded in a prior venture (i.e., started a company that went public) have a 30% chance of succeeding in their next venture. By contrast, first-time entrepreneurs have only an 18% chance of succeeding and entrepreneurs who previously failed have a 20% chance of succeeding. This performance persistence suggests that a component of success in entrepreneurship is attributable to skill. While it may be better to be lucky than smart, the evidence presented here indicates that being smart has value too.

We also find evidence in support of the entrepreneurial skill hypothesis by examining the behavior and performance of venture capital firms. As has been shown by Sorensen (2004), Kaplan and Schoar (2005), Gompers, Kovner, Lerner and Scharfstein (2006), and Hochberg, Ljungqvist, and Lu (2006), companies that are funded by more experienced (top-tier) venture capital firms are more likely to succeed. This could be because top-tier venture capital firms are better able to identify high quality companies and entrepreneurs. Alternatively, this performance differential could be because top-tier venture capital firms add more value – e.g., by helping new ventures make customer contacts, fill key management positions, or set business strategy. However, we find that there is only a performance differential when venture capital firms invest in companies started by first-time entrepreneurs or those who previously failed. If a company is started by an entrepreneur with a track record of success, then the company is no more likely to succeed if it is funded by a top-tier venture capital firm or one in the lower tier. Thus, it seems, prior success is a public signal of quality. It also implies that previously successful entrepreneurs derive no benefits from the value-added services of more

experienced venture capital firms; successful entrepreneurs apparently know what they're doing.

Another piece of evidence in support of the entrepreneurial skill hypothesis is that when previously successful entrepreneurs raise funding for their next venture, they are able to do so when the company is younger and at an earlier stage of development. Presumably, this is the case because venture capital firms perceive a successful track record as evidence of skill, not just luck.

Taken together, these findings also support the view that suppliers of capital are not just efficient risk-bearers, but rather help to put capital in the right hands and ensure that it is used effectively. The evidence for this goes beyond the finding—documented here and by others—that more experienced venture capital firms have higher success rates on their investments. More experienced venture capital firms only have higher success rates when they invest in unproven entrepreneurs, a fact which highlights the role suppliers of venture capital play in identifying skilled entrepreneurs and helping them to succeed.

Finally, we study the value consequences of serial entrepreneurship. We start by examining the pre-money valuations of new ventures. More experienced venture capital firms invest at higher valuations, which is consistent with our finding that they also invest in firms with higher success rates. However, we do not find that serial entrepreneurs (whether successful or not) are able to benefit from their higher success rates by selling equity at higher prices. Given this fact, it should come as no surprise that the average investment multiple (exit valuation divided by pre-money valuation) is higher for companies of previously successful serial entrepreneurs. We also find that

fund returns are higher for venture capital firms that tend to invest a larger share of their portfolio in serial entrepreneurs. Our findings are consistent with there being an imperfectly competitive venture capital market in which prices do not get bid up to the point where excess returns from investing in serial entrepreneurs are eliminated.

Our findings are related to a number of other studies in the entrepreneurship literature. Several study the effect of experience on performance. Consistent with our findings, Eesley and Roberts (2006a) use data from a survey of alumni from the Massachusetts Institute of Technology to show that entrepreneurial experience increases the likelihood of success (as measured by firm revenues). Our finding that serial entrepreneurs are more likely to succeed is also consistent with the observations of Kaplan and Stromberg (2003), who study the contractual terms of venture capital financings. They find that serial entrepreneurs receive more favorable control provisions than first time entrepreneurs, including more favorable board control, vesting, liquidation rights, and more up-front capital. Presumably this is because their higher success rates make it less important for venture capitalists to protect themselves with tighter control provisions.

Chatterji (2005) shows that industry experience also increases the likelihood of success. In the medical device industry, startups founded by former employees of other medical device companies perform better than other startups. The value of industry experience is also emphasized by Bhide (2000), who shows that a substantial fraction of the Inc. 500 got their ideas for their new company while working for their prior employer. Kaplan, Sensoy, and Stromberg (2006) emphasize the importance of management in the success of entrepreneurial firms. Carroll and Mosakowski (1987),

Honig and Davidson (2000) and Reuber, Dyke and Fischer (1990) are other related works.

Finally, a number of papers have examined the characteristics of serial entrepreneurs. Eesley and Roberts (2006b) find that entrepreneurs are more likely to start another venture if they started their first venture when they were younger, were not married, and funding their first company with venture capital. Bengtsson (2005, 2006) finds that failed serial entrepreneurs are more likely than successful serial entrepreneurs to get funding from the same venture capital firm that financed their first ventures. Consistent with our finding on the role of venture capitalists, he argues that these initial venture capitalists are better able to judge whether the venture failed because of bad luck or the limitations of the entrepreneur.

The rest of the paper is organized as follows. Section 2 describes the construction of the data set and summarizes the data. Our main findings are presented in Section 3. We conclude in Section 4.

## **2. Data**

The core data for the analysis come from Dow Jones' *Venture Source* (previously named *Venture One*), described in more detail in Gompers, Lerner, and Scharfstein (2005). *Venture Source*, established in 1987, collects data on firms that have obtained venture capital financing. Firms that have received early-stage financing exclusively from individual investors, federally chartered Small Business Investment Companies, and corporate development groups are not included in the database. The companies are initially identified from a wide variety of sources, including trade publications, company Web pages,

and telephone contacts with venture investors. *Venture Source* then collects information about the businesses through interviews with venture capitalists and entrepreneurs. The data collected include the identity of the key founders (the crucial information used here) as well as the industry, strategy, employment, financial history, and revenues of the company. Data on the firms are updated and validated through monthly contacts with investors and companies.

When considering and controlling for the role of the venture capital investor, we consider only observations in which the venture capital firm serves on the board of the company. We do not consider the influence of other venture investors who do not serve on the board of directors. Our analysis focuses on data covering investments from 1975 to 2000, dropping information prior to 1975 due to data quality concerns.<sup>1</sup> In keeping with industry estimates of a maturation period of three to five years for venture capital financed companies, we drop companies receiving their first venture capital investment after 2000 so that the outcome data can be meaningfully interpreted. Results were qualitatively similar when we ran the analyses looking only at data through 1998 in order to be conservative about exit periods.

For the purposes of this analysis, we examine the founders (henceforth referred to as “entrepreneurs”) that joined firms listed in the *Venture Source* database during the period from 1986 to 2000. Typically, the database reports the previous affiliation and title (at the previous employer) of these entrepreneurs, as well as the date they joined the firm. In some cases, however, *Venture Source* did not collect this information. In these cases, we attempt to find this information by examining contemporaneous news stories in LEXIS-NEXIS,

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<sup>1</sup>Gompers and Lerner (2004) discuss the coverage and selection issues in Venture Economics and Venture Source data prior to 1975.



securities filings, and web sites of surviving firms. We believe this data collection procedure may introduce a bias in favor of having more information on successful firms, but it is not apparent to us that it affects our analysis.

We identify serial entrepreneurs through their inclusion as founders in more than one company in our data set. As a result, we may fail to identify serial entrepreneurs who had previously started companies that were not venture capital financed. Thus, our study is only about serial entrepreneurship in venture capital-financed firms, not about serial entrepreneurship in general. To the extent that prior experience in non-venture-backed companies is important, we will be understating the effect of entrepreneurial experience.

Table 1 reports the number and fraction of serial entrepreneurs in our sample in each year. Several patterns are worth highlighting. First, the number of entrepreneurs in the sample increased slowly from 1984 through 1994. Afterwards, as the Internet and technology boom took off in the mid-1990s, the number of entrepreneurs grew very rapidly. Second, with the general growth of the industry through this period, serial entrepreneurs accounted for an increasing fraction of the sample, growing from about 7% in 1986 to a peak of 13-14% in 1994. There was some decrease in the fraction of serial entrepreneurs after 1994, probably because of the influx of first-time entrepreneurs as part of the Internet boom. The absolute number of serial entrepreneurs actually peaked in 1999.

