Do Venture Capitalists Affect Investment Performance? Evidence from First-time Funds

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I. Introduction

Venture capital (VC) is an important source of financing for start-up companies and has become an increasingly large part of institutional investors' portfolios, yet compared to other sources of financing we understand relatively little about what drives the performance of VC investments. Studies such as Cochrane (2005), Kaplan and Schoar (2005), Ljungqvist and Richardson (2003), and Quigley and Woodward (2003) have made progress towards an understanding of the drivers of VC investment performance by empirically characterizing the returns to both individual investments and to VC funds. However, many questions remain about the underlying reasons for the pattern in returns that have so far been documented. In a recent study Kaplan and Schoar (2005) document both heterogeneity and persistence in VC fund returns, even after controlling for observable risk characteristics of the funds. These features of VC fund returns stand in marked contrast to those of mutual funds in the public equity markets. Kaplan and Schoar's evidence suggests that differences in non-risk factors, such as venture capitalist skill or venture firm resources, are driving part of the observed heterogeneity and persistence in VC fund returns.

In this paper, I examine whether measures of the human capital of venture capitalist teams, based on their educational and work histories, can predict the performance of the VC funds they manage. This paper is the first, to my knowledge, to conduct such tests. Venture capitalists often take an active role in both monitoring and advising their funds' portfolio companies, for example, by serving as board members, helping locate executives (e.g., Hellmann and Puri (2000, 2002), Kaplan and Stromberg (2001) and Lerner (1995)). In addition, if certain venture capitalists are better at providing value-added services to portfolio companies after investing, they may have an advantage in winning the best deals because high quality portfolio will want the benefit of these services (e.g. Gompers and Lerner (2001) and Sorenson (2005)). Moreover, venture capitalists must identify and evaluate prospective portfolio companies before investing in them. If some venture capitalists have more skill in these activities than others, then their funds should exhibit differences in performance and may do so consistently over time.

To the extent that differences in ability or investing strategy differ by venture capitalist team backgrounds in work and education then we should expect these differences to predict VC investment performance. Using information on the educational and work histories of venture

capitalists, I examine whether the characteristics of venture capitalist fund management teams can predict the performance of first-time VC funds and find that they do.

I focus on first-time funds because it allows me to identify the impact of venture capitalist team characteristics, as distinct from the impact of the funds' managing firms, on VC fund performance. Variation in the reputation or resources of VC funds' managing firms may lead to heterogeneity and persistence in fund returns. For example, a managing firm may be able to realize synergies between portfolio companies in its various funds (Lindsey (2003)) or may able to draw on the resources of its syndication partners in past deals (Hochberg, Ljungqvist and Lu (2005)) in a manner that is distinct from the skill levels of the individual venture capitalists working for the managing firm at any point in time. This also suggests that the roles differences in skill among venture capitalists play in the performance of VC funds may evolve over time as managing firms build track records and connections. Rather than examining the average effect of venture capitalists' characteristics across all funds, controlling for managing firm characteristics, I focus on examining the effect of venture capitalists' characteristics on first-time funds, when managing firms' resources and reputations are non-existent or insignificant compared to the characteristics of the individual venture capitalists comprising them.

The tests in this paper are related to the tests in Chevalier and Ellison (1999) who examine whether measures of mutual fund manager skill are related to the cross-section of mutual fund returns. Chevalier and Ellison find that mutual fund managers who attend universities with high average test admission (SAT) scores manage better performing funds. In this paper, I also test for the predictability in VC fund performance based on fund manager characteristics. However, in the context of the VC markets the tests take on a different meaning. While it may be less surprising to some that VC fund performance is predictable if we think that VC markets are more likely to be inefficient relative to public capital markets, it is also the case that understanding which individual and team-level skills matter for VC fund performance and when becomes more important for understanding exactly how VC markets are inefficient and where there are potential gains for skilled investors. In addition, while the tests performed in Chevalier and Ellison provide evidence of predictability in public equity markets, their tests cannot distinguish whether the individual fund managers or the institutions for which they work are the drivers behind the differences in fund performance. Whether individual investors, and

the fund management teams they comprise, have the ability to influence investment outcomes is the main hypothesis of interest in this paper.

The central findings of this paper are as follows. Venture capitalist characteristics do predict first-time VC fund performance. Work history characteristics have more predictive ability than do educational history characteristics for VC fund performance, which suggests that the skills that are important in VC investing come primarily from skills garnered in the workplace. First-time funds whose founding teams have venture investing experience exhibit greater percentages of portfolio company exits. However, the correlation between past venture investing experience and fund exit percentages doubles when the founding team also has experience managing a start-up. Further, the predictive power of these work history characteristics on fund performance is stronger in seed stage funds than for later stage funds. This suggests that venture capitalist skill is more important in VC funds that focus on early stage investments than in VC funds that focus on later stage investments. Further, the higher exit percentages for the main characteristics do not appear to be driven by more acquisitions relative to IPOs, traditionally the more profitable exit route for portfolio companies. Thus, it is plausible that the higher exit percentages truly reflect better fund performance, rather than differences in fund management style or risk-taking.

While work history characteristics have the most predictive ability, educational history characteristics are not irrelevant. In particular, venture capitalist teams with science and engineering degrees perform better, though having worked as a professional scientist or engineer does not predict fund performance. In later stage funds, the one skill measure that does predict fund performance (positively), but not for seed stage funds, is whether a venture capitalist team has a member who attended an ivy league university. Finally, I find that the predictive ability of venture capitalist characteristics persists in follow-on funds. Overall, the findings indicate that skill plays an important role in the heterogeneity and persistence of venture capital fund performance

Having documented that venture capitalist characteristics can explain heterogeneity and persistence in VC fund performance, I turn to a discussion of what could be the potential mechanisms behind these correlations in the data. Although the data do not allow a precise test of any particular mechanism, the data do provide some facts which were previously unknown and with which potential mechanisms must be consistent. Decomposing fund exit percentages

by first round investment exits and follow-on round investment exits, I find that the higher exit percentages of funds whose teams have both VC and entrepreneurial experience performance of seed stage funds comes in almost equal amounts from both successful first-round investments and from successful follow-on round investments in companies first started by other VC funds. Thus, the skills that VC-entrepreneur teams embody are important for both first-round investments, when a company is just getting off the ground, and in follow-on investments, when a company has already been established and needs extra capital to grow.

The rest of this paper is structured as follows. Section II describes the data and the estimation sample. Section III describes the characteristics of venture capitalists raising first-time funds. Section IV presents the results on which venture capitalists' characteristics predict fund performance. Section V examines whether venture capitalists' characteristics also predict follow-on fund performance. Section VI discusses the potential mechanisms behind the observed correlations between venture capitalist team human capital and first-time fund performance. Section VII concludes.

II. Data

I use the Thomson Financial/Venture Economics VentureXpert database for information on VC funds, their management firms and the portfolio companies in which they invest. The basic unit of observation in VentureXpert is a financing deal, or round. VentureXpert records the identities of the participating VC firms and funds in the round as well as the portfolio company receiving the investment. The database also records outcomes of the portfolio companies receiving private equity capital, including whether they went public, were acquired, went bankrupt, were shut down, or are still active investments.

A. First-time Funds

I first restrict my sample of VC funds to include only funds whose managing firms are based in the United States and which are classified as "Private Equity Firms Investing Own Capital." The impact of venture capitalists' characteristics on the performance of first-time venture capital funds connected to banks, corporations or governments may not be the same as their impact on funds managed by independent investment firms due to differing incentives and resources of being connected to a larger organization. Second, I restrict the sample to funds that

were raised between 1980 and 1998. The typical life span of a venture capital investment is around three to five years and the typical life span of a venture capital fund is around ten years. Funds make most of their investments within three years of the fund's start. Therefore, funds that were started after 1998 may not have had enough time to exit their investments, making comparisons between the performance of these younger funds and older funds, which have had time to exit all of their investments, difficult.

Third, I select only funds that are classified as venture funds in VentureXpert, and exclude those classified as buyout funds. Funds classified as venture funds include those with an investment stage focus of seed stage, development, early stage, balanced stage, expansion and later stage. The buyout funds that are excluded include those with an investment stage focus of mezzanine stage, buyouts, recaps, turnaround, distressed debt, generalist, and other private equity. I choose to focus only on venture funds, rather then both venture and buyout funds, since the skill sets that are likely required for fund success will likely vary a great deal depending on whether a fund is trying to help firms start and grow (venture) or restructure in some way (buyout). Finally, I restrict the sample to funds that invested in five or more portfolio companies and which have non-missing size information, i.e. the total amount of money that the fund has raised to invest in portfolio companies

Imposing these sample selection criteria leaves a sample of 1,184 venture capital funds representing 1,152 managing venture capital firms. Of these 318 are first-time funds. I define a first-time fund as being the first fund managed by a venture capital firm and having a vintage year of no more than two years after the founding date of the managing venture capital firm. Table I presents a longitudinal view of this sample of venture capital funds. Panel A presents a longitudinal view of the entire sample of funds, both first-time funds and follow-on funds. The sample average fund size is around 82 million dollars and the average number of portfolio companies in which a fund invests is around 23. The average percentage of funds' portfolio companies that exit, via IPO or acquisition, is around 56 per cent. The average fund exit percentage decline towards the end of the sample period, in part because some of the funds raised in these later years may still be waiting for an outcome for a few of their portfolio companies. About 45 per cent of the funds are seed or early stage funds. About 34 per cent of

the funds are located in California, and about 14 per cent are located in New England.[1] There is variation in the number and size of funds over the sample period; the number of funds raised in the late 1980s and early 1990s falls and then increases towards the end of the sample period. Interestingly, while the average size of funds increased over the sample period, the average number of portfolio companies funds invest in has declined over the sample period, suggesting perhaps a shift toward larger deals, or deals with more follow-on investments required.

Panel B presents a longitudinal view of the sample of first-time funds raised between 1980 and 1998. The average size of a first-time fund is slightly smaller than the average fund size over the sample period. However, in a given year the average first-time fund size may in fact be larger than the average fund size in a year due to some firms raising small follow-on funds and some first-time funds raising quite large sums. The percentage of first-time funds raised in California and New England are very close to the sample averages. However, more first-time funds are early or seed stage funds, 50 per cent, compared to the sample average of 45 per cent. The pattern in the number of first-time funds raised over time mirrors the pattern we saw for all venture funds raised over the period. The average portfolio company exit percentage for the sample of first-time funds is slightly lower than the full sample average at around 54 per cent.

B. Venture Capitalist Biographical Information

In addition to recording information on private equity financing rounds, VentureXpert records the names and job titles of people working for venture capital managing firms and their portfolio companies. VentureXpert records each individual's name and current job title as well as any other positions the individual holds or previously held with other venture capital firms and portfolio companies, including board memberships, included in the VentureXpert database. Most of the information contained in VentureXpert is reported by venture capital firms in response to inquiries by Venture Economics. Venture capital firms vary in the types of people they report as working for them. Some identify a very broad set of individuals, including associates, analysts, and other support staff. Others report only the most senior members of the organization. Thus, VentureXpert will only record past positions an individual held with other

[1] I define New England to include Massachusetts, New Hampshire, Vermont, Maine and Rhode Island. I exclude Connecticut funds because they are often very close to New York City.

venture capital firms to the extent that these firms reported the individual and his or her position to VentureXpert at the time the individual worked for the venture firm.

I use the names of the executives recorded in VentureXpert as the starting point for identifying the venture capitalists who raise and manage the first-time venture capital funds in my sample. I am interested in identifying the individuals responsible for making decisions about in which portfolio companies the venture capital fund invests, with whom to syndicate investments, and how much money to invest in each portfolio company. There are two challenges to identifying fund managers from the set of individuals listed in VentureXpert as working for each venture capital firm. The first challenge is distinguishing fund managers, i.e. individuals with the decision-making ability in the fund, from individuals who are primarily engaged in support activities. The second challenge is identifying the individuals who were fund managers during the period over which a first-time fund was invested and harvested.

I take a two-step approach identifying which individuals recorded in VentureXpert are first-time VC fund managers. First, I check if any of the individuals served as board members for any of the fund's portfolio companies. If they have, I classify these individuals as fund managers, since serving as a board member and monitoring and advising portfolio companies is the role of a fund manager. The venture capitalist or fund manager who is the "lead," or responsible decision maker, for a deal often takes a board seat on the portfolio company. Second, I classify individuals with the same job title as the individuals holding board seats as fund managers as well. It is important to note here that I exclude peripheral individuals, such as "entrepreneurs-in-residence" and "venture partners" who are people who are connected to the VC fund but do not act as fund managers. Such people may be called upon to serve as CEO of a portfolio company or, provide occasional advice to the fund managers or add advertising value to the fund but who do not engage in active management of the VC fund. In most cases, such peripheral individuals are not listed in VentureXpert, and first-time funds are less likely to have such individuals than are follow-on funds.

This screening process identifies a set of individuals who at some point may have been fund managers for one of the funds managed by a venture capital firm. I further identify the individuals who were fund managers of the first fund raised and managed by the venture capital firm. To do this I need information on the dates an individual joined the venture capital firm. In some cases, founding partners of a venture capital firm are actually listed as "Founding Partners"

or "Founders" in VentureXpert. For such individuals, I classify them as managers of the first-time funds in my sample, and double-check my classification when I hand-collect venture capitalists' biographical information. For each individual I classify as a fund manager for my sample of first-time venture funds, I hand-collect information on the schools the individual attended, the degrees attained, including major field of study and year of degree, and the companies they worked for as well as the positions held with these firms. I also collect information on the dates during which the individuals held these positions.

To collect this information, I first visit the websites of the managing firms of the first-time venture capital funds in my sample, if they are still in existence. For individuals who are still working for the managing firms, I collect information from the biographies listed on these websites. I then use a biographical search engine called ZoomInfo to collect additional information on my set of potential first-time fund managers. ZoomInfo collects information on individuals working for companies in the U.S. and Canada by crawling the websites of these companies and caches appearances in old webpages over the past several years of individuals included in its database of professionals. I search both on the names of any individuals listed in VentureXpert and on the name of the VC fund and managing firm. ZoomInfo records biographical information such as schooling and work history. Finally, I consult Marquis' Who's Who in Business for additional information. It is important to note here that I also take care to discover any founding fund managers of first-time VC funds who may have not been listed in VentureXpert when I collect biographical information about fund managers.

I am able to collect biographical information for the founding management teams for 222 of my sample of 318 first-time venture capital funds. Panel C of Table I presents longitudinal information for my sub-sample of first-time funds for which I have venture capitalist biographical information. The averages and medians are very similar to those in Panel B, although there are a larger a number of first-time funds in the earlier part of the sample period with missing biographical information than in the later part of the sample period. First-time venture capital funds raised in the earlier part of my sample whose managing firms shut down and do not have websites make it harder to collect information on the individuals who started these firms. However, the funds for which I do have information in the earlier part of the sample period appear to be representative of the set of first-time funds raised in those years, at least along the dimensions of the variables reported in Table I. As a further precaution to ensure that

the results in the paper do not suffer from survivorship bias, I repeat the regression analysis detailed below on the sub-sample of first-time funds raised in the 1990s and find similar results.

III. Characteristics of Venture Capitalists Who Start First-time Funds

I next describe the biographical variables collected and how these variables vary across individual venture capitalists and across first-time VC funds before turning to an examination of whether these characteristics predict first-time fund performance.

For each venture capitalist, I record the undergraduate and graduate degrees he attained as well as the subject in which he majored as an undergraduate. I also record which universities each venture capitalist attended. In the fund performance prediction regressions in Section IV, I focus on a few educational history variables that are particularly related to hypotheses about how human capital or skill may matter for first-time VC fund performance. In particular, I focus on whether a venture capitalist team has a member who attended a particular type of university (e.g. ivy league, Harvard or Stanford), has an MBA degree, whether that MBA degree is from a particular type of university, and whether a member of the team majored in science or engineering. In the next section, I detail more specifically the hypotheses surrounding each educational history variable.

For each venture capitalist, I also record the firms for which he worked and the past positions he held at those firms. Amongst the set of work history characteristics I consider in the fund performance regressions are whether a venture capitalist previously worked for another venture fund, whether a venture capitalist worked as a strategy consultant, whether a venture capitalist worked in non-venture finance, whether a venture capitalist worked as an engineer, whether a venture capitalist has experience as a managing executive at a start-up company. The hypotheses these variables address are those to do with the skill sets and connections acquired at these past jobs, as well as the "types" of people who may select into these jobs, matter for first-time fund performance. Again, I will elaborate further on these hypotheses in Section IV. Before doing so, however, I describe the general characteristics of the sample of first-time VC fund managers educational and work histories.

Table II summarizes the characteristics of the venture capitalists managing the sample of first-time venture funds. The sample includes 482 individual venture capitalists with an average of 2.17 founding venture capitalists per first-time fund. The first column of Table II reports

average statistics across all 482 venture capitalists. The second column of Table II reports statistics by first-time fund management team. Each of the variables beginning with "Has" in the second column identifies whether at least one venture capitalist on the fund management team has a particular characteristic. The Appendix contains detailed definitions of these variables. Focusing on the first column of averages across all venture capitalists managing first-time funds, we see that 58 per cent have MBAs, but only a small percentage have PhDs or law degrees, 7 and 8 per cent respectively. 33 percent studied engineering or science in college and 37 per cent attended an ivy league university. A large fraction of those who attended an ivy league university also got their MBAs from an ivy league university. 19 per cent of venture capitalists attended Harvard and almost all of them also got an MBA there, 16 per cent. 14 per cent of venture capitalists attended Stanford, but only a little over half, 9 per cent, also got their MBAs there.

Focusing on individual venture capitalist work histories in the first column of Table II, we see that the largest fraction, about 44 per cent, of first-time fund venture capitalists have prior venture investing experience. About 15 per cent founded and managed start-up companies, but only a small percentage, 5 per cent, have both worked previously as venture capitalists and entrepreneurs. The next largest fraction, 29 per cent, of venture capitalists previously worked in non-venture finance. 16 per cent of venture capitalists worked as management or strategy consultants and only 9 per cent worked as professional engineers.

When we focus on the averages across first-time fund management teams in the second column of Table II, the percentages of first-time funds for which at least one venture capitalist possesses a particular trait increases vis-à-vis the full sample averages as different types of venture capitalists team up to form the funds. About 80 per cent of first-time funds have a venture capitalist who has an MBA; 56 per cent of funds have a venture capitalist who attended an ivy league university. A little over a third of first-time fund management teams have at least one member who attended Harvard, and about one fifth of first-time fund management teams have a member who attended Stanford. About 57 per cent of first-time venture funds have a venture capitalist with past venture investing experience. About 25 per cent of funds also have a venture capitalist who has experience as a managing executive at a start-up company. Interestingly, we see quite a large increase in the number of first-time funds with teams of venture capitalists that have both venture investing experience and experience running a start-up

relative to the average across all individual venture capitalists, relative to individual venture capitalists who have both types of experience. There is a high propensity for venture capitalists with past investing experience to team up with venture capitalists with past entrepreneurial experience.

Table III presents venture capitalist team characteristics by seed stage and later stage fund sub-samples. Seed stage funds are funds with stage focus in VentureXpert recorded "Seed Stage" or "Early Stage". Later stage funds are funds with stage focus in VentureXpert as "Later Stage," "Expansion" or “Balanced Stage". In the regression analysis in Sections IV and V, I analyze the sub-samples of first-time seed stage and later stage funds separately since hypotheses about which characteristics of venture capitalists may affect investment performance vary across funds that focus on early stage investing and company development and funds that focus on later rounds of financing and getting a company ready for an exit. Indeed, there are differences in the composition of founding venture capitalist teams between seed and later stage funds. In particular, a greater percentage of founding seed stage fund teams have science and engineering degrees but a smaller percentage attended ivy league universities or have MBAs. Most striking, the percentage of first-time seed stage fund venture capitalist teams with past startup management experience is double the percentage for later stage first-time funds (32 per cent versus 16 per cent) and the percentage of first-time seed stage fund venture capitalist teams with both venture investing and entrepreneurial backgrounds is almost triple that for first-time later stage funds (21 per cent versus 8 per cent). In contrast, first-time later stage fund venture capitalist teams disproportionately worked in the non-venture finance industry and attended ivy league universities, where they also received their MBAs. While there are notable differences between the average founding venture capitalist teams of seed stage and later stage funds, it remains to be seen whether the team characteristics that predict fund performance between these two samples is different.

Finally, Table IV presents correlation matrices of the founding fund team characteristics for first-time seed and later stage funds. The correlation matrices can give us a sense of which fund characteristics variables are strongly correlated with others, so we don’t include them simultaneously in regression analysis. They also shed light on fund team formation and which types of venture capitalists tend to work with other types of venture capitalists. Focusing on the top panel of correlations for first-time seed stage fund teams, there are several interesting facts.

First, venture capitalists who have worked in start-ups tend to not team up with venture capitalists with MBAs or who have attended ivy league universities. However, they are likely to team up with venture capitalists who have science or engineering degrees. Finally, venture capitalists with past venture investing experience either have or team up with others who have ivy league MBAs and past experience in the consulting and non-venture finance industries. Turning to the bottom panel of correlations for first-time later stage funds, we see some similar patterns of teaming up behavior as for seed stage funds. Table IV suggests there are systematic patterns to how venture capitalists form teams to manage first-time funds. In the analysis below we will see which if any of these differences in venture capitalist team composition are associated with differences in first-time fund performance.

IV. Do Venture Capitalists' Characteristics Predict First-time Fund Performance?

I now turn to the central question of the paper, namely whether the venture capitalist team characteristics described in Section III can predict first-time fund performance. My fund performance metric is the percentage of a fund's portfolio companies that exited either via an initial public offering or an acquisition, which was summarized in Table I. Absent fund-level cashflow information with which to form fund-level internal rates of return (IRRs), the fraction of portfolio companies that are exited is the most common way of measuring VC fund performance. Past studies (e.g. Hochberg, Ljungqvist and Lu (2006)) have found that a fund's IRR and the fraction of companies that exit are positively correlated, with a correlation coefficient of around 0.6. I further explore the robustness of the paper's findings to alternative performance measures, such as fraction of IPOs and fraction of acquisitions, later in this section.

A. Sub-Hypotheses about Which Venture Capitalist Skills Should Matter for Investment Performance

While the main hypothesis of this paper is that venture capitalist skill affects investment performance, there are also a number of sub-hypotheses surrounding the reasons why certain measures of individual skill should predict investment performance. Before turning to the regression analysis, I discuss these sub-hypotheses and then return to discuss them later in the paper.

A.1. Educational History Hypotheses

There are several hypotheses about how venture capitalist educational characteristics should be related to VC fund performance. The first is that venture capitalists with an MBA may possess certain skills learned in business school which may enhance fund performance. These skills could be skills in managing, selecting and attracting fund investments as well as better access to and information about prospective deals due to connections acquired in business school. In addition, having earned an MBA might be indicative of the type of person a venture capitalist is rather than indicating that certain skills or networks have been acquired in business school. Seeing whether a venture capital team has a member with an MBA positively predicts first-time VC fund performance would be evidence in favor of these three hypotheses.

Likewise, having attended a more prestigious university may enhance a venture capitalist's fund's performance due to better access to and information about prospective deals due to connections and skills acquired at the more prestigious university. In the regression analysis I include a dummy variable for whether a venture capitalist on the fund management team attended an ivy league university as well as a dummy for whether a venture capitalists received an MBA degree from an ivy league university if he received an MBA degree. I differentiate whether a venture capitalist team is connected with an ivy league university at the undergraduate level or MBA level. It is often argued that the quality and benefit of an MBA education is differentiated by the quality of the institution granting the degree and the historical network an student gains access to while attending that institution. The skills and network available to an individual receiving an MBA from a prestigious university may differ from the skills and network available to an individual receiving an undergraduate degree from such an institution. Again, seeing that having a venture capitalist who attended a prestigious university matters for first-time fund performance may also be indicative of the type of person who already embodied certain skills rather than indicative of value-added aspects of the prestigious university. The above three hypotheses are hypotheses about the mechanisms behind why having attended a prestigious university is a measure of venture capitalist investment skill. In the regression analysis below finding that having attended a prestigious university matters is evidence that these three hypotheses, or subsets of them, are at work.