Table 2 documents the distribution of serial entrepreneurs across industries based on the nine industry groupings used in Gompers, Kovner, Lerner, and Scharfstein (2006). The data show a clear concentration of entrepreneurs in the three sectors that are most closely associated with the venture capital industry: Internet and computers; communications and electronics; and biotech and healthcare. These are also the three

industries with the highest representation of serial entrepreneurs. The other industries, such as financial services and consumer, are smaller and have a lower percentage of serial entrepreneurs.

Table 3 lists the 50 most active venture capital firms in our sample and ranks them according to both the number of serial entrepreneurs they have funded and the fraction of serial entrepreneurs in their portfolios. Given that many successful venture capital firms have an explicit strategy of funding serial entrepreneurs, it is not surprising that these firms have higher rates of serial entrepreneurship than the sample average. This tabulation suggests that the biggest and most experienced venture capital firms are more successful in recruiting serial entrepreneurs. Nevertheless, there does appear to be quite a bit of heterogeneity among these firms in their funding of serial entrepreneurs. Some of the variation may stem from the industry composition of their portfolios, the length of time that the groups have been active investors, and the importance they place on funding serial entrepreneurs. In any case, the reliance on serial entrepreneurs of the largest, most experienced, and most successful venture capital firms indicates that we will need to control for venture capital firm characteristics in trying to identify an independent effect of serial entrepreneurship.

Table 4 provides summary statistics for the data we use in our regression analysis. We present data for (1) all entrepreneurs in their first ventures; (2) entrepreneurs who have started only one venture; (3) serial entrepreneurs in their first venture; and (4) serial entrepreneurs in their later ventures.

The first variable we look at is the success rate within these subgroups of entrepreneurs. We define “success” as going public or filing to go public by December

2003. The findings are similar if we define success to also include firms that were acquired or merged. The overall success rate on first time ventures is 25.3%. Not surprisingly, serial entrepreneurs have an above-average success rate of 36.9% on their first ventures: venture capitalists are more likely to be more enthusiastic about financing a successful entrepreneur than one who has previously failed. It is more interesting that in their subsequent ventures they have a significantly higher success rate (29.0%) than do first time entrepreneurs (25.3%).

Serial entrepreneurs have higher success rates, even though on average they receive venture capital funding at an earlier stage in their company's development. While 45% of first-time ventures receive first-round funding at an early stage (meaning they are classified as “startup,” “developing product,” or “beta testing,” and not yet “profitable” or “shipping product”), close to 60% of entrepreneurs receive first-round funding at an early stage when it is their second or later venture. The later ventures of serial entrepreneurs also receive first-round funding when the ventures are younger—21 months as compared to 37 months for first time entrepreneurs. This earlier funding stage is also reflected in lower first-round pre-money valuations for serial entrepreneurs—\$12.3 million as compared to \$16.0 million for first-time entrepreneurs.

Controlling for year, serial entrepreneurs appear to be funded by more experienced venture capital firms, both in their first and subsequent ventures.<sup>2</sup> The last row of Table 4 reports the ratio of the number of prior investments made by the venture capital firm to the average number of prior investments made by other venture capital firms in the year of the investment. This ratio is consistently greater than one because more experienced (and likely

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<sup>2</sup> Throughout the paper, we use venture capital experience as a proxy for ability. Recently, other measures of ability have been utilized including centrality of the venture capitalists in the overall venture capital network (Hochberg, Ljungqvist, and Lu, 2006; Sorenson and Stuart, 2001).

larger) venture capital firms do more deals. The table indicates that venture capital firms that invest in serial entrepreneurs, whether in their first or subsequent ventures, have nearly three times the average experience of the average firm investing in the same year. This is about 14% greater than the year-adjusted experience of venture capital firms that invest in one-time-only entrepreneurs.<sup>3</sup> Given the evidence that more experienced venture capital firms have higher success rates (e.g., Gompers, Kovner, Lerner and Scharfstein, 2006) it will be important for us to control for venture capital experience in our regression, as well as other factors such as company location, which has also been linked to outcomes.

### **3. Findings**

#### *A. Success*

In this section we take a regression approach to exploring the impact of serial entrepreneurs on the success of the companies they start. In the first set of regressions, the unit of analysis is the entrepreneur at the time that the database first records the firm's venture capital funding. Our basic approach is to estimate logistic regressions where the outcome is whether the firm "succeeds," i.e. goes public or registers to go public by December 2003. Our results are qualitatively similar if we also include an acquisition as a successful outcome.

A main variable of interest in the initial regressions is a dummy variable, *LATER VENTURE*, which takes the value one if the entrepreneur had previously been a founder of a venture capital backed company. We are also interested in whether the entrepreneur

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<sup>3</sup>Note that venture capital firms that invest in the first ventures of serial entrepreneurs have done fewer deals on an absolute basis. This is because these first deals are early in the sample period.

had *succeeded* in his prior venture, and thus construct a dummy variable, *PRIOR SUCCESS*, to take account of this possibility.

There are a number of controls that must be included in the regression as well. As noted above, we control for venture capitalists' experience. The simplest measure of experience would be the number of prior companies in which the venture capital firm invested. We take a log transformation of this number to reflect the idea that an additional investment made by a firm that has done relatively few deals is more meaningful than an additional investment by a firm that has done many. However, because of the growth and maturation of the venture capital industry, there would be a time trend in this measure of experience. This is not necessarily a problem: investors in the latter part of the sample do have more experience. Nevertheless, we use a more conservative measure of experience, which adjusts for the average level of experience of other venture capital firms in the relevant year. Thus, our measure of experience for a venture capital investor is the log of one plus the number of prior companies in which the venture capital firm has invested minus the log of one plus the average number of prior investments undertaken by venture capital firms in the year of the investment. Because there are often multiple venture capital firms investing in a firm in the first round, we take experience of the most experienced investor who serves on the board of directors of the firms after the first venture financing round of the company, which we label *VC EXPERIENCE*.<sup>4</sup>

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<sup>4</sup>We have replicated the analysis using the average experience of investors from the earliest round and employing an entrepreneur-company-VC firm level analysis where each investor from the earliest round was a separate observation. In both cases, the results were qualitatively similar. We do not use the experience of venture capitalists who do not join the firm's board, since it is standard practice for venture investors with significant equity stakes or involvement with the firm to join the board.

The regressions also include dummy variables for the round of the investment. Although we include each company only once (when the company shows up in the database for the first time), about 26% of the observations begin with rounds later than the first round. (In these instances, the firm raised an initial financing round from another investor, such as an individual angel.) All of the results are robust to including only companies where the first observation in the database is the first investment round. We also include dummy variables for the company's stage of development and the logarithm of company age in months. Because success has been tied to location, we include a dummy variable for whether the firm was headquartered in California and one for whether it was headquartered in Massachusetts. We also include year and industry fixed effects. Finally, because there is often more than one entrepreneur per company, there will be multiple observations per company. Thus, robust standard errors of the coefficient estimates are calculated after clustering by company. In later regressions, the unit of analysis will be the company.

The first column of Table 5 reports one of the central findings of the paper. The coefficient of *LATER VENTURE* is positive and statistically significant. At the means of the other variables, entrepreneurs in their second or later ventures have a predicted success rate of 25.0%, while first-time entrepreneurs have a predicted success rate of 20.8%.