The last set of hypotheses surrounding venture capitalists' educational histories have to do with whether a venture capitalist studied science or engineering as an undergraduate. Once

again there are several hypotheses which might explain why having a venture capitalist who studied science and engineering might matter positively for fund performance. Such venture capitalists may be better equipped to analyze and understand the underlying technologies of portfolio companies or may be better able to tackle the problems and issues surrounding venture capital investments due to their training. Finally, such venture capitalists may simply be more talented and self-select into studying science and engineering as undergraduates.

A.2. Work History Hypotheses

The sub-hypotheses surrounding why educational characteristics may be related to skill all predict a positive correlation between first-time VC fund performance and the educational characteristics. However, when we turn to venture capitalist work history characteristics, we see that hypotheses surrounding why certain work history characteristics may predict first-time fund performance may predict both positive or negative fund performance. The first venture capitalist work history variable I consider is whether a venture capitalist worked previously as a manager of another venture capital fund. One hypothesis is that such a venture capitalist would have more skill in finding, evaluating and managing VC investments because he has had experience in doing so before. However, another hypothesis is that the former venture capitalists who go out to start their own funds are on average worse than other first-time VC fund managers, perhaps because they were fired or forced out of their old VC firms. Thus, the direction of the coefficient on whether a first-time VC fund management team has a former venture capital fund manager on board in the fund performance regressions is ambiguous.

The next work history characteristic I consider is whether a first-time fund management team has a venture capitalist who previously worked as a managing executive at a start-up company. Again, the direction of the coefficient on this work history variable in the fund performance regressions is ambiguous. One hypothesis is that venture capitalist teams with individuals who have operational experience in start-up companies will manage better performing funds because individuals with such experience will be better able to select and provide advice to the fund's investments. However, it is also possible that such VC fund management teams are on average less skilled because it may be the case that the former entrepreneurs were on average of lower quality and left their careers as entrepreneurs to become venture capitalists.

Similar hypotheses can be posed about the other work history variables that lead to ambiguous predictions on the sign of the coefficients on these variables. VC fund teams with former strategy consultants may possess better management skills and connections leading to better investments and value-added services. However, these individuals may also be failed consultants and on average of lower quality. It also may be the case that these teams perform no better or no worse on average if the work history variable simply doesn't measure a skill that is important for the performance of VC investments. Likewise, VC fund management teams with venture capitalists who previously worked in the non-venture finance industry may possess skills and contacts that are useful in finding buyers for companies or in arranging additional financing. However, it is also possible that these skills are not important relative to the skills other management teams possess suggesting that the coefficient on this work history variable should be zero. Finally, I look at whether VC fund management teams with former industrial scientists or engineers perform differently. One hypothesis is that these fund management teams will be better able to identify good technologies in new markets and make better investments. On the other hand, such fund managers may spend too much time worrying about the underlying product rather than focusing on a company's overall strategy and be less skilled VC fund managers. Thus, the regression analysis will tell us which of these hypotheses for each work history variable prevails.

In the regression analysis below I also analyze whether the skill measures which predict VC fund performance vary by seed stage and later stage funds. As mentioned above, we should expect different skill sets to matter differently for funds that focus on building companies at the beginning of life and for fund that focus on providing capital and services to companies that have already had several that are seeking to expand. Thus, we might expect that the coefficients on the venture capitalist team characteristics will vary across sub-samples of VC funds which focus on different stages of the company lifecycle.

The regression analysis in the next subsection will shed light on which, if any, of the work and educational history variables predict first-time VC fund performance and which sets of sub-hypotheses detailed above about the underlying skills that these variables may capture are worthy of further investigation.

B. Fund Performance Regressions

I now turn to the regression analysis which seeks to identify if measures of venture capitalist team skill do predict first-time VC fund performance. I regress the percentage of portfolio companies in which a fund invests that exit on the fund-level venture capitalist team characteristics and other fund-level and market-level controls as in equation (1).

$$PercentExit_i = b_0 + b^j{}_1 HasVCChar^j{}_i + b_2 X_i + b_3 Z_t + e_i \quad (1)$$

The main variables of interest in testing the key hypothesis that measures of investor skill can predict VC fund performance are the $HasVCChar^j_i$ variables that were summarized in Section III and defined in the Appendix. The matrix X_i contains fund-level controls, the number of founding venture capitalists, the natural logarithm of the size of the fund (in constant year 2000 millions of dollars), a dummy variables for whether the fund is located in California or New England, and dummy variables for whether the fund focuses on biotech, software or telecommunications industry investments. The matrix Z_t contains time-varying market-level controls, the lagged natural logarithm of VC fund inflows per year (in constant year 2000 millions of dollars) and dummy variables for whether a fund was raised between 1985 and 1989, between 1990 and 1994 or between 1995 and 1998.

I also estimate regressions with the same independent variables as in equation (1) but with the log odds ratio, $LN(PercentExit_i/(1-PercentExit_i))$, as the dependent variable. Doing so constrains the predicted values to range between zero and one. The results are very similar to the results from estimating equation (1) directly. Moreover, since the vast majority of values $PercentExit_i$ takes are well within the zero to one interval, the predicted values that are generated from estimating equation (1) are all between zero and one. I, therefore, choose to report estimates of equation (1), rather than using the log odds ratio, since interpretation of the coefficients is more intuitive.

Table V reports regression results for equation (1) estimated using the complete sample of 222 first-time VC funds. Standard errors adjusted for clustering and the fund-year level are reported in parentheses. The first three specifications estimate the impact of the educational and work history variables in addition to controlling for the fund's size, the number of founding venture capitalists, a dummy variable for whether the fund is a seed stage fund, and the log of lagged VC fund inflows. The last three specifications add the additional control variables of

fund industry, location and year dummies. The main correlations between the venture capitalist characteristic variables and fund exit percentages are robust across the various specifications.

Four main results emerge from Table V. First, the coefficient on HasSciEngDegree is positive and statistically significant in all specifications. This supports the hypothesis that having a venture capitalist who studied science and engineering as an undergraduate is a measure of how skilled the fund management team will be in making investments and predicts better fund performance. Second, the coefficient on HasMBA is strongly statistically negative. This is somewhat surprising given the intuitive hypothesis that having a venture capitalist with an MBA degree should increase fund performance or have no effect at all. In fact, the opposite appears to be true. Having an MBA degree from a more prestigious university does not eliminate the negative correlation between having an MBA degree and a first-time fund's portfolio company exit percentage.[2] Taken at face value, this suggests that the types of venture capitalists who get MBAs are worse than the average venture capitalist, at least when we measure fund performance by the total percentage of a fund's portfolio companies that are either acquired or taken public. I will explore whether the negative impact of an MBA is robust to alternative measures of fund performance.

Third, the coefficient on lagged log fund inflows is large, negative and very statistically significant, i.e., when there has been a lot of fundraising future fund performance declines, consistent with past findings such as Gompers and Lerner (2000). Finally, the coefficients on both HasPastVC and HasPastStartupExec are positive and statistically significant. Moreover, each coefficient is similar in magnitude; having a venture capitalist with past venture investing experience increases a fund's percentage of portfolio companies that exit by 6 to 7 percentage points and the same is true for funds having a venture capitalist who previously managed a start-up. Thus, in the entire sample of first-time funds we find evidence in support of the hypothesis that skills as measured by past work experience both in VC investing and in entrepreneurial management positively predict first-time fund performance.

[2] I also explore interactions the statistical significance of HasHarvardMBA and HasStanfordMBA in the regressions since a disproportionate number of venture capitalists are connected to these two universities. In the case of Harvard, the negative correlation between having an MBA and first-time fund performance is reduced but not eliminated. Having an MBA from Stanford does not mitigate the negative correlation between having an MBA and first-time fund performance. Finally, for the subsample of VC fund management teams for which I have the average age of the founding venture capitalists, the negative coefficient on HasMBA does not disappear when I control for average age. Thus, the effect is not driven by an omitted age variable bias.

In general, the other work history variables do not significantly predict first-time fund performance. The fact that the magnitudes of the coefficients on HasPastVC and HasPastStartupExec are similar in magnitude and they are the only work history coefficients to really matter in the regressions, leads one to hypothesize whether the interaction of these two venture capitalist characteristics on the same fund management team has a multiplicative effect. One could argue that having both types of venture capitalists on the same team, or indeed having a venture capitalist with both types of experience, should doubly enhance the performance of a VC fund. On the other hand, however, it could be that these two types of venture capitalists might clash when managing a fund together. To test these hypotheses, I replace the HasPastVC and HasPastStartupExec variables in equation (1) with HasPastVCOnly, HasPastStartupExecOnly and HasVCandStartupExec which classify first-time fund management teams as having only past VC investing experience, only past entrepreneurial management experience, and both VC investing and entrepreneurial management experience. The regression results for this modified fund performance regression are reported in Table VI.

The main result of note in Table VI is that the coefficient on HasVCandStartupExec is double that of the coefficients on HasPastVC and HasPastStartupExec in Table V. That is, when the members of a first-time VC fund management team has members with both past venture investing experience and past entrepreneurial management experience, the performance impact, as measured by the fund's total exit percentage, double what it would be if the management team only possessed one of these characteristics. Moreover, HasPastVCOnly and HasPastStartupExecOnly have positive coefficients of the same magnitude as in Table V, so that these team characteristics on their own still impact fund performance. Thus, the independent impact of venture investing experience and entrepreneurial management experience on first-time fund exit percentages identified in Table V still hold after accounting for the interaction between venture investing, i.e., the coefficients in Table V were not being driven only by teams with both venture investing and entrepreneurial management experience. However, the results in Table VI indicate that there appears to be a complementarity between having venture investing experience and entrepreneurial management experience combined in the same VC fund management team. What is unclear, at least from the analysis here, is the mechanism behind this reduced form complementarity in performance between. I will discuss possible mechanisms and how we might identify them in Section VI.

In sum, the regression analysis reported in Tables V and VI support the main hypothesis of the paper that venture capitalist skill does affect investment performance. We have seen that certain first-time fund management team characteristics are strongly correlated with fund performance. As a first step at an examination of the possible underlying mechanisms which cause these skills to matter, I next examine whether these identified correlations between fund performance and fund management team characteristics matter more or less for seed stage and later stage funds.

B.1. Seed Stage Funds

As discussed in the hypotheses sub-section, it is reasonable to think that the skills needed for successful early stage companies, in which deal identification and idea and product development are more important, may differ from the skills need for successful later stage companies, in which product commercialization and company growth are more likely to be the focus of the investments. I now turn to an examination of whether the correlations identified between fund management team characteristics and first-time VC fund exit percentages in the full sample of first-time funds differ when estimated on the subset of first-time seed stage VC funds. I re-estimate equation (1) on the sub-sample of seed stage first-time venture funds. The results are reported in Table VII.

An examination of the coefficients in Table VII leads us to conclude that the results discussed for the entire sample of first-time VC funds are applicable to the sub-sample of seed stage funds. In fact, the results are strengthened, suggesting that the results observed for the entire sample are being driven primarily by the sub-sample of seed-stage funds. Once again, having fund management teams with science and engineering undergraduate training, venture investing experience, entrepreneurial management experience, and more importantly the combination of the latter two, positively predicts first-time VC fund exit percentages. First-time seed stage funds whose management teams possess MBAs have lower exit percentages. Thus, the main results for the full sample apply in the seed-stage sample, and in most cases are strengthened.

B.2. Later Stage Funds

I next turn to an analysis of the sample of later stage funds to see what if any VC fund management team characteristics predict first-time fund exit percentages for funds that focus on later stage companies. As for the sub-sample of seed stage funds, I estimate specifications of equation (1), but now on the sub-sample of later stage first-time funds. The estimated coefficients are reported in Table VIII.

An examination of the coefficients in Table VIII leads us to conclude that in general venture capitalists team characteristics have less predictive ability in the sub-sample of later stage funds. In general, the coefficients on the venture capitalist team characteristics are of the same sign as the coefficients estimated on the sub-sample of seed stage funds but they are smaller in magnitude and not statistically significant. This could be due to a smaller sample size – 104 later stage funds and 118 seed stage funds. However, even given this lower predictive ability of venture capitalist team characteristics in the sub-sample of later stage funds, we see that having a venture capitalist with an ivy league undergraduate degree predicts higher first-time VC fund exit percentages than in the sub-sample of first-time seed stage VC funds. The predictive ability of having an undergraduate ivy league degree is statistically significant in the regression specifications without fund year fixed effects, but falls just short of statistical significance in the specifications with fixed effects.

To test whether the differences in magnitudes in coefficients for the sub-samples of seed stage and later stage funds are statistically significant, I interact all independent variables with a seed stage dummy and estimate equation (1) on the full sample of first-time VC funds. I find that the differences in coefficients on HasMBA, HasIvy and HasVCandStartupExec between the two sub-samples are statistically significant at the 5 per cent level. Thus, while in general venture capitalist characteristics have less predictive ability in the sub-sample of later stage funds, we do notice some differences on which measures of venture capitalist skill do matter for later stage funds vis-à-vis seed stage funds. In particular, having an ivy league undergraduate educations, and the skill sets connected with this characteristics, seem to matter more for better performance of later stage funds, but the improved performance we observed for seed stage funds due to the complementarity between having team members with both venture investing and entrepreneurial management experience does not appear in the sample of later stage funds. Moreover, the apparent negative performance impact of having a venture capitalist with an MBA

is not as strong in the sub-sample of later stage funds as it is for the sub-sample of seed-stage funds.

Thus, there are differences in which measures of venture capitalist skill matter for the performance of seed stage funds vis-à-vis later stage funds, which supports the hypothesis that the set of venture capitalist skills that are important for venture investing at earlier and later points in a company's lifecycle are different.

C. Decomposing Fund Exit Percentages

In the previous sub-section, we saw that venture capitalist team educational and work history characteristics predict first-time VC fund performance, and moreover, which characteristics matter vary in the sub-samples of seed stage and later stage funds, suggesting that different investor skills matter for the success of firms when they are at different points in their lifecycle. Thus, the evidence presented is consistent with venture capitalist team skill mattering for the performance of VC investments.

In this sub-section, I first turn to an analysis of the robustness of the above findings if we measure first-time VC fund performance using alternative measures. I then turn to an analysis of how the venture capitalist team characteristics relate to the success of companies in which the VC fund invested in the first round of financing and to the success of companies in which the VC fund first invested in a follow-on found of financing. This second part of the analysis will allow us a preliminary look at which hypotheses presented in section IV.A about the mechanisms underlying the observed correlations between VC fund exit percentages and fund management team characteristics are at work.

C.1. IPOs versus Acquisitions

We have observed that certain venture capitalist team characteristics matter for first-time fund performance. I have so far interpreted these differences in fund performance as evidence that venture capitalist skill matters, and moreover, team skills matter above and beyond individual skills, as evidenced by the doubling of the impact on performance when a fund management team has members that possess both venture investing experience and entrepreneurial management experience. However, it is possible that the differences in fund exit percentages across different fund management teams do not reflect differences in overall fund

performance, i.e. it may not be the case that the funds with higher total exit percentages have higher IRRs. For example, if some types of fund management teams systematically push quickly for more profitable IPOs amongst a smaller set of their portfolio companies their total exit percentages might be lower even if their fund IRRs are similar or higher than other VC funds.

I test whether the venture capitalist team characteristics are associated with differences in the percentages of companies that go public rather than are acquired to see if this is happening. In particular, I re-estimate equation (1), but use the percentage of portfolio companies that go public and the percentage of portfolio companies that are acquired as the dependent variables. I estimate these regressions on the full sample of first-time funds and on the sub-samples of seed stage and later stage funds. The results are reported in Table IX.

Examining the coefficients in Table IX, we notice three things. First the superior performance of first-time VC funds with fund management teams with both venture investing experience and entrepreneurial management experience stems more from companies going public than from companies being acquired, though such fund management teams have higher percentages of companies both going public and being acquired. Thus, it is unlikely that the higher exit percentages of such fund management teams do not reflect higher IRRs for these funds, given that over the time period being considered IPOs were the more profitable exit route for portfolio companies. The second fact of note from Table IX is that for the other venture capitalist team characteristics that positively predicted fund total exit percentages, i.e. HasIvy, HasSciEngDegree, HasPastVCOnly and HasPastStartupExecOnly, the IPO percentages for their funds are higher. Thus, once again, the higher total exit percentages observed for these venture capitalist team characteristics in the previous sub-section are likely associated with higher IRRs. For venture capitalists teams with only past venture investing experience, while IPO percentages are higher, the percentage of acquired portfolio companies is even higher.

The final fact of note from Table IX is that for venture capitalist teams with an MBA, the negative exit percentages are driven both by fewer IPOs and fewer acquisitions. However, fund management teams with MBAs do exhibit lower acquisition percentages than IPO percentages. In fact, for seed stage funds and for the full sample, the negative performance differential between venture capitalist teams with and without an MBA is statistically significant only for acquisition percentages. Thus, it is possible that the negative coefficient on HasMBA in Tables VI and VII, in which the dependent variable is the total fund exit percentage, are due in part to

differences in the management style of venture capitalists who have MBAs. That is, venture capitalists with MBAs may spend more time and resources pushing their firms towards IPO rather than spending time on acquisitions. However, the evidence from Table XI tells us that at least in terms of percentage of portfolio companies that go public, venture capitalist teams with MBAs do no better than other venture capitalist teams when we measure fund performance by percentage of portfolio companies that go public, and in terms of percentage of portfolio companies that are acquired, venture capitalist teams with MBAs do worse than others.

In sum, the evidence presented in Table IX indicates that the results on which venture capitalist team characteristics are measuring skill in investment, with the exception of HasMBA, are robust to using the percentage of IPOs as an alternative measure of first-time VC fund performance. Thus, it does not appear to be the case that differences observed in total exit percentages across fund management teams with different characteristics are due to systematic differences in the types of exits their funds achieve, making it a plausible assumption that differences observed in exit percentages correlate with differences in fund gross rates of return.

C.2. First Round Investments versus Follow-on Round Investments

We have seen that venture capitalist team characteristics predict first-time VC fund performance and established that these differences are robust to alternative fund performance measures. Thus venture capitalist skill does matter for VC fund performance and can explain at least some of the heterogeneity in VC fund performance.

I now take an initial look at what may be driving the observed correlations between these venture capitalist team characteristics and fund performance by decomposing fund exit percentages into two parts – the percentage of companies in which the fund invested in the first round that exit and the percentage of companies in which the fund first invested in a follow-on round that exit. I examine whether funds' better performance correlated to certain venture capitalist characteristics comes from superior investments in companies in the first round, when due diligence and identification of a good company or management team are important as well as perhaps the ability to advise on early stage firm issues such as helping to build an initial management team, or from superior investments in companies in later rounds, when networks that enable a VC fund to be invited into follow-on round syndicates or enable the fund to help the portfolio company establish customers and suppliers as well as acquirers may matter more.

Table X reports regression results from estimation equations similar to equation (1) but with two new dependent variables – the percentage of portfolio companies in which the fund invests in the first round of financing that exit and the percentage of portfolio companies in which the fund does not invest in the first round of financing that exit. The first three columns report estimates when the dependent variable is the percentage of portfolio companies in which a fund invests in the first round that exit on the full sample of first-time VC fund and on the sub-samples of seed stage and later stage funds. The last three columns report estimates when the dependent variable is the percentage of portfolio companies in which a fund first invested in a follow-on round that exit.

Focusing first on Columns 1 and 3 of Table X, there are several results of note. First, having a venture capitalist team with both venture investing experience and experience managing a start-up increases performance of both companies in which the fund is the first investor and companies in which the fund invests as a follow-on investor. Moreover, the improvement is similar in magnitude across the two types of portfolio companies. This suggests that the best management teams of first-time seed stage VC funds are able to identify good investments in the first round of financing, but also are invited to join in later rounds of companies started by other VC funds. Moreover, the only venture capitalist team characteristic which is correlated with both high first round company exits and later round company exits is having a venture capitalist team with both venture investing experience and experience managing a start-up.

The second result of note for seed stage funds in Table X is that the large negative impact on fund performance from having a venture capitalist with an MBA on the founding team is driven by poor performance of companies in which the fund invests in the first round of financing. This suggests that MBAs are particularly bad, or non-MBAs are particularly good, at identifying good companies before other VC funds invest and in helping these companies grow. Third, first-time seed stage venture capitalist teams with a member who worked as a management consultant make successful investments in companies when they invest as follow-on investors, suggesting that these teams are good at helping established companies grow and also perhaps are well-connected in the relevant industries.

In sum, the first-time seed stage VC funds that perform exceptionally well have venture capitalist teams with experience both in venture investing and in managing start-ups. Moreover, this exceptional performance is driven both by good investments in companies in which the fund

is the first investor and good investments in companies in which the fund is a follow-on investor after other VC funds have already invested. This suggests that these venture capitalist teams excel so much because they are both well-connected and are able to identify and add value to new companies at the start of those companies' lives.

I now turn to the fund performance decomposition results for the sub-sample of first-time later stage funds reported in Columns 3 and 6 of Table X. Recall that the most significant predictor of later stage fund performance from Table VI is whether a venture capitalist attended an ivy league university. The results in Table X show that the success of these venture capitalists stems from successful investments in companies in the first round of financing, rather than in from investments in companies in which the fund is a follow-on investor. This result is somewhat counterintuitive since later stage funds mostly concentrate on follow-on investments in companies in which other VC funds have already invested. The results suggests that later stage funds with venture capitalists who attended ivy league universities achieve their comparative advantage by being invited into first rounds or perhaps even identifying these companies, even though they also make later stage follow-on investments. None of the venture capitalist team characteristics I examine are positively correlated with good performance in investments in companies in later rounds. Moreover, none of the venture capitalist team characteristics are significantly correlated with larger syndicate size. The results on first-time later stage funds are a bit surprising in light of the investment strategy of these funds, i.e. investing primarily in follow-on financing rounds. However, they can be rationalized if the market for later stage investments is competitive and the main way of competing is also co-investing in early stage deals, perhaps with lead investors who have identified good investment opportunities but who need extra cash to close the deal.

In sum, the analysis in this section presents some suggestive evidence on the underlying mechanism behind the raw correlations that are worthy of further investigation.

V. Does the Predictive Power of Venture Capitalists' Characteristics Persist?

The preceding analysis has documented that characteristics of individual venture capitalists comprising first-time fund management teams significantly predict the performance of those first-time funds. The analysis lends support to the hypothesis that there are differing abilities or skill levels amongst venture capitalists and that these differences in skill lead to

heterogeneity in VC fund performance, which may be further amplified by sorting of higher quality firms to higher quality venture capitalists. Another key feature of VC funds is that their performance persists amongst funds managed by the same VC firm (e.g., Kaplan and Schoar, 2006). The question then arises of whether the venture capitalist characteristics that matter for first-time VC fund performance also matter for the performance of follow-on funds managed by the same venture capitalists. In this section, I examine whether the venture capitalist characteristics that predict first-time fund performance also predict the performance of follow-on funds.

About 70 per cent of the first-time funds raise follow-on funds. I estimate the probability that a first-time VC fund raises a follow-on fund as a function of venture capitalist team characteristics as well as fund performance regressions on the sample of follow-on funds raised by my sample of first-time fund venture capitalists. The estimation results for the full sample of funds are reported in Table XI. The estimation results for the sub-samples of seed stage and later stage funds are reported in Table XII. Focusing first on Table XI, we see that the main venture capitalist team characteristic that predicts whether a first-time VC fund raises is follow-on fund is HasPastVCandStartupExec consistent with the superior performance of first-time funds managed by this kind of venture capitalist team. The other venture capitalist team characteristics that predicted first-time VC fund performance enter in a directionally consistent way in the probit models, but are not statistically significant. Focusing on the probit models estimated on the sub-samples of seed stage and later stage funds we see that for seed stage funds, once again, HasPastVCandStartupExec enters positively and is statistically significant. For later stage funds, none of the venture capitalist team characteristics enter in statistically significant way, consistent with the estimates in Table VIII.