There are a number of hypotheses as to why the success rate of entrepreneurs in their second or later ventures is higher than the success rate of first-time entrepreneurs. One hypothesis is that there is learning-by-doing in entrepreneurship. The experience of starting a new venture—successful or not—confers on entrepreneurs some benefits (skills,

contacts, ideas) that are useful in subsequent ventures. (Such a hypothesis is consistent with Lazear's (2005) finding that Stanford MBAs who ultimately become entrepreneurs follow more varied career paths than their classmates.) In this view, entrepreneurs can learn to succeed through the experience of having started a company regardless of what its ultimate performance is. Alternatively, the higher average success rate of entrepreneurs in subsequent ventures could reflect a deeper pool of talented and hard-working entrepreneurs. We use the outcome of serial entrepreneurs' prior ventures to distinguish between these hypotheses.

To determine whether a pure learning-by-doing effect exists, in the second column of Table 5 we add the dummy variable, *PRIOR SUCCESS*, which equals 1 if the prior venture of the serial entrepreneur was successful. The estimated coefficient of this variable is positive and statistically significant. Including it also lowers the coefficient of the *LATER VENTURE* dummy so that it is no longer statistically significant. The predicted success rate of entrepreneurs with a track record of success is 30.6%, compared to only 22.1% for serial entrepreneurs who failed in their prior venture, and 20.9% for first-time entrepreneurs. This finding indicates that it is not experience *per se* that improves the odds of success for serial entrepreneurs. Instead, it suggests the importance of entrepreneurial skill in determining performance.

The unit of analysis for the first two columns of Table 5 is the entrepreneur-company level. We also repeat the analysis using only one observation per company, accounting for any potential concerns about the independence of observations. The third column of Table 5 reports the results of a regression in which the unit of analysis is the company, not the entrepreneur-company. The key variables are 1) a dummy for whether

*any* of the founders is in their second or later ventures and 2) a dummy for whether *any* of the founders was successful in a prior venture. Here too a track record of prior success has a bigger effect on future success than does prior experience *per se*. Companies with a previously successful entrepreneur have a predicted success rate of 26.7%, whereas those with entrepreneurs who failed in prior ventures have an 17.9% success rate, and companies with first-time entrepreneurs have a 14.1% chance of success. The effect of prior success on predicting future success is very large.

The regressions also indicate that venture capital firm experience is positively related to success. Using estimates from the third column of Table 5, at the 75<sup>th</sup> percentile of *VC EXPERIENCE* and at the means of all the other variables, the predicted success rate is 19.0%, while at the 25<sup>th</sup> percentile, the predicted success rate is only 13.3%. There are a number of reasons why more experienced venture capital firms may make more successful investments.

To consider the importance of the VC firm in determining portfolio company success, we do a similar analysis on two levels. In specification 4 of Table 5, we look at the data on an entrepreneur-company-VC firm level. This allows us to fully consider variation in entrepreneur and VC firm characteristics. To account for concerns about the independence of observations, specification 5 is at the company-VC firm level.

In these specifications, we are using *VC EXPERIENCE* as an imperfect proxy for the quality of a venture capital firm. If successful entrepreneurs are more likely to get funded by better venture capital firms, we could be getting a positive coefficient of *PRIOR SUCCESS* because it is a proxy for the unobservable components of venture capital firm quality that is not captured by *VC EXPERIENCE*. Thus, to control for



unobservable characteristics, we estimate the model with venture capital firm fixed effects. This enables us to estimate how well a given venture capital firm does on its investments in serial entrepreneurs relative to its other investments in first-time entrepreneurs. Results in the fourth and fifth columns of Table 5 indicate that with venture capital firm fixed effects, the differential between first time entrepreneurs and successful serial entrepreneurs is even larger. The fifth column, which estimates the effects at the company level, generates a predicted success rate for first-time entrepreneurs of 17.7%. The predicted success rate for failed serial entrepreneurs in later ventures is 19.8%, and it is 29.6% for entrepreneurs with successful track records.

Financing from experienced venture capital firms has a large effect on the probability that an entrepreneur succeeds for one of several reasons: because these firms are better able to screen for high quality entrepreneurs, because they are better monitors of entrepreneurs, or because they simply have access to the best deals. But, if an entrepreneur already has a demonstrable track record of success, does a more experienced venture capital firm still enhance performance? To answer this question, we add to the basic specification in column 2 and 3 of Table 5 an interaction term between *VC EXPERIENCE* and *PRIOR SUCCESS*, as well an interaction term between *VC EXPERIENCE* and *LATER VENTURE*.

The results are reported in columns 6 and 7 of the table. The coefficient of *VC EXPERIENCE* × *PRIOR SUCCESS* is negative and statistically significant (though somewhat more so in column 6). This indicates that venture capital firm experience has a less positive effect on the performance of entrepreneurs with successful track records. Indeed, using estimates from column 7, the predicted success rate for previously

successful entrepreneurs is 28.1% when funded by more experienced venture capital firms (at the 75<sup>th</sup> percentile of *VC EXPERIENCE*) and 27.7% when funded by less experienced venture capital firms (at the 25<sup>th</sup> percentile of *VC EXPERIENCE*).

Essentially, venture capital firm experience has a minimal effect on the performance of entrepreneurs with good track records. Where venture capital firm experience does matter is in the performance of first-time entrepreneurs and serial entrepreneurs with histories of failure. First-time entrepreneurs have a 17.6% chance of succeeding when funded by more experienced venture capital firms and an 11.7% chance of succeeding when being funded by a less experienced venture capital firm. Likewise, failed entrepreneurs who are funded by more experienced venture capital firms have a 22.1% chance of succeeding as compared to a 14.7% chance of succeeding when they are funded by less experienced venture capital firms.

These findings provide support for the view that venture capital firms actively screen and/or monitor their portfolio companies, and that there is some skill in doing so. When an entrepreneur has a proven track record of success—a publicly observable measure of quality—experienced venture capital firms are no better than others at determining whether he will succeed. It is only when there are less clear measures of quality—an entrepreneur is starting a company for the first time, or an entrepreneur has actually failed in his prior venture—that more experienced venture capital firms have an advantage in identifying entrepreneurs who will succeed. To use a sports analogy, all general managers of teams in the National Football League (NFL) probably agree that superstar quarterback Tom Brady of the New England Patriots would be a valuable addition to their teams. But, NFL teams were much less optimistic about his prospects

in 2000 when the Patriots drafted him in the sixth round. The football equivalent of our finding would be that teams with a more experienced staff (such as the Patriots) are better at identifying diamonds-in-the-rough such as Tom Brady when they are in the draft, but no better at determining their worth once they are proven superstars.<sup>5</sup>

The results are also consistent with the view that venture capitalists actively monitor their portfolio firms or add value through a variety of means such as executive recruiting and customer contacts. Previously successful entrepreneurs—who presumably need less monitoring and value-added services—do not benefit as much from this sort of venture capital firm monitoring and expertise. By way of contrast, the evidence suggests that first-time entrepreneurs and those with a track record of failure are more likely to benefit from venture capital firm expertise. To continue the football analogy, Tom Brady would benefit less from a high-quality football coach now than he did when he was first drafted.

Table 6 provides additional supporting evidence for the view that more experienced venture capital firms are better able to identify and/or develop entrepreneurial skill. Here, we analyze the sample of first-time entrepreneurs to determine the factors that lead them to become serial entrepreneurs. The dependent variable is equal to one if the entrepreneur subsequently starts another venture. The logistic regression reported in the first column in the table indicates that first-time entrepreneurs funded by more experienced venture capital firms are more likely to become serial entrepreneurs. At the 25<sup>th</sup> percentile of experience, there is a 4.8% chance

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<sup>5</sup>Massey and Thaler (2006) present strong evidence that high first-round NFL draft picks are overvalued relative to later picks. Although they interpret their findings as evidence of a behavioral bias, it is also possible that less experienced general managers (who run lower quality teams and get to pick early in the first round) have a harder time assessing quality.

that an entrepreneur will start another venture, whereas at the 75<sup>th</sup> percentile, there is a 5.7% probability. Though the increase is small on an absolute basis, given the low baseline rates of serial entrepreneurship, the effect is quite big.

### *B. Valuation*

We now examine how serial entrepreneurship and venture capital firm experience affect company valuations.<sup>6</sup> To analyze this question, we use first-round “pre-money” valuation as our valuation measure. *Venture Source* calculates this as the product of the price paid per share in the round and the shares outstanding *prior* to the financing round.<sup>7</sup> The pre-money valuation is the perceived net present value of the company, and therefore excludes the additional capital raised in the financing.

A company’s valuation depends on numerous factors including those we can (imperfectly) observe (e.g., the stage of product development, company age, industry, location, public market valuation levels, entrepreneur’s quality, and venture capital firm’s quality) and those we cannot (e.g., the company’s sales and assets). We are mainly interested in how measures of entrepreneur quality and venture capital firm quality affect pre-money valuation.

Table 7 presents the results of regressing the natural log of real pre-money valuation (expressed in millions of year 2000 dollars) on the above observables. Because the data include significant outliers (one valuation exceeds \$600 million), we winsorize the dependent variable at the 99<sup>th</sup> percentile (\$131.5 million), which is more than 15

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<sup>6</sup>Hsu (2004) shows that entrepreneurs have to pay more (i.e., to accept a lower valuation) to be financed by venture capitalists with better track records.

<sup>7</sup>Almost all venture capital financings use convertible preferred stock. This methodology for calculation pre-money valuation implicitly assumes that the value of preferred stock’s liquidation preference is zero. Thus, this common approach to calculating pre-money valuation overstates the true valuation. This bias is unlikely to vary systematically with the variables we are using in our regression analysis.

times the median. All the regressions include industry and year fixed effects. We again consider specifications at the entrepreneur-company level (1, 2 and 6), company level (3 and 7), the entrepreneur-company-VC firm level (4), and the company-VC firm level (5). Before describing our main results, it is worth pointing out that the controls all have the predicted sign. Older firms and those at later stages of product development have higher valuations. In addition, when public market industry valuations are higher, venture capital valuations are also higher. The public market industry valuation is calculated as the average market-to-book equity ratio for publicly traded firms in the same industry.<sup>8</sup> Finally, firms located in California have slightly higher valuations than those in other states and firms located in Massachusetts have somewhat lower valuations, but these differences are not statistically significant.

Of more interest is the finding that venture capital firm experience is positively related to pre-money valuation. The effect, however, is modest. The elasticity is approximately 9.2%. For example, the estimates from column 3 of Table 7 imply that at the 75<sup>th</sup> percentile of *VC EXPERIENCE*, the forecasted valuation is \$10.49 million, whereas at the 25<sup>th</sup>, it is \$8.92 million. That more experienced firms pay more for new ventures is not surprising, given that they have higher success rates. Because there are

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<sup>8</sup>In order to do this we need to link the SIC codes of public companies to the nine industries used in our analysis. Our procedure is to identify the SIC codes of all venture capital-backed firms that went public within a given Venture Economics industry code. Because there are multiple SIC codes associated with each of our nine industries, we construct market-to-book ratios as a weighted average of the market-to-book ratios of the public companies in those SIC codes, where the weights are the relative fractions of firms that went public within our nine industries. For each of the public firms assigned to the industry, we compute the ratio of shareholders' equity to the market value of the equity at the beginning of the quarter. If multiple classes of common and preferred stock were outstanding, the combined value of all classes is used. In many industries, numerous small firms with significant negative earnings introduce a substantial skewness to the distribution of these ratios. Consequently, we weighted the average by equity market capitalization at the beginning of the quarter.

unobservable firm characteristics that affect valuation levels (or those that are measured with error), it is likely that *VC EXPERIENCE* serves as a proxy for the characteristics that increase firm value. These characteristics, such as the quality of the entrepreneur, might be unobservable to less experienced venture capital firms. Alternatively, characteristics such as sales or assets could be observable to market participants, but unobservable to us given the data we have. If more experienced venture capital firms invest in more mature firms in ways we do not fully capture with our company stage controls, this could explain our finding.

The finding that new ventures funded by more experienced venture capital firms invest at higher pre-money valuations needs to be reconciled with Hsu's (2004) finding that more experienced venture capital firms make offers at *lower* pre-money valuations. Hsu examines a sample of new ventures that received competing offers from venture capital firms. To the extent that more experienced venture capital firms add more value to new ventures (as is consistent with our findings), they would require larger equity stakes (lower share prices) in exchange for their money and their value-added services. Thus, the offers from top-tier ventures capital firms should imply lower pre-money valuations even though the companies are worth more if funded by them. Because Hsu is looking at *within-venture* offers, he is controlling for the quality of the venture. He is therefore able to isolate the effect of venture capital firm quality on valuations. Because we are looking *across* ventures, we are picking up the effect identified by Hsu as well as the between-venture differences in quality. This may explain why the estimated effect is small.

Somewhat surprisingly, in the first two columns of Table 7 we find no relationship between pre-money valuation and *LATER VENTURE* and *PRIOR SUCCESS*. The same is true when we conduct the analysis at the company level (column 3) and include venture capital firm fixed effects (columns 4 and 5). Given the higher success rates of previously successful entrepreneurs, one would have thought that firms associated with these entrepreneurs would have had higher valuations. Apparently this is not the case, which suggests that venture capital firms are able to buy equity in firms started by previously successful entrepreneurs at a discount.

The last two columns of Table 7 add interactions of *VC EXPERIENCE* with measures of *PRIOR SUCCESS* and *LATER VENTURE*. The coefficient of the interaction term is negative and statistically significant only at the five percent level. This suggests that top-tier venture capital firms are not as eager to pay for prior performance, but the magnitude of the effect is small.

This result is consistent with the results of Kaplan and Stromberg (2003). Kaplan and Stromberg examine venture capital contractual terms and find that repeat entrepreneurs receive more favorable terms for vesting, board structure, liquidation rights, and the tranching of capital, but did not receive greater equity ownership percentages. It therefore appears that serial entrepreneurs may extract greater value from venture capitalists in the non-price terms of investment.

The overall conclusion that we draw from Table 7 is that despite the higher success rates of entrepreneurs with successful track records, venture capital firms are not paying premiums to invest in their companies. Why successful entrepreneurs appear

unable to capture an increasing share of rents is something of a mystery, but it has implications for returns.

### *C. Returns*

In this section, we investigate whether venture capital firms earn higher returns on their investments in serial entrepreneurs. Unfortunately, we do not observe actual rates of return on venture capital investments.<sup>9</sup> What we can observe, with varying degrees of accuracy, is company valuations at the time of exit. *Venture Economics* and *Venture Source* provide this information for most IPOs and some acquisitions. For companies missing information in these databases, we search for valuation at the time of IPO in SDC Corporate New Issues database. We also searched for acquisition values using *Factiva*. If the firm did not go public by December 2003, we assume that the exit value is zero. We exclude from the analysis firms that went public or were acquired where we could not find the valuation.

Our crude measure of return is the ratio of the exit valuation to pre-money valuation in the first financing round with venture investors, what we refer to as the investment multiple. The investment multiple is likely to be correlated with actual returns but it does not adjust for two critical elements of return: the time it takes to exit and the dilution that occurs over financing rounds.

Table 8 presents regression results in which the dependent variable is the investment multiple divided by the average investment multiple of firms funded in the same industry and year. We refer to this variable as the relative investment multiple.

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<sup>9</sup>Venture capitalists typically invest in multiple financing rounds. Even if we know that a given venture firm invested in a certain round, it is often unclear what percentage of the equity sold in the financed the venture capitalist received. This information is needed to compute a rate of return.