Turning to the fund performance regressions in Columns 3 and 4 of Tables XI and Columns 2 and 4 of Table XII, we see that the primary predictors of first-time VC fund performance continue to predict follow-on fund performance. In particular, having a venture capitalist team with both experience in venture investing and in managing a start-up as well as having studied science and engineering as an undergraduate positively predicts the performance of follow-on funds. Interestingly, HasMBA does not enter the follow-on fund performance regressions in negative direction as it did in the first-time fund performance regressions, which suggests that perhaps the initial lower exit percentages of MBA-managed funds are due in part to

differences in management style, with MBA-managed funds more aggressively shooting for IPOs in the their first-time funds, than statistically significant differences in IRR between MBA-managed funds and other funds. Finally, as we saw in the first-time fund performance regressions, in general venture capitalist team characteristics are more predictive of the performance of seed stage funds than for later stage funds.

In sum, the results presented in this section support the paper's main hypothesis that measures of venture capitalist team skill can explain both VC fund performance heterogeneity and persistence.

VI. Discussion of Skill Sub-Hypotheses

The results from Sections IV and V strongly support the main hypothesis of the paper – that venture capitalist skill can explain, at least in part, the observed heterogeneity and persistence in VC fund performance. At the beginning of Section IV, I discussed a variety of sub-hypotheses about why we may observe different measure of investor skill mattering for investment performance. In this section, I discuss how we might go about separating groups of sub-hypotheses for which we found support in Sections IV and V.

We have seen that the venture capitalist human capital characteristics that most strongly predict VC fund performance are whether a venture capitalist has previous venture investing experience, whether a venture capitalist has previous experience managing a startup company, whether a venture capitalist studied science or engineering as an undergraduate, and most importantly whether a fund management team had members with both past venture investing experience and past experience managing a startup company. These findings rule out a number of the sub-hypotheses on which skills should matter for VC investments surrounding all of the other skill measures that do not predict VC fund performance. Moreover, there are some sub-hypotheses about the skill measures that do predict VC fund performance that are also rejected because the direction of the performance prediction is opposite of what these sub-hypotheses predict. For example, it does not seem to be the case that venture capitalists who leave other VC firms to start their own funds are on average worse quality than other venture capitalists who start VC funds, i.e. there is no support for the adverse selection sub-hypotheses for past venture investment experience to negatively predict first-time VC fund performance. Likewise, there is no support for the adverse selection sub-hypothesis that past entrepreneurial management

experience should negatively predict VC fund performance. In fact the opposite is true. Thus the findings lends support to the notion that venture capitalists specialize in investments in which they can take roles that are specific to their own work backgrounds (e.g., Botazzi, da Rin and Hellmann (2004)) in order to achieve better returns. Finally there is no support for the sub-hypothesis that having studied science or engineering makes venture capitalists more likely to get too involved with the underlying product and technology development, rather than focusing on commercialization and growth. Rather, such venture capitalists perform on average better, supporting the set of sub-hypotheses which predict that such venture capitalists will be better able to evaluate and monitor VC investments.

While the analysis in this paper allows us to rule out certain sub-hypotheses about the underlying mechanisms for why individual venture capitalist skill should matter, the results rule in a set of sub-hypotheses that explain the raw correlations between venture capitalist characteristics and fund performance. That is, the positive predictive ability of having past venture investing experience and past entrepreneurial management experience could be due to better networks and deal flow or to better monitoring and advice giving ability, or both. Future work should attempt to disentangle these sub-hypotheses. For example, one could imagine using information on the educational and work histories of entrepreneurs in which the venture capitalists invest in order to detect network effects (e.g. Gompers, Lerner and Scharfstein (2005)) and analyzing the specific role each venture capitalist on a team played in each of a fund's portfolio companies.

VII. Conclusion

Supplementing data on first-time venture capital funds and their portfolio companies with data on the educational and work histories of the venture capitalists managing these funds, this paper investigated whether characteristics of venture capitalist teams can predict investment performance. Venture capitalists characteristics do predict fund performance even controlling for other fund and market characteristics, consistent with the paper's main hypothesis that venture capitalist skill contributes to VC fund performance heterogeneity and persistence. Moreover, what characteristics of venture capitalists matter for fund performance varies by fund investment strategy.

Work history characteristics have more predictive ability than do educational history characteristics for VC fund performance, which suggests that the skills that are important in VC investing comes primarily from skills garnered in the workplace. First-time funds whose founding teams have venture investing experience exhibit greater percentages of portfolio company exits. However, the correlation between past venture investing experience and fund exit percentages doubles when the founding team also has experience managing a start-up. Further, the predictive power of these work history characteristics on fund performance is stronger in seed stage funds than for later stage funds. This suggests that venture capitalist skill is more important in VC funds that focus on early stage investments than in VC funds that focus on later stage investments. Finally, I find that the characteristics of venture capitalists that predict first-time funds also predict the performance of follow-on funds, consistent with the fund performance persistence findings by Kaplan and Schoar (2005).

Thus, the results strongly support the central hypothesis of the paper that investor skill can predict investment performance. This paper is the first, to my knowledge, to conduct tests of this hypothesis that enable us to disentangle the impact of firm-level or institutional-level skill from individual investor skill on investment performance. Moreover, the results highlight which sets of skills matter and when and point to future research directions in studying the underlying mechanisms behind the correlations between skill measures and investment performance.

The results in this paper also highlight the importance of human capital in the nature and boundaries of the firm (e.g., Zingales (2000) and Rajan and Zingales (2001)) and point to several future research questions. How do VC fund management teams evolve over time and do these changes also predict VC fund performance, and if so, how? To what extent do VC firms acquire firm level capital or expertise, distinct from the human capital of the individual venture capitalists working for the firm at any point in time? How does the importance of individual venture capitalist ability affect how contracts and compensation are set in the VC industry?

Appendix: Variable Names and Descriptions

Variable Name	*Variable Description*
Venture Capitalist Educational History Variables	
HasPHD	Dummy = 1 if fund has at least one venture capitalist with an MBA
HasLawDegree	Dummy = 1 if fund has at least one venture capitalist with a law degree
HasSciEngDegree	Dummy = 1 if fund has at least one venture capitalist who studied science or engineering as an undergraduate or graduate student
HasIvy	Dummy = 1 if fund has at least one venture capitalist who attended an ivy league university, i.e. Harvard, Dartmouth, Yale, Brown, Cornell, Columbia, University of Pennsylvania, or Princeton
HasHarvard	Dummy = 1 if fund has at least one venture capitalist who attended Harvard Unversity
HasStanford	Dummy = 1 if fund has at least one venture capitalist who attended Stanford University
HasIvyMBA	Dummy = 1 if fund has at least one venture capitalist who has an MBA from an ivy league university, i.e. Harvard, Dartmouth, Yale, Brown, Cornell, Columbia, University of Pennsylvania, or Princeton
HasHarvardMBA	Dummy = 1 if fund has at least one venture capitalist who has an MBA from Harvard
HasStanfordMBA	Dummy = 1 if fund has at least one venture capitalist who has an MBA from Stanford
Venture Capitalist Work History Variables	
HasPastVC	Dummy = 1 if fund has at least one venture capitalist who previously for another venture capital fund
HasPastVCOnly	Dummy = 1 if fund has at least one venture capitalist who previously for another venture capital fund organized and has no venture capitalist who worked as a managing executive at a start-up company
HasPastStartupExec	Dummy = 1 if fund has at least one venture capitalist who previously worked as a managing executive at a start-up company
HasPastStartupExecOnly	Dummy = 1 if fund has at least one venture capitalist who previously worked as a managing executive at a start-up and has no venture capitalist who previously worked for another venture capital fund
HasPastVCandExec	Dummy = 1 if fund has at least one venture capitalist who previously for another venture capital fund AND previously worked as a managing executive at a start-up company

HasPastConsultant	Dummy = 1 if fund has at least one venture capitalist who previously worked as a management or strategy consultant
HasPastFinance	Dummy = 1 if fund has at least one venture capitalist who previously worked in the finance industry (non-venture)
HasPastEngineer	Dummy = 1 if fund has at least one venture capitalist who previously worked as engineers
Other Variables	
Log(Fund size)	Natural logarithm of inflation adjusted (2000 dollars in millions) fund size
Number of founders	Number of founding venture capitalists in first-time fund
Biotech	Dummy = 1 if fund industry preference is listed as "Biotech Related Research", "Biotechnology", "Genetic Engineering", "Human Biotechnology", "Industrial Biotechnology", "Life Science", or "Pharmaceuticals"
Software	Dummy = 1 if fund industry preference is listed as "Applications Software", "Computer Services", "Data Communications", "Information Technology", "Internet" or "Software"
Telecomm	Dummy = 1 if fund industry preference is listed as "Telecommunications", "Commercial Communications", "Communications and Media" or "Wireless Communications"
Log(Fund Inflows Last Year)	Natural logarithm of inflation adjusted (2000 dollars in millions) of lagged venture capital fund raising in the U.S.
California	Dummy = 1 if fund is located in California
New England	Dummy = 1 if fund is located in New England, i.e. Maine, New Hampshire, Vermont, Massachusetts or Rhode Island
Fund year 1985-1989	Dummy = 1 if fund is raised in years 1985 to 1989
Fund year 1990-1994	Dummy = 1 if fund is raised in years 1990 to 1994
Fund year 1995-1998	Dummy = 1 if fund is raised in years 1995 to 1998

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Table I. Venture Capital Fund Summary Statistics

Data source is VentureXpert. Sample includes venture capital funds based in the United States with at least five portfolio companies and non-missing fund size managed by independent venture firms. Means are reported. Medians are in parentheses. Standard deviations are in brackets.

Panel A - U.S. Venture Capital Funds Raised between 1980 and 1998

	1980 - 1998	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fund Size (millions 2000 $)	82.0	57.2	32.9	32.8	44.9	46.5	32.1	76.1	54.2	64.0	98.7	88.1	91.2	80.7	77.5	117.3	78.5	90.4	111.4	180.4
	(43.2)	(45.2)	(17.7)	(18.5)	(23.3)	(32.6)	(15.3)	(28.1)	(32.3)	(46.4)	(38.7)	(59.9)	(47.4)	(61.3)	(63.4)	(60.9)	(60.8)	(57.5)	(79.2)	(103.9)
	[203.5]																			
Companies per Fund	22.8	35.9	26.6	26.3	24.4	28.6	22.1	25.4	22.9	21.3	21.0	20.4	30.3	28.9	19.6	20.0	19.3	20.3	19.0	18.8
	(17)	(31)	(20)	(22)	(20)	(25.5)	(14.5)	(20)	(14)	(19)	(17)	(15)	(22)	(24.5)	(15)	(18)	(17)	(15)	(16)	(15)
	[19.2]																			
Fund Exit Percentage	56.6	64.3	60.0	61.7	64.1	62.0	58.9	61.7	59.5	59.2	62.9	65.1	72.2	64.4	59.9	53.9	55.2	49.2	49.8	41.8
	(58.3)	(64.0)	(62.5)	(62.5)	(66.7)	(61.5)	(60.0)	(64.6)	(60.6)	(63.6)	(65.0)	(61.7)	(69.0)	(66.4)	(61.5)	(55.1)	(58.1)	(52.6)	(50.0)	(42.9)
	[18.6]																			
Early or Seed Stage Fund	0.45	0.39	0.29	0.33	0.32	0.36	0.37	0.43	0.40	0.57	0.49	0.29	0.47	0.44	0.40	0.61	0.59	0.49	0.46	0.59
California	0.34	0.49	0.31	0.35	0.29	0.32	0.23	0.32	0.27	0.33	0.41	0.17	0.53	0.36	0.42	0.31	0.41	0.33	0.36	0.37
New England	0.14	0.12	0.20	0.16	0.13	0.14	0.15	0.20	0.10	0.14	0.10	0.25	0.00	0.28	0.02	0.16	0.16	0.16	0.11	0.14
Number of Funds	1,184	33	59	69	82	90	60	56	62	51	49	24	15	36	43	49	73	81	124	128
Number of Firms	557																			