When the relative investment multiple is one, the investment multiple on the venture capital firm's investment is equal to the industry-year average.

The regressors include the same set of variables we have been considering throughout. The first column indicates that the relative investment multiple is greater for firms with serial entrepreneurs, although the effect is not statistically significant. The effect is larger for serial entrepreneurs who previously succeeded, as results reported in the second column indicate. The estimated effect is statistically significant at conventional levels. Finally, venture capital experience is positively related to the relative investment multiple.

The estimates from the third column of Table 8 imply that among companies funded by inexperienced venture capital firms, only those with previously successful entrepreneurs do better than the industry-year average investment multiple (79% higher on average). First time and failed entrepreneurs do significantly worse than the average. By contrast, when companies are funded by top-tier venture capital firms, they perform in general at the industry average and do significantly better if one of the entrepreneurs has a successful track record (107% greater).

The last column of Table 8 looks at relative investment multiples, conditional on the venture succeeding. Prior success and venture capital experience have no appreciable effect on relative investment valuation. This indicates that the higher returns documented in the first four columns of the Table 8 come from higher success rates, not greater returns in the IPOs.

Finally, we try to connect our deal-level results to venture capital fund internal rates of return. Our source of return data is the *2004 Private Equity Performance*

*Monitor*, which presents return data on over 1,700 private equity funds. This information is compiled by Mark O'Hare, who over the past five years has created a database of returns from public sources (e.g., institutional investors who have posted their returns online), Freedom of Information Act requests to public funds, and voluntary disclosures by both general and limited partners. In order to do this mapping, we need to make some assumptions. (For instance, because Mayfield V was raised in 1984 and Mayfield VI in 1988, we attribute all investments made between 1984 and 1987 to Mayfield V.)

Our dependent variable is fund internal rate of return (IRR) measured in percent. (For example, a 60% return gets entered into the data as 60.) The average fund IRR is 13.8%. We include a series of controls including industry shares in the portfolio of the fund, year dummies for the year the fund was established, and assets under management at the time the fund was raised.

Our main independent variables of interest are the portion of a fund's deals that involve serial entrepreneurs and the portion that involve successful serial entrepreneurs. The results in Table 9 are quite strong and demonstrate the impact that serial entrepreneurs can have on portfolio returns. At the 25<sup>th</sup> return percentile, 6.8% of venture capital funds are investments in companies with serial entrepreneurs; at the 75<sup>th</sup> percentile, it is 18.2%. The coefficient of 59.2 in column 2 implies a 7.3% greater IRR for funds that invest in serial entrepreneurs. However, there appears to be no link to the share of the fund invested in previously successful entrepreneurs. The estimated effects of experience are also large. Top-tier firms are predicted to have IRRs of 45.4%, as compared to 14.3% for less experienced venture capital firms.

#### **4. Conclusions**

This paper examines the role that skill plays in the success of entrepreneurs and venture capitalists. By examining the experience of serial entrepreneurs and the venture capitalists that fund them, we are able to provide insights into how important each is and what type of skill each possesses. Our results indicate that skill is an important determinant of success for entrepreneurial startups. Successful serial entrepreneurs are more likely to replicate the success of their past companies than either single venture entrepreneurs or serial entrepreneurs who failed in their prior venture.

More experienced venture capital firms are also shown to have higher success rates on their investments. However, this is isolated to first time entrepreneurs and those who previously failed. When experienced and inexperienced venture capital firms invest in entrepreneurs with a track record of success, there is no performance differential. This evidence would seem to suggest that prior success is a signal of quality or that venture capital firms add little value to talented, successful entrepreneurs. If prior success were pure luck, we would not see this pattern.

While they are more likely to be successful, serial entrepreneurs are not able to extract all of the value from their superior ability. We find that successful serial entrepreneurs do not achieve higher valuations than do other entrepreneurs.<sup>10</sup> This leads to higher deal returns for venture capitalists who invest in companies started by successful serial entrepreneurs. Investing in serial entrepreneurs also leads to higher rates of return of the funds themselves.

Our paper raises several interesting questions for future research. First, while our paper identifies entrepreneurial skill, it does not distinguish exactly what the critical

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<sup>10</sup> We are unable to determine the value implications of the non-price terms in Kaplan and Stromberg (2003) because we do not have the actual financing documents.

entrepreneurial skill is. It is possible that entrepreneurial skill is embodied in the networks with customers, suppliers, and other market participants that enhance the outcomes of serial entrepreneurs. It is also possible that the skill is greater ability to identify markets, set strategy, and correctly analyze various business problems. In future work, we hope to examine the markets that serial entrepreneurs enter and to identify whether future success is confined to the markets where they have operated in the past or whether successful serial entrepreneurs are also more successful in new markets.

While not ruling it out, our results are less consistent with the learning by doing work of Eesley and Roberts (2006a,b). A learning-by-doing story would need to explain why there is differential learning between successful and unsuccessful serial entrepreneurs as well as why more experienced venture capitalists can identify failed serial entrepreneurs who “learned” in their previous venture.

The results in this paper also highlight the role of venture capital skill in identifying talented entrepreneurs and attractive markets. We do not, however, identify whether this ability operates at the individual or the firm level. Similarly, we do not know whether various attributes of the individual general partners or the firms themselves are also associated with greater ability to identify successful investments. In future work, we plan to look at how demographic characteristics of individual general partners and characteristics of venture capital teams affect the success of venture capital investments.

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**Table 1: Frequency of Serial Entrepreneurs by Year**

Year	Serial Entrepreneurs	Total Entrepreneurs	Serial Entrepreneurs as a Percent of Total
1980	0	11	0.0
1981	0	7	0.0
1982	0	11	0.0
1983	0	34	0.0
1984	2	29	6.9
1985	3	42	7.1
1986	9	99	9.1
1987	9	130	6.9
1988	10	209	4.8
1989	14	254	5.5
1990	35	301	11.6
1991	34	337	10.1
1992	53	522	10.2
1993	65	516	12.6
1994	78	574	13.6
1995	129	1,051	12.3
1996	166	1,262	13.2
1997	141	1,205	11.7
1998	164	1,256	13.1
1999	174	1,678	10.4
2000	38	404	9.4

Sample includes one observation per entrepreneur - company pair.

**Table 2: Frequency of Serial Entrepreneurs by Industry**

	Serial Entrepreneurs	Total Entrepreneurs	Serial Entrepreneurs as a Percent of Total
Internet and Computers	556	4,489	12.4
Communications and Electronics	157	1,424	11.0
Business and Industrial	2	109	1.8
Consumer	29	576	5.0
Energy	0	19	0.0
Biotech and Healthcare	271	1,964	13.8
Financial Services	11	163	6.7
Business Services	68	827	8.2
Other	30	361	8.3

Sample includes one observation per entrepreneur - company pair.