Panel B - First-time U.S. Venture Capital Funds Raised between 1980 and 1998

	1980 - 1998	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fund Size (millions 2000 $)	51.9	51.8	38.4	39.3	32.5	40.0	35.6	28.2	32..2	41.5	17.5	32.6	5.9	46.7	42.1	59.1	66.3	65.2	85.7	101.8
	(31.6)	(46.7)	(22.0)	(24.1)	(26.3)	(26.7)	(28.7)	(18.9)	(22.6)	(39.1)	(12.4)	(34.4)	----	(60.2)	(39.3)	(49.4)	(82.1)	(56.4)	(43.4)	(51.7)
	[82.2]																			
Companies per Fund	22.0	44.2	34.6	31.3	26.5	25.3	24.6	17.9	13.9	18.1	14.7	10.5	5.0	12.3	11.2	19.3	21.9	18.3	16.6	12.9
	(17)	(42)	(30)	(28)	(22)	(23)	(16)	(15.5)	(13)	(16.5)	(12)	(9)	----	(7)	(9.5)	(21)	(19.5)	(14.5)	(15)	(10)
	[18.9]																			
Fund Exit Percentage	54.2	65.5	59.8	54.8	62.1	58.1	57.8	61.7	55.2	49.0	59.9	56.8	100.0	55.1	53.9	45.5	50.6	46.1	47.8	41.9
	(55.9)	(65.7)	(60.0)	(53.6)	(65.0)	(57.1)	(62.5)	(64.0)	(57.1)	(54.7)	(56.4)	(58.6)	(100)	(65.2)	(62.0)	(48.4)	(55.3)	(46.7)	(44.7)	(42.9)
	[19.0]																			
Early or Seed Stage Fund	0.50	0.50	0.28	0.43	0.50	0.35	0.47	0.50	0.53	0.63	0.60	0.75	0.00	0.00	0.17	0.43	0.55	0.69	0.66	0.56
California	0.33	0.50	0.32	0.09	0.29	0.19	0.35	0.35	0.32	0.25	0.50	0.00	0.00	0.00	0.50	0.29	0.65	0.35	0.43	0.26
New England	0.13	0.17	0.20	0.22	0.17	0.19	0.12	0.05	0.11	0.13	0.00	0.25	0.00	0.00	0.00	0.14	0.10	0.04	0.17	0.11
Number of Funds	318	12	25	23	24	31	17	20	19	8	10	4	1	3	6	7	20	26	35	27
Number of Firms	318																			

Panel C - First-time U.S. Venture Capital Funds Raised between 1980 and 1998 with collected venture capitalist histories

	1980 - 1998	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fund Size (millions 2000 $)	61.9	83.9	66.9	54.6	40.6	36.5	55.3	28.7	40.4	49.5	17.4	35.3	5.9	61.3	43.2	59.1	69.6	62.6	92.9	104.5
	(43.4)	(57.3)	(51.5)	(27.5)	(31.7)	(22.2)	(52.6)	(21.1)	(20.5)	(43.4)	(10.1)	(44.2)	----	(61.3)	(41.9)	(49.8)	(82.8)	(56.4)	(53.4)	(46.5)
	[95.0]																			
Companies per Fund	22.9	78.3	43.7	35.5	32.8	30.2	26.7	20.9	13.9	20.0	15.7	11.3	5.0	15.0	11.8	19.3	22.7	19.3	16.6	12.9
	(19)	(79.5)	(37)	(29)	(25)	(26)	(27)	(19)	(11)	(17)	(12)	(10)	----	(15)	(11)	(21)	(20)	(15)	(15)	(10)
	[17.3]																			
Fund Exit Percentage	53.2	67.9	64.5	58.0	62.5	54.6	63.6	59.6	54.1	59.8	57.7	54.8	100.0	68.3	52.1	45.5	52.4	47.1	48.5	40.1
	(55.7)	(69.2)	(64.9)	(67.6)	(65.3)	(55.2)	(64.3)	(64.0)	(57.1)	(60.5)	(54.2)	(57.1)	(100)	(68.3)	(61.5)	(48.4)	(55.6)	(50.0)	(45.4)	(40.2)
	[19.4]																			
Early or Seed Stage Fund	0.53	0.50	0.44	0.46	0.43	0.42	0.67	0.40	0.45	0.40	0.57	1.00	0.00	0.00	0.00	0.43	0.53	0.71	0.68	0.58
California	0.33	0.75	0.22	0.08	0.29	0.11	0.33	0.33	0.27	0.20	0.43	0.00	0.00	0.00	0.40	0.29	0.68	0.38	0.45	0.29
New England	0.14	0.00	0.33	0.31	0.07	0.26	0.17	0.07	0.09	0.20	0.00	0.33	0.00	0.00	0.00	0.14	0.05	0.04	0.19	0.13
Number of Funds	222	3	8	11	14	19	7	16	13	6	7	3	1	2	5	7	19	25	32	24
Number of Firms	222																			

Table II. Characteristics of Venture Capitalists Managing First-time Funds Raised between 1980 and 1998

The sample includes first time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. Variables in the first column are dummy variables equal to one if a venture capitalist possesses a particular characteristic. Variables beginning with "Has" in the second column are dummy variables equal to one if at least one venture capitalist in a fund possesses a particular characteristic. Please see the Appendix for more detailed variable definitions.

	All Venture Capitalists Mean		All First-time Funds Mean
Educational History Variables		*Educational History Variables*	
MBA	58%	HasMBA	79%
PHD	7%	HasPHD	14%
LawDegree	8%	HasLawDegree	16%
SciEngDegree	33%	HasSciEngDegree	49%
Ivy	37%	HasIvy	56%
Harvard	19%	HasHarvard	34%
Stanford	14%	HasStanford	20%
IvyMBA	24%	HasIvyMBA	42%
Harvard MBA	16%	HasHarvardMBA	30%
Stanford MBA	9%	HasStanfordMBA	14%
Work History Variables		*Work History Variables*	
PastVC	44%	HasPastVC	57%
PastStartupExec	15%	HasPastStartupExec	25%
PastVCandStartupExec	5%	HasPastVCandExec	14%
PastConsultant	16%	HasPastConsultant	27%
PastFinance	29%	HasPastFinance	50%
PastEngineer	9%	HasPastEngineer	16%
		Number of VCs per Fund	2.17
Number of Venture Capitalists	482	Number of Funds	222

Table III. Characteristics of Venture Capitalists Managing First-time Funds Raised between 1980 and 1998
Seed and Later Stage Fund Sub-samples

The sample includes first time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. Variables beginning with "Has" are dummy variables equal to one if at least one venture capitalist in a fund possesses a particular characteristic. Seed stage funds are funds with stage focus in VentureXpert recorded "Seed Stage" or "Early Stage". Later stage funds are funds with stage focus in VentureXpert as "Later Stage," "Expansion" or "Balanced Stage". Please see the Appendix for more detailed variable definitions.

	Seed Stage Funds Mean	Later Stage Funds Mean
Educational History Variables		
HasMBA	76%	83%
HasPHD	19%	8%
HasLawDegree	9%	23%
HasSciEngDegree	56%	40%
HasIvy	52%	61%
HasHarvard	32%	37%
HasStanford	21%	19%
HasIvyMBA	38%	47%
HasHarvardMBA	26%	34%
HasStanfordMBA	15%	12%
Work History Variables		
HasPastVC	60%	54%
HasPastStartupExec	32%	16%
HasPastVCandExec	21%	8%
HasPastConsultant	26%	30%
HasPastFinance	41%	61%
HasPastEngineer	20%	12%
Number of VCs per Fund	2.25	2.09
Number of Funds	118	104

Table IV. Correlation Matrices for First-time Venture Capital Fund Team Characteristics

The sample includes first time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. Variables beginning with "Has" are dummy variables equal to one if at least one venture capitalist in a fund possesses a particular characteristic. Seed stage funds are funds with stage focus in VentureXpert recorded "Seed Stage" or "Early Stage". Later stage funds are funds with stage focus in VentureXpert as "Later Stage," "Expansion" or "Balanced Stage". Please see the Appendix for more detailed variable definitions.

Panel A - Seed stage funds

	Has MBA	Has PHD	Has LawDeg	Has SciEngDeg	Has Ivy	Has Harvard	Has Stanford	Has IvyMBA	Has HarvardMBA	Has StanfordMBA	Has PastVC	Has PastStartupExec	Has PastVCandExec	Has PastConsult	Has PastFinance	Has PastEngineer
HasMBA	1.000															
HasPHD	-0.038	1.000														
HasLawDegree	0.112	-0.155	1.000													
HasSciEngDegree	-0.008	0.158	-0.071	1.000												
HasIvy	0.345	0.155	0.074	0.227	1.000											
HasHarvard	0.295	0.002	0.096	-0.069	0.652	1.000										
HasStanford	0.136	0.189	-0.019	0.233	0.063	0.019	1.000									
HasIvyMBA	0.443	-0.021	-0.074	0.093	0.758	0.709	-0.054	1.000								
HasHarvardMBA	0.329	-0.032	0.012	-0.036	0.563	0.864	-0.008	0.743	1.000							
HasStanfordMBA	0.231	0.112	-0.050	0.118	0.055	-0.020	0.812	-0.077	-0.020	1.000						
HasPastVC	0.194	0.082	0.025	0.194	0.297	0.182	0.244	0.182	0.122	0.239	1.000					
HasPastStartupExec	-0.167	-0.100	0.089	0.131	-0.139	-0.040	0.190	-0.136	-0.031	0.077	0.047	1.000				
HasPastVCandExec	-0.062	-0.028	0.127	0.148	-0.064	-0.027	0.214	-0.141	-0.056	0.151	0.416	0.733	1.000			
HasPastConsultant	0.192	0.018	0.079	0.082	0.171	0.148	0.041	0.180	0.148	0.036	0.122	-0.115	-0.008	1.000		
HasPastFinance	0.061	0.088	0.148	-0.003	0.173	0.180	0.050	0.162	0.187	0.051	0.152	-0.059	-0.079	0.028	1.000	
HasPastEngineer	-0.126	0.202	-0.012	0.348	0.130	-0.013	0.281	0.007	-0.094	0.101	0.186	0.162	0.175	0.054	0.025	1.000

Panel B - Later stage funds

	Has MBA	Has PHD	Has LawDeg	Has SciEngDeg	Has Ivy	Has Harvard	Has Stanford	Has IvyMBA	Has HarvardMBA	Has StanfordMBA	Has PastVC	Has PastStartupExec	Has PastVCandExec	Has PastConsult	Has PastFinance	Has PastEngineer
HasMBA	1.000															
HasPHD	-0.060	1.000														
HasLawDegree	-0.234	0.015	1.000													
HasSciEngDegree	0.165	-0.015	0.019	1.000												
HasIvy	0.206	0.009	0.017	0.056	1.000											
HasHarvard	0.245	0.076	0.098	0.056	0.615	1.000										
HasStanford	0.156	-0.048	0.025	0.198	0.090	-0.022	1.000									
HasIvyMBA	0.426	0.019	-0.009	0.055	0.749	0.703	0.032	1.000								
HasHarvardMBA	0.329	0.095	-0.011	0.066	0.578	0.940	-0.044	0.772	1.000							
HasStanfordMBA	0.171	-0.108	-0.067	0.165	0.064	-0.109	0.775	-0.062	-0.150	1.000						
HasPastVC	0.191	0.119	-0.047	0.008	0.089	0.072	0.299	0.092	0.059	0.229	1.000					
HasPastStartupExec	-0.143	0.069	0.192	0.063	0.034	-0.124	0.050	0.004	-0.100	-0.008	-0.064	1.000				
HasPastVCandExec	0.131	0.188	0.100	0.205	0.009	-0.072	0.135	0.091	-0.056	0.001	0.264	0.653	1.000			
HasPastConsultant	-0.038	-0.029	0.046	0.111	0.133	0.021	-0.048	0.022	-0.028	0.074	-0.202	0.056	0.050	1.000		
HasPastFinance	0.154	0.156	-0.076	-0.064	-0.040	0.009	-0.010	-0.034	-0.039	0.064	-0.108	-0.231	0.009	0.047	1.000	
HasPastEngineer	0.018	0.110	0.002	0.342	-0.055	0.010	0.260	-0.004	-0.028	0.298	0.055	0.070	0.219	0.010	0.005	1.000

Table V. First-time Fund Performance Regressions

The sample includes first time U.S. venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variable is the percentage of a fund's portfolio companies that exit, either via an IPO or an acquisition. Reported regression coefficients are estimated using OLS . T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Variables beginning with "Has" are dummy variables equal to one if at least one venture capitalist in a fund possesses a particular characteristic. Please see Appendix for more detailed variable definitions.

Dependent Variable:						
% of Fund's Companies that Exit	(1)	(2)	(3)	(4)	(5)	(6)
VC Characteristics						
HasIvy	6.93		6.20	7.35		6.45
	(1.34)		(1.22)	(1.54)		(1.40)
HasSciEngDegree	6.09 **		6.32 **	5.23 **		5.39 **
	(2.74)		(2.73)	(2.42)		(2.26)
HasMBA	-8.94 **		-9.54 ***	-9.54 **		-10.32 ***
	(-2.56)		(-3.41)	(-2.73)		(-3.76)
HasIvyMBA	-1.45		-0.88	-0.37		0.27
	(-0.47)		(-0.27)	(-0.12)		(0.08)
HasPastVC		6.39 **	7.12 ***		6.85 **	7.56 ***
		(2.48)	(2.98)		(2.69)	(3.12)
HasPastStartupExec		7.70 **	6.02 **		7.65 **	5.84 **
		(2.40)	(2.37)		(2.17)	(2.09)
HasPastConsultant		2.98	2.09		2.82	1.74
		(1.41)	(0.68)		(0.88)	(0.56)
HasPastFinance		2.02	2.69		1.99	2.55
		(0.65)	(0.87)		(0.65)	(0.83)
HasPastEngineer		0.51	-2.99		-0.46	-3.43
		(0.25)	(-1.16)		(-0.21)	(-1.23)
Fund Characteristics						
Log(Fund Size)	2.39	2.95 **	1.93	2.18	3.01 **	1.81
	(1.80)	(2.12)	(1.44)	(1.60)	(2.20)	(1.31)
Number of founders	-0.89	-1.45	-1.83	-0.30	-1.16	-1.46
	(-0.44)	(-1.30)	(-1.60)	(-0.19)	(-1.01)	(-1.32)
Seed stage	-4.61	-3.86	-5.27 **	-5.14 **	-4.13	-5.64 **
	(-1.89)	(-1.56)	(-2.30)	(-2.13)	(-1.68)	(-2.56)
Biotech				7.98 **	7.94 **	7.80 **
				(2.60)	(2.37)	(2.42)
Software				2.22	2.03	2.00
				(0.73)	(0.76)	(0.64)
Telecomm				2.71	2.84	2.82
				(1.27)	(1.28)	(1.29)
Market Characteristics						
Log(Fund Inflows Last Year)	-7.21 ***	-8.56 ***	-7.58 ***	-6.71 ***	-6.47 ***	-6.04 ***
	(-4.74)	(-10.86)	(-8.39)	(-4.33)	(-3.84)	(-3.98)
California				3.55	2.85	3.31
				(1.25)	(1.09)	(1.22)
New England				-3.19	-2.69	-3.74
				(-1.00)	(-0.68)	(-1.01)
Fund year 1985-1989				2.26	0.41	1.31
				(1.22)	(0.19)	(0.69)
Fund year 1990-1994				-1.73	-6.32	-4.37
				(-0.37)	(-1.18)	(-0.88)
Fund year 1995-1998				-1.38	-5.84	-4.21
				(-0.41)	(-1.72)	(-1.28)
Constant	109.98 ***	112.57 ***	111.44 ***	103.62 ***	94.36 ***	97.73 ***
	(11.54)	(13.71)	(12.78)	(6.52)	(5.88)	(6.39)
N	222	222	222	222	222	222
Adjusted R^2	0.208	0.186	0.237	0.206	0.183	0.237

Table VI. First-time Fund Performance Regressions - Effect of Having Both VC and Entrepreneurial Experienced Teams

The sample includes first-time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variable is the percentage of a fund's portfolio companies that exit, either via an IPO or an acquisition. Reported regression coefficients are estimated using OLS with a constant term. T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. HasPastVCOnly is a dummy equal to one if a founding fund team only VC investing experience. HasPastStartupExecOnly is a dummy equal to one if a founding fund team only has experience managing a startup. HasVCandStartupExec is a dummy equal to one if a founding team has both VC investing experience and experience managing a startup company. Also included in each regression are the fund's number of founders, the natural logarithm of fund size, the natural logarithm of total venture capital fund inflows in the year prior to the fund's closing and a dummy equal to one if a fund is a seed stage fund. Fund industry dummies are dummies for whether a fund focuses on investments in the biotech, telecomm or software industries. Fund geography dummies are dummies for whether a fund is located in California or New England. Fund year dummies are dummies for whether a fund closed between 1985 and 1989, between 1990 and 1994 or between 1995 and 1998. Please see Appendix for more detailed variable definitions.

Dependent Variable:								
% of Fund's Companies that Exit	(1)		(2)		(3)		(4)	
VC Characteristics								
HasIvy			6.36				6.67	
			(1.24)				(1.44)	
HasSciEngDegree			6.29	**			5.34	**
			(2.75)				(2.26)	
HasMBA			-9.64	***			-10.46	***
			(-3.51)				(-3.93)	
HasIvyMBA			-0.83				0.32	
			(-0.26)				(0.09)	
HasPastVCOnly	6.57	**	6.72	**	6.97	**	7.00	**
	(2.22)		(2.40)		(2.42)		(2.53)	
HasPastStartupExecOnly	8.17	**	4.96		7.97	*	4.39	
	(2.13)		(1.37)		(1.92)		(1.12)	
HasVCandStartupExec	13.88	**	13.59	***	14.37	**	13.99	***
	(2.54)		(2.96)		(2.53)		(2.94)	
HasPastConsultant	3.00		2.02		2.83		1.65	
	(0.90)		(0.64)		(0.88)		(0.52)	
HasPastFinance	2.02		2.69		1.99		2.55	
	(0.66)		(0.87)		(0.65)		(0.83)	
HasPastEngineer	0.53		-3.04		-0.44		-3.53	
	(0.25)		(-1.17)		(-0.20)		(-1.25)	
Fund industry dummies?	No		No		Yes		Yes	
Fund geography dummies?	No		No		Yes		Yes	
Fund year dummies?	No		No		Yes		Yes	
N	222		222		222		222	
Adjusted R^2	0.182		0.234		0.179		0.234	

Table VII. Seed Stage First-time Fund Performance Regressions

The sample includes first time U.S seed stage venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variable is the percentage of a fund's portfolio companies that exit, either via an IPO or an acquisition. Reported regression coefficients are estimated using OLS with a constant term. T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. HasPastVCOnly is a dummy equal to one if a founding fund team only VC investing experience. HasPastStartupExecOnly is a dummy equal to one if a founding fund team only has experience managing a startup. HasVCandStartupExec is a dummy equal to one if a founding team has both VC investing experience and experience managing a startup company. Also included in each regression are the fund's number of founders, the natural logarithm of fund size and the natural logarithm of total venture capital fund inflows in the year prior to the fund's closing. Fund industry dummies are dummies for whether a fund focuses on investments in the biotech, telecomm or software industries. Fund geography dummies are dummies for whether a fund is located in California or New England. Fund year dummies are dummies for whether a fund closed between 1985 and 1989, between 1990 and 1994 or between 1995 and 1998. Please see Appendix for more detailed variable definitions.

Dependent Variable:						
% of Fund's Companies that Exit	(1)	(2)	(3)	(4)	(5)	(6)
VC Characteristics						
HasIvy	4.42		3.85	6.12		6.00
	(0.76)		(0.65)	(1.06)		(1.06)
HasSciEngDegree	6.45 **		6.87 *	6.87 **		7.09 *
	(2.35)		(1.88)	(2.24)		(1.76)
HasMBA	-10.97 ***		-11.93 ***	-11.12 ***		-11.61 ***
	(-3.43)		(-4.82)	(-3.54)		(-4.14)
HasIvyMBA	1.18		1.39	1.39		1.30
	(0.21)		(0.21)	(0.24)		(0.19)
HasPastVCOnly		5.21	5.62		6.16	6.09
		(1.12)	(1.29)		(1.40)	(1.19)
HasPastStartupExecOnly		5.22	2.37		6.17	3.27
		(1.11)	(0.52)		(1.19)	(0.51)
HasVCandStartupExec		17.21 **	15.91 **		18.83 ***	17.60 ***
		(2.70)	(2.70)		(3.29)	(3.12)
HasPastConsultant		5.61	5.71		4.90	4.80
		(1.34)	(1.30)		(1.28)	(1.10)
HasPastFinance		7.33 *	7.00		7.21	6.86
		(1.88)	(1.63)		(1.81)	(1.66)
HasPastEngineer		-2.87	-7.19		-3.68	-7.64
		(-0.85)	(-1.52)		(-1.09)	(-1.53)
Fund industry dummies?	No	No	No	Yes	Yes	Yes
Fund geography dummies?	No	No	No	Yes	Yes	Yes
Fund year dummies?	No	No	No	Yes	Yes	Yes
N	118	118	118	118	118	118
Adjusted R^2	0.206	0.223	0.276	0.157	0.176	0.233

Table VIII. Later Stage First-time Fund Performance Regressions

The sample includes first time U.S later stage venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variable is the percentage of a fund's portfolio companies that exit, either via an IPO or an acquisition. Reported regression coefficients are estimated using OLS with a constant term. T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. HasPastVCOnly is a dummy equal to one if a founding fund team only VC investing experience. HasPastStartupExecOnly is a dummy equal to one if a founding fund team only has experience managing a startup. HasVCandStartupExec is a dummy equal to one if a founding team has both VC investing experience and experience managing a startup company. Also included in each regression are the fund's number of founders, the natural logarithm of fund size and the natural logarithm of total venture capital fund inflows in the year prior to the fund's closing. Fund industry dummies are dummies for whether a fund focuses on investments in the biotech, telecomm or software industries. Fund geography dummies are dummies for whether a fund is located in California or New England. Fund year dummies are dummies for whether a fund closed between 1985 and 1989, between 1990 and 1994 or between 1995 and 1998. Please see Appendix for more detailed variable definitions.

Dependent Variable:						
% of Fund's Companies that Exit	(1)	(2)	(3)	(4)	(5)	(6)
VC Characteristics						
HasIvy	10.77 *		11.12	9.31		10.44
	(1.73)		(1.64)	(1.37)		(1.52)
HasSciEngDegree	6.20 **		6.09 *	3.98		4.11
	(2.02)		(1.97)	(1.17)		(1.14)
HasMBA	-4.25		-3.49	-4.93		-5.30
	(-0.71)		(-0.71)	(-0.93)		(-1.35)
HasIvyMBA	-5.95		-6.56	-3.82		-4.46
	(-1.43)		(-1.45)	(-0.65)		(-0.79)
HasPastVCOnly		5.27	5.36		5.23	5.17
		(1.31)	(1.43)		(1.35)	(1.53)
HasPastStartupExecOnly		11.84	7.91		6.97	2.24
		(1.27)	(0.89)		(0.76)	(0.25)
HasVCandStartupExec		4.96	7.26		3.82	6.03
		(0.71)	(1.15)		(0.46)	(0.86)
HasPastConsultant		-0.55	-2.63		-1.42	-3.58
		(-0.12)	(-0.76)		(-0.33)	(-0.92)
HasPastFinance		-1.67	-0.83		-1.72	-0.82
		(-0.42)	(-0.19)		(-0.50)	(-0.22)
HasPastEngineer		5.62	3.71		4.69	3.38
		(1.26)	(0.93)		(1.34)	(1.11)
Fund industry dummies?	No	No	No	Yes	Yes	Yes
Fund geography dummies?	No	No	No	Yes	Yes	Yes
Fund year dummies?	No	No	No	Yes	Yes	Yes
N	104	104	104	104	104	104
Adjusted R^2	0.120	0.080	0.112	0.183	0.147	0.171

Table IX. Decomposing Fund Exit Percentages - IPOs and Acquisitions

The sample includes first time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variables are the percentage of a fund's portfolio companies that IPO and the percentage of a fund's portfolio companies that are acquired. Reported regression coefficients are estimated using OLS with a constant term. T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. HasPastVCOnly is a dummy equal to one if a founding fund team only VC investing experience. HasPastStartupExecOnly is a dummy equal to one if a founding fund team only has experience managing a startup. HasVCandStartupExec is a dummy equal to one if a founding team has both VC investing experience and experience managing a startup company. Also included in each regression are the fund's number of founders, the natural logarithm of fund size, the natural logarithm of total venture capital fund inflows in the year prior to the fund's closing and a dummy equal to one if the fund is a seed stage fund. Please see Appendix for more detailed variable definitions.