**Table 3: Frequency of Serial Entrepreneurs by Venture Capital Firm**

Year	Serial	Total	Serial Entrepreneurs as a Percent of Total	Ranking by:	
	Entrepreneurs	Entrepreneurs		Number	Percent
Kleiner Perkins Caufield & Byers	100	666	15.0	1	9
New Enterprise Associates	80	702	11.4	2	28
Sequoia Capital	69	432	16.0	3	5
U.S. Venture Partners	68	454	15.0	4	10
Mayfield	63	459	13.7	5	19
Accel Partners	61	418	14.6	6	13
Crosspoint Venture Partners	60	407	14.7	7	11
Institutional Venture Partners	56	385	14.5	8	14
Bessemer Venture Partners	49	340	14.4	9	16
Matrix Partners	44	275	16.0	10	4
Menlo Ventures	43	305	14.1	11	17
Sprout Group	42	315	13.3	12	21
Brentwood Associates	40	265	15.1	14	8
Venrock Associates	40	389	10.3	13	31
Mohr Davidow Ventures	38	251	15.1	16	6
Oak Investment Partners	38	462	8.2	15	39
Domain Associates	37	210	17.6	17	1
Benchmark Capital	36	264	13.6	19	20
Greylock Partners	36	374	9.6	18	34
InterWest Partners	35	312	11.2	20	29
Advent International	33	238	13.9	21	18
Foundation Capital	31	188	16.5	24	2
Enterprise Partners Venture Capital	31	215	14.4	23	15
Canaan Partners	31	252	12.3	22	23
Delphi Ventures	30	185	16.2	26	3
Sigma Partners	30	204	14.7	25	12
Charles River Ventures	29	192	15.1	27	7
Norwest Venture Partners	27	231	11.7	28	25
Austin Ventures	25	270	9.3	29	36
Morgan Stanley Venture Partners	24	191	12.6	34	22
Lightspeed Venture Partners	24	202	11.9	33	24
Sutter Hill Ventures	24	207	11.6	32	26
Battery Ventures	24	242	9.9	31	33
Sevin Rosen Funds	24	254	9.4	30	35
JPMorgan Partners	23	225	10.2	36	32
St. Paul Venture Capital	23	277	8.3	35	38
Alta Partners	22	190	11.6	37	27
Morgenthaler	20	183	10.9	38	30
Trinity Ventures	18	214	8.4	39	37
Warburg Pincus	16	195	8.2	40	40

Sample includes one observation per VC firm-portfolio company. Includes the 40 VC firms with the most total deals in the sample.

**Table 4: Summary Statistics**

	All First Ventures	Entrepreneurs with One Venture		Serial Entrepreneurs	
				First Venture	Later Ventures
Success Rate	0.253	0.243	0.369 ***	0.290 ***	
Pre-Money Valuation (millions of 2000 \$)	15.95	15.78	17.75 *	12.30 ***	
Firm in Startup Stage	0.116	0.118	0.090 **	0.175 ***	
Firm in Development Stage	0.294	0.294	0.293	0.377 ***	
Firm in Beta Stage	0.039	0.039	0.037	0.045	
Firm in Shipping Stage	0.469	0.470	0.462	0.362 ***	
Firm in Profitable Stage	0.073	0.070	0.101 **	0.036 ***	
Firm in Re-Start Stage	0.009	0.009	0.016	0.006	
California-Based Company	0.430	0.417	0.578 ***	0.591 ***	
Massachusetts-Based Company	0.119	0.119	0.122	0.119	
Age of Firm (in Months)	36.64	36.30	40.54 **	20.60 ***	
Previous Deals by VC Firm	51.35	51.76	46.70 ***	58.86 ***	
Previous Deals by VC Firm Relative to Year Average	2.896	2.887	2.989	3.290 ***	

One observation per entrepreneur-company pair.

\*\*\*, \*\*, \* indicate significant difference from mean value of entrepreneurs with one venture at the 1%, 5% and 10% level, respectively.

**Table 5: Venture Success Rates**

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
	Probit		Probit		Probit		Probit		Probit		Probit		Probit
LATER VENTURE	0.0411		0.0126				0.0017				0.0069		
	(2.92)	***	(0.73)				(0.09)				(0.34)		
PRIOR SUCCESS			0.0830				0.0992				0.1252		
			(2.93)	***			(3.04)	***			(3.68)	***	
Any Entrepreneur In LATER VENTURE					0.0384				0.0222				0.0362
					(2.21)	**			(1.01)				(1.65)
Any Entrepreneur Has PRIOR SUCCESS					0.0808				0.0939				0.1198
					(3.12)	***			(2.90)	***			(3.66)
VC FIRM EXPERIENCE	0.0381		0.0379		0.0357						0.0391		0.0399
	(4.51)	***	(4.49)	***	(5.82)	***					(4.56)	***	(5.52)
VC FIRM EXPERIENCE X LATER VENTURE											0.0079		
											(0.51)		
VC FIRM EXPERIENCE X PRIOR SUCCESS											-0.0453		
											(2.02)	**	
VC FIRM EXPERIENCE X Any Entrepreneur In Later Venture													0.0027
													(0.16)
VC FIRM EXPERIENCE X Any Entrepreneur Has PRIOR SUCCESS													-0.0404
													(1.87)
Logarithm of Age of Company	0.0060		0.0061		0.0084		0.0086		0.0024		0.0060		0.0082
	(0.89)		(0.90)		(1.70)	*	(1.03)		(0.37)		(0.89)		(1.68)
California-Based Company	0.0249		0.0249		0.0029		0.0183		-0.0066		0.0249		0.0024
	(1.33)		(1.33)		(0.21)		(0.75)		(0.34)		(1.33)		(0.17)
Massachusetts-Based Company	-0.0616		-0.0610		-0.0415		-0.1039		-0.0681		-0.0617		-0.0436
	(2.38)	**	(2.36)	**	(2.24)	**	(3.24)	***	(2.61)	***	(2.39)	**	(2.37)
Company In Development Stage	0.0175		0.0168		0.0304		0.0183		0.0544		0.0171		0.0305
	(0.58)		(0.56)		(1.39)		(0.55)		(2.05)	**	(0.57)		(1.40)
Company In Beta Stage	0.0402		0.0403		0.0691		0.0476		0.1202		0.0411		0.0702
	(0.78)		(0.78)		(1.78)	*	(0.93)		(2.79)		(0.80)		(1.81)

Company In Shipping Stage	0.0659 (2.06)	**	0.0657 (2.06)	**	0.0671 (2.92)	***	0.0982 (2.79)	***	0.1282 (4.56)	***	0.0664 (2.08)	**	0.0677 (2.94)	***
Company In Profitable Stage	0.1784 (3.49)	***	0.1789 (3.50)	***	0.2269 (5.40)	***	0.1814 (2.99)	***	0.2672 (5.26)	***	0.1798 (3.51)	***	0.2278 (5.41)	***
Company In Re-Start Stage	-0.0163 (0.15)		-0.0138 (0.13)		-0.0554 (0.76)		-0.0040 (0.04)		0.0133 (0.15)		-0.0128 (0.12)		-0.0541 (0.74)	
Company Stage Missing	0.1057 (1.96)	*	0.1061 (1.97)	**	0.1453 (3.31)	***	0.2929 (4.07)	***	0.2891 (4.46)	***	0.1082 (2.00)	**	0.1500 (3.39)	***
Controls for:														
Round Number	yes		yes		yes		yes		yes		yes		yes	
Year	yes		yes		yes		yes		yes		yes		yes	
Industry	yes		yes		yes		yes		yes		yes		yes	
VC Firm Fixed Effects	no		no		no		yes		yes		no		no	
Log-likelihood	-4872.2		-4867.7		-1635.5		-9568.9		-2805.8		-4865.5		-1632.9	
$\chi^2$ -Statistic	373.1		376.9		536.7		1008.7		1034.9		379.4		535.7	
p-Value	0.000		0.000		0.000		0.000		0.000		0.000		0.000	
Observations	9,876		9,876		3,831		19,617		6,180		9,876		3,831	

The sample consists of 9,932 ventures by 8,808 entrepreneurs covering the years 1975 to 2000. The dependent variable is *Success*, an indicator variable that takes on the value of one if the portfolio company went public and zero otherwise. *LATER VENTURE* is an indicator variable that takes on the value of one if the entrepreneur had started a previous venture-backed company and zero otherwise. *PRIOR SUCCESS* is an indicator variable that takes on the value of one if the entrepreneur had started a previous venture-backed company that went public or filed to go public by December 2003 and zero otherwise. *Any Entrepreneur in Later Venture* is an indicator variable that takes the value of one if any entrepreneur within the company had started a previous venture-backed company and zero otherwise. *Any Entrepreneur with Prior Success* is an indicator variable that takes the value of one if any entrepreneur within the company started a previous venture-backed company that went public or filed to go public by December 2003 and zero otherwise. *VC FIRM EXPERIENCE* is the difference between the log of the number of investments made by venture capital organization  $f$  prior to year  $t$  and the average in year  $t$  of the number of investments made by all organizations prior to year  $t$ . The sample analyzed in columns 1, 2, and 6 is at the entrepreneur-company level, the sample analyzed in columns 3 and 7 is at the company level, the sample analyzed in column 4 is at the entrepreneur-company-VC firm level, and the sample analyzed in column 5 is at the company-VC firm level.