	All funds		*Seed stage funds*		*Later stage funds*	
Dependent Variable:	% of fund's companies that IPO	% of fund's companies acquired	% of fund's companies that IPO	% of fund's companies acquired	% of fund's companies that IPO	% of fund's companies acquired
	(1)	(2)	(3)	(4)	(5)	(6)
VC Characteristics						
HasIvy	4.99	1.37	2.80	1.05	7.89	3.22
	(1.48)	(0.46)	(0.46)	(0.20)	(1.42)	(0.91)
HasSciEngDegree	3.06	3.23	3.53	3.34	3.71	2.39
	(1.60)	(1.45)	(1.33)	(0.73)	(1.45)	(0.80)
HasMBA	-3.94	-5.69 ***	-3.48	-8.46	-3.19	-0.30
	(-1.23)	(-3.00)	(-1.12)	(-3.10)	(-0.59)	(-0.08)
HasIvyMBA	-1.10	0.26	1.28	0.11	-4.74	-1.82
	(-0.52)	(0.09)	(0.53)	(0.01)	(-1.24)	(-0.50)
HasPastVCOnly	1.50	5.22 **	0.66	4.96	1.67	3.69
	(0.79)	(2.43)	(0.23)	(1.11)	(0.58)	(1.03)
HasPastStartupExecOnly	4.45	0.50	2.97	-0.60	5.74	2.16
	(1.10)	(0.18)	(0.52)	(-0.12)	(0.70)	(0.54)
HasVCandStartupExec	7.84 ***	5.75	8.67 **	7.25	7.06	0.20
	(3.80)	(1.31)	(2.58)	(1.01)	(1.24)	(0.05)
HasPastConsultant	1.48	0.54	2.91	2.80	-2.12	-0.51
	(0.72)	(0.17)	(0.74)	(0.54)	(-1.01)	(-0.18)
HasPastFinance	2.69 **	-0.01	4.03 *	2.96	3.14	-3.97
	(2.09)	(-0.00)	(2.00)	(0.73)	(0.79)	(-1.33)
HasPastEngineer	-0.53	-2.51	-1.69	-5.50	0.29	3.41
	(-0.33)	(-1.22)	(-0.81)	(-1.41)	(0.13)	(1.01)
N	222	222	118	118	104	104
Adjusted R^2	0.155	0.036	0.267	0.099	0.036	0.015

Table X. Decomposing Fund Exit Percentages - First Round Investment and Later Round Investment Performance

The sample includes first time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variables are the percentage of portfolio companies in which the fund invests in the first round that are exited and the percentage of portfolio companies in which the fund first invests in a follow-on round that are exited. Reported regression coefficients are estimated using OLS with a constant term. T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Variables beginning with "Has" are dummy variables equal to one if at least one venture capitalist in a fund possesses a particular characteristic. Also included in each regression are the fund's number of founders, the natural logarithm of fund size, the natural logarithm of total venture capital fund inflows in the year prior to the fund's closing and a dummy equal to one if a fund is a seed stage fund. Please see Appendix for more detailed variable definitions.

	Companies in which fund invested in the first round			Companies in which fund first invested in a follow-on round		
Dependent Variable:	% Companies that exit *All funds*	% Companies that exit *Seed stage funds*	% Companies that exit *Later stage funds*	% Companies that exit *All funds*	% Companies that exit *Seed stage funds*	% Companies that Exit *Later stage funds*
	(1)	(2)	(3)	(4)	(5)	(6)
VC Characteristics						
HasIvy	13.64 **	9.68	21.23 **	4.77	2.17	7.73
	(2.05)	(1.19)	(2.48)	(0.75)	(0.30)	(1.00)
HasSciEngDegree	4.89	4.66	4.25	6.96 **	9.01 *	4.18
	(1.40)	(0.83)	(0.69)	(2.14)	(1.91)	(1.00)
HasMBA	-9.64 *	-15.24 **	1.48	-1.22	0.89	-2.85
	(-2.01)	(-2.35)	(0.23)	(-0.27)	(0.14)	(-0.42)
HasIvyMBA	-8.04	-4.54	-15.68 **	-4.80	-4.05	-6.18
	(-1.29)	(-0.38)	(-2.76)	(-1.08)	(-0.71)	(-0.81)
HasPastVCOnly	6.28 *	2.41	8.19 *	5.70 *	1.99	3.61
	(1.70)	(0.33)	(1.71)	(1.97)	(0.32)	(1.27)
HasPastStartupExecOnly	4.03	-0.94	14.95	6.69	5.59	4.48
	(0.93)	(-0.16)	(1.28)	(1.04)	(0.62)	(0.48)
HasVCandStartupExec	14.80 ***	13.39 **	14.03	15.88 *	19.42 *	4.44
	(3.97)	(2.27)	(1.52)	(1.83)	(1.79)	(0.73)
HasPastConsultant	1.62	5.70	-0.66	4.57	11.70 *	-3.56
	(0.48)	(1.26)	(-0.12)	(0.86)	(1.91)	(-0.61)
HasPastFinance	-1.10	2.64	-2.03	2.81	7.23 **	0.19
	(-0.35)	(0.44)	(-0.38)	(0.89)	(2.07)	(0.04)
HasPastEngineer	-3.51	-10.83	9.52	-3.84	-8.30	-0.48
	(-0.86)	(-1.58)	(1.49)	(-1.19)	(-1.69)	(-0.11)
N	222	118	104	222	118	104
Adjusted R^2	0.199	0.202	0.190	0.124	0.148	0.099

Table XI. Probability of Raising a Follow-on Fund and Follow-on Fund Performance

The sample includes first time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variable in the first two specifications is a dummy equal to one if a first-time fund raises a follow-on fund. The first two specifications are probit models estimated using maximum likelihood. Coefficients and z-stats adjusted for clustering by fund year are reported. The dependent variable in the last two specifications is the percentage of a fund's portfolio companies that exit, either via an IPO or an acquisition. The last two specifications are regressions estimated using OLS with a constant term. T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Also included in each regression are the fund's number of founders, the natural logarithm of fund size, the natural logarithm of total venture capital fund inflows in the year prior to the fund's closing and a dummy equal to one if the fund is a seed stage fund. Fund industry dummies are dummies for whether a fund focuses on investments in the biotech, telecomm or software industries. Fund geography dummies are dummies for whether a fund is located in California or New England. Fund year dummies are dummies for whether a fund closed between 1985 and 1989, between 1990 and 1994 or between 1995 and 1998. Please see Appendix for more detailed variable definitions.

Dependent Variable:	Probability of Raising a Follow-On Fund (1)		Probability of Raising a Follow-On Fund (2)		% of Follow-On Fund's Companies that Exit (3)		% of Follow-On Fund's Companies that Exit (4)	
VC Characteristics								
HasIvy	-0.25		-0.18		5.57		3.94	
	(-0.82)		(-0.52)		(1.07)		(0.72)	
HasSciEngDegree	-0.12		-0.09		5.01	**	3.30	
	(-0.68)		(-0.53)		(2.01)		(1.19)	
HasMBA	-0.16		-0.14		-0.19		-0.09	
	(-0.56)		(-0.53)		(-0.04)		(-0.02)	
HasIvyMBA	0.22		0.16		2.38		3.16	
	(0.68)		(0.44)		(0.39)		(0.48)	
HasPastVCOnly	-0.02		-0.11		-1.28		-1.52	
	(-0.09)		(-0.49)		(-0.25)		(-0.27)	
HasPastStartupExecOnly	0.58		0.56		1.06		1.36	
	(1.55)		(1.49)		(0.18)		(0.19)	
HasVCandStartupExec	0.60	***	0.63	*	5.84	*	5.24	*
	(2.19)		(1.94)		(1.73)		(1.66)	
HasPastConsultant	0.46	*	0.45	*	1.16		2.64	
	(1.85)		(1.70)		(0.48)		(0.83)	
HasPastFinance	-0.08		-0.12		2.26		4.40	
	(-0.54)		(-0.86)		(0.62)		(1.35)	
HasPastEngineer	0.40		0.23		3.24		0.01	
	(1.11)		(0.66)		(1.15)		(0.00)	
Fund industry?	No		Yes		No		Yes	
Fund geography?	No		Yes		No		Yes	
Fund year?	No		Yes		No		Yes	
N	222		222		143		143	
Pseudo R^2	0.086		0.147					
Adjusted R^2					0.214		0.250	

Table XII. Probability of Raising a Follow-on Fund and Follow-on Fund Performance - Seed and Later Stage Funds

The sample includes first time U.S venture capital funds managed by independent venture firms identified in VentureXpert and with collected venture capitalist histories. The dependent variable in the first two specifications is a dummy equal to one if a first-time fund raises a follow-on fund. The first two specifications are probit models estimated using maximum likelihood. Coefficients and z-stats adjusted for clustering by fund year are reported. The dependent variable in the last two specifications is the percentage of a fund's portfolio companies that exit, either via an IPO or an acquisition. The last two specifications are regressions estimated using OLS with a constant term. T-statistics adjusted for clustering by fund year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Also included in each regression are the fund's number of founders, the natural logarithm of fund size, the natural logarithm of total venture capital fund inflows in the year prior to the fund's closing and a dummy equal to one if the fund is a seed stage fund. Please see Appendix for more detailed variable definitions.

	Seed stage funds		*Later stage funds*	
Dependent Variable:	Probability of Raising a Follow-On Fund	% of Follow-On Fund's Companies that Exit	Probability of Raising a Follow-On Fund	% of Follow-On Fund's Companies that Exit
	(1)	(2)	(3)	(4)
VC Characteristics				
HasIvy	-0.03	-3.16	-0.52	8.71
	(-0.06)	(-0.40)	(-1.06)	(1.15)
HasSciEngDegree	-0.01	8.39 *	-0.29	1.83
	(-0.04)	(1.71)	(-1.06)	(0.34)
HasMBA	-0.30	2.72	-0.28	-2.81
	(-0.85)	(0.47)	(-0.60)	(-0.37)
HasIvyMBA	0.32	5.63	0.21	1.68
	(0.63)	(0.92)	(0.47)	(0.15)
HasPastVCOnly	-0.30	5.40	-0.00	-6.51
	(-0.83)	(0.79)	(-0.00)	(-0.98)
HasPastStartupExecOnly	0.42	5.62	0.91	-6.39
	(0.95)	(0.65)	(1.31)	(-0.61)
HasVCandStartupExec	0.80 *	13.37 **	0.68	1.26
	(1.94)	(1.99)	(1.28)	(0.09)
HasPastConsultant	1.01 *	1.72	0.20	1.11
	(1.74)	(0.40)	(0.60)	(0.25)
HasPastFinance	-0.14	3.27	-0.19	5.86
	(-0.46)	(0.91)	(-0.53)	(0.90)
HasPastEngineer	0.19	0.09	0.73	-1.38
	(0.50)	(0.01)	(1.41)	(-0.26)
N	118	70	104	73
Pseudo R^2	0.193		0.188	
Adjusted R^2		0.321		0.108