Standard errors are clustered at portfolio company level. Robust t-statistics are in parentheses below coefficient estimates.

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

**Table 6: Probability of Becoming a Serial Entrepreneur**

	(1)		(2)	
	Probit		Probit	
VC FIRM EXPERIENCE	0.0058 (2.57)	**	0.0058 (2.53)	**
PRIOR SUCCESS			0.0009 (0.17)	
Logarithm of Age of Company	0.0036 (1.75)	*	0.0036 (1.75)	*
California-Based Company	0.0347 (6.47)	***	0.0347 (6.46)	***
Massachusetts-Based Company	0.0193 (2.18)	**	0.0194 (2.19)	**
Company In Development Stage	0.0122 (1.29)		0.0122 (1.28)	
Company In Beta Stage	0.0058 (0.40)		0.0058 (0.40)	
Company In Shipping Stage	0.0141 (1.47)		0.0141 (1.47)	
Company In Profitable Stage	0.0032 (0.26)		0.0031 (0.25)	
Company In Re-Start Stage	-0.0086 (0.41)		-0.0085 (0.41)	
Company Stage Missing	0.0262 (1.75)	*	0.0261 (1.75)	*
Controls for:				
Round Number	yes		yes	
Year	yes		yes	
Industry	yes		yes	
Log-likelihood	-2145.5		-2145.5	
$\chi^2$ -Statistic	563.6		564.4	
<i>p</i> -Value	0.000		0.000	
Observations	8,734		8,734	

The sample consists of 8,808 initial ventures by entrepreneurs covering the years 1975 to 2000. The dependent variable is *Become Serial*, an indicator variable that takes the value of one if the entrepreneur begins a second venture and zero otherwise. *VC FIRM EXPERIENCE* is the difference between the log of the number of investments made by venture capital organization *f* prior to year *t* and the average in year *t* of the number of investments made by all organizations prior to year *t*. *PRIOR SUCCESS* is an indicator variable that takes on the value of one if the entrepreneur's first venture-backed company went public or filed to go public by December 2003 and zero otherwise.

Standard errors are clustered at portfolio company level. Robust t-statistics are in parentheses below coefficient estimates.

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

**Table 7: Pre-Money Valuations**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS
LATER VENTURE	-0.0290 (0.97)	-0.0245 (0.66)		0.0144 (0.46)		-0.0210 (0.45)	
PRIOR SUCCESS		-0.0132 (0.23)		-0.0726 (1.31)		0.0671 (0.90)	
Any Entrepreneur In LATER VENTURE			-0.0260 (0.60)		-0.0112 (0.28)		-0.0176 (0.31)
Any Entrepreneur Has PRIOR SUCCESS			0.0065 (0.11)		-0.0351 (0.58)		0.1204 (1.50)
VC FIRM EXPERIENCE	0.0916 (4.88) ***	0.0916 (4.88) ***	0.1149 (7.12) ***			0.0965 (5.09) ***	0.1344 (7.12) ***
VC FIRM EXPERIENCE X LATER VENTURE						-0.0050 (0.15)	
VC FIRM EXPERIENCE X PRIOR SUCCESS						-0.0926 (1.75) *	
VC FIRM EXPERIENCE X Any Entrepreneur In Later Venture							-0.0135 (0.31)
VC FIRM EXPERIENCE X Any Entrepreneur Has PRIOR SUCCESS							-0.1382 (2.34) **
Logarithm of Age of Company	0.0889 (4.94) ***	0.0889 (4.93) ***	0.0927 (5.82) ***	0.0396 (3.77) ***	0.0543 (3.08) ***	0.0886 (4.92) ***	0.0916 (5.76) ***
California-Based Company	0.0771 (1.87) *	0.0771 (1.87) *	0.0629 (1.69) *	0.0576 (2.29) **	0.0195 (0.47)	0.0771 (1.87) *	0.0611 (1.64)
Massachusetts-Based Company	-0.0554 (0.95)	-0.0555 (0.95)	-0.0715 (1.42)	-0.1195 (3.46)	-0.1312 (2.53) **	-0.0575 (0.99)	-0.0800 (1.60)
Company In Development Stage	0.4787 (8.28) ***	0.4788 (8.28) ***	0.4366 (8.71) ***	0.7874 (19.28) ***	0.6834 (10.77) ***	0.4794 (8.29) ***	0.4367 (8.70) ***
Company In Beta Stage	0.6504 (6.17) ***	0.6503 (6.17) ***	0.6652 (7.32) ***	1.1635 (19.80) ***	1.0595 (11.83) ***	0.6509 (6.18) ***	0.6661 (7.37) ***
Company In Shipping Stage	0.9070	0.9070	0.8456	1.2609	1.1157	0.9078	0.8468

	(14.02)	***	(14.02)	***	(14.48)	***	(28.84)	***	(16.19)	***	(14.05)	***	(14.49)	***
Company In Profitable Stage	1.3444		1.3442		1.3231		1.8374		1.6150		1.3451		1.3247	
	(12.92)	***	(12.91)	***	(13.16)	***	(28.27)	***	(14.51)	***	(12.93)	***	(13.21)	***
Company In Re-Start Stage	-0.5520		-0.5524		-0.5416		0.2357		0.0529		-0.5501		-0.5322	
	(2.29)	**	(2.29)	**	(2.45)	**	(2.29)	**	(0.22)		(2.28)	**	(2.41)	**
Company Stage Missing	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	
	(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)	
Logarithm of Value-Weighted Industry Index	0.4467		0.4465		0.3532		0.2684		0.1682		0.4472		0.3572	
	(4.32)	**	(4.32)	**	(3.80)	**	(3.95)	**	(1.61)		(4.33)	**	(3.86)	**
Controls for:														
Round Number	yes		yes		yes		yes		yes		yes		yes	
Year	yes		yes		yes		yes		yes		yes		yes	
Industry	yes		yes		yes		yes		yes		yes		yes	
VC Firm Fixed Effects	no		no		no		yes		yes		no		no	
R-squared	0.36		0.36		0.35		0.56		0.56		0.36		0.35	
Observations	6,377		6,377		2,348		15,670		4,912		6,377		2,348	

The sample consists of 6,418 professional venture financings of privately held firms between 1975 and 2000 in the *Venture Source* database for which the firm was able to determine the valuation of the financing round. The dependent variable is natural logarithm of Pre-Money Valuation, defined as the product of the price paid per share in the financing round and the shares outstanding prior to the financing round, expressed in millions of current dollars. Later Venture is an indicator variable that takes on the value of one if the entrepreneur had started a previous venture-backed company and zero otherwise. *PRIOR SUCCESS* is an indicator variable that takes on the value of one if the entrepreneur had started a previous venture-backed company that went public or filed to go public by December 2003 and zero otherwise. *Any Entrepreneur in Later Venture* is an indicator variable that takes the value of one if any entrepreneur within the company had started a previous venture-backed company and zero otherwise. *Any Entrepreneur with Prior Success* is an indicator variable that takes the value of one if any entrepreneur within the company started a previous venture-backed company that went public or filed to go public by December 2003 and zero otherwise. *VC FIRM EXPERIENCE* is the difference between the log of the number of investments made by venture capital organization  $f$  prior to year  $t$  and the average in year  $t$  of the number of investments made by all organizations prior to year  $t$ . The sample analyzed in columns 1, 2, and 6 is at the entrepreneur-company level, the sample analyzed in columns 3 and 7 is at the company level, the sample analyzed in column 4 is at the entrepreneur-company-VC firm level, and the sample analyzed in column 5 is at the company-VC firm level.

Standard errors are clustered at portfolio company level. Robust t-statistics are in parentheses below coefficient estimates.

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

**Table 8: Venture Returns**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
LATER VENTURE	0.3429 (1.63)	0.0883 (0.36)	0.1228 (0.54)		-0.3030 (1.93)	0.1845 (1.41)	0.0163 (0.12)	0.1536 (0.86)
PRIOR SUCCESS		0.7799 (1.46)	0.8278 (1.66)	*	1.4183 (2.77)		0.4238 (1.37)	0.3159 (0.91)
ANY ENTREPRENEUR IN LATER VENTURE				0.3823 (1.39)				
ANY ENTREPRENEUR HAS PRIOR SUCCESS				0.8185 (1.64)				
VC FIRM EXPERIENCE	0.1531 (1.73)	* 0.1515 (1.71)	* 0.1594 (1.80)	* 0.2285 (2.29)	** 0.2089 (1.93)	* -0.1216 (1.63)	- 0.1187 (1.59)	-0.1076 (1.41)
VC FIRM EXPERIENCE X LATER VENTURE			-0.0546 (0.28)		0.0224 (0.17)			-0.1387 (1.18)
VC FIRM EXPERIENCE X PRIOR SUCCESS			-0.0555 (0.16)		-0.0591 (0.16)			0.1012 (0.40)
VC FIRM EXPERIENCE X Any Entrepreneur In Later Venture				-0.0892 (0.34)				
VC FIRM EXPERIENCE X Any Entrepreneur Has PRIOR SUCCESS				0.0359 (0.09)				
Logarithm of Age of Company	-0.1371 (2.23)	** -0.1373 (2.23)	** -0.1376 (2.22)	** -0.1084 (1.60)	-0.0712 (1.18)	-0.2048 (3.36)	- 0.2023 (3.31)	-0.2023 (3.30)
California-Based Company	0.3013 (1.23)	0.3024 (1.23)	0.3021 (1.23)	0.1221 (0.48)	0.2886 (0.96)	0.0169 (0.08)	0.0126 (0.06)	0.0146 (0.07)
Massachusetts-Based Company	-0.1708 (0.68)	-0.1634 (0.65)	-0.1643 (0.66)	-0.1585 (0.54)	-0.0815 (0.26)	0.0258 (0.09)	0.0277 (0.09)	0.0247 (0.08)
Company In Development Stage	-0.3487 (0.80)	-0.3519 (0.81)	-0.3521 (0.81)	-0.1943 (0.41)	-0.2974 (0.61)	-1.1035 (2.05)	- 1.1169 (2.07)	-1.1208 (2.07)



Company In Beta Stage	-0.9392 (2.23)	**	-0.9333 (2.21)	**	-0.9346 (2.21)	**	-0.7156 (1.57)	-1.0589 (2.28)	**	-1.7482 (3.07)	***	-	1.7498 (3.07)	***	-1.7495 (3.07)	***
Company In Shipping Stage	-0.1372 (0.29)		-0.1318 (0.28)		-0.1321 (0.28)		-0.0247 (0.05)	-0.4690 (0.91)		-1.2298 (2.27)	**	-	1.2334 (2.27)	**	-1.2365 (2.27)	**
Company In Profitable Stage	-0.3106 (0.64)		-0.3011 (0.62)		-0.3019 (0.62)		-0.1153 (0.22)	-0.4534 (0.82)		-1.4655 (2.62)	***	-	1.4653 (2.62)	***	-1.4703 (2.62)	***
Company In Re-Start Stage	0.5986 (0.39)		0.6178 (0.41)		0.6163 (0.40)		0.0814 (0.09)	0.8543 (0.48)		0.3517 (0.31)		-	0.3693 (0.32)		0.3669 (0.32)	
Company Stage Missing	-1.0495 (2.54)	**	-1.0383 (2.51)	**	-1.0363 (2.50)	**	-0.7742 (1.74)	-1.1125 (2.52)	*	0.0000 (0.00)	**	0.0000 (0.00)	0.0000 (0.00)		0.0000 (0.00)	
Controls for:																
Round Number	yes		yes		yes		yes	yes		yes		yes	yes		yes	
Year	yes		yes		yes		yes	yes		yes		yes	yes		yes	
Industry	yes		yes		yes		yes	yes		yes		yes	yes		yes	
R-squared	0.01		0.01		0.01		0.01	0.01		0.1		0.1	0.1		0.1	
Observations	8,897		8,897		8,897		3,513	6,586		1,554		1,554	1,554		1,554	

The sample consists of 8,944 ventures for which an IPO valuation was determined or for which there was no IPO. The dependent variable is *IPO Exit Return*, defined as the ratio of the IPO valuation to the pre-money valuation for the venture relative to the ratio of the IPO valuation to pre-money valuation of all ventures in the same industry in the current year. *LATER VENTURE* is an indicator variable that takes on the value of one if the entrepreneur had started a previous venture-backed company and zero otherwise. *PRIOR SUCCESS* is an indicator variable that takes on the value of one if the entrepreneur had started a previous venture-backed company that went public or filed to go public by December 2003 and zero otherwise. *Any Entrepreneur in Later Venture* is an indicator variable that takes the value of one if any entrepreneur within the company had started a previous venture-backed company and zero otherwise. *Any Entrepreneur with Prior Success* is an indicator variable that takes the value of one if any entrepreneur within the company started a previous venture-backed company that went public or filed to go public by December 2003 and zero otherwise. VC Firm Experience, is the difference between the log of the number of investments made by venture capital organization *f* prior to year *t* and the average in year *t* of the number of investments made by all organizations prior to year *t*. Standard errors are clustered at portfolio company level. Robust t-statistics are in parentheses below coefficient estimates.

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

**Table 9: Fund-Level Returns**

	(1)		(2)		(3)		(4)	
	OLS		OLS		OLS		WLS	
Share of Portfolio With LATER VENTURE	54.0521 (1.21)		59.1963 (1.24)		36.7272 (0.63)		310.7474 (1.70)	*
Share of Portfolio With PRIOR SUCCESS					64.4079 (0.72)		-74.5977 (0.31)	
VC FIRM EXPERIENCE	20.0744 (5.02)	***	19.5406 (4.77)	***	20.0984 (5.01)	***	20.1381 (3.50)	***
Controls:								
Vintage Year Fixed Effects	yes		yes		yes		yes	
Fund Size	yes		yes		yes		yes	
Percentage in Each Industry	yes		yes		yes		yes	
Mean Round Number of Deals			yes					
R-squared	0.45		0.46		0.46		0.59	
Observations	514		482		514		514	

The sample consists of 370 VC funds with information from the 2004 Private Equity Performance Monitor. The dependent variable is *Fund IRR*, defined as the IRR of the fund. *Share of Portfolio with Later Venture* is the share of the individual VC firm's portfolio in later ventures of serial entrepreneurs over the years of the fund. *Share of Portfolio with Prior Success* is the share of the individual VC firm's portfolio in later ventures of serial entrepreneurs where the entrepreneur was successful in the previous venture over the years of the fund. *VC FIRM EXPERIENCE* is the difference between the log of the average number of investments made by venture capital organization  $f$  prior to year  $t$  for each investment in the fund and the average in year  $t$  of the average number of investments made by all organizations prior to year  $t$ .

Standard errors are clustered at VC firm level. Robust t-statistics are in parentheses below coefficient estimates.

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