Specialization and Success:
Evidence from Venture Capital

Paul Gompers, Anna Kovner, Josh Lerner, and David Scharfstein*

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This paper examines how organizational structure affects behavior and performance by looking closely at the performance of different types of venture capital organizations. We find a strong positive relationship between the degree of specialization by individual venture capitalists at a firm and its success. At the same time, however, the marginal effect of increasing specialization at the firm is much weaker when the individual investment professionals are highly specialized themselves. The deterioration in performance appears due to both an inefficient allocation of funding across industries and poor selection of investments within industries. Organizational characteristics, however, are not irrelevant: venture capital organizations with more experience tend to outperform those with less experience.

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*Harvard University. Gompers, Lerner, and Scharfstein are also affiliates of the National Bureau of Economic Research. We thank for their research assistance Vanessa Broussard, Miriam Tawil, Daniel Goodman, Leif Holtzman, Alex Lee, and Chenling Zhang. Seminar participants at Columbia, Dartmouth, and Duke made helpful comments. Harvard Business School's Division of Research provided financial assistance. All errors and omissions are our own.

1. Introduction

The central goal of organizational economics is to understand how organizational structure affects behavior and performance. This paper tries to address this question by examining the structure and performance of venture capital firms.

The venture capital industry is a good setting for studying the effects of organizational structure for three basic reasons. First, there is considerable heterogeneity in how venture capital organizations are organized. While some firms specialize in making investments within a particular industry, others take a more generalist approach, diversifying their investments across industries. Some of these generalist firms are comprised of venture capitalists who are themselves generalists, while others are comprised of a diversified group of industry specialists. For example, Kleiner, Perkins, Caufield and Byers, one of the leading venture capital firms, is a generalist firm comprised largely of generalists such as John Doerr who has made investments in the Internet (Amazon, Google), computer software (Intuit) and computer hardware (Sun Microsystems). By contrast, Alta Partners is a generalist firm, with investments in life sciences and information technology but its partners tend to specialize in one industry or the other. And, Domain Associates is a specialist firm (of course comprised of specialists) that focuses on life sciences.

A second reason to study organizations in the environment of venture capital is that we can get detailed information on their specific investments and the individuals responsible for these investments. This allows us to measure the behavior of venture capital firms at a much more detailed level than is typical of studies in this area (such as those on the effects of corporate diversification by Rajan, Servaes and Zingales (2000)

and Scharfstein (1998)). Finally, studying the venture capital industry allows us to measure the outcomes of investments, thereby enabling us to gauge the effect of organizational structure on performance at a very detailed level.

How might the degree of specialization of venture capital firms and their venture capitalists affect behavior and performance? In theory, it can affect both the quality of capital allocation across industries and the performance of investments within an industry. With respect to cross-industry capital allocation, there are a number of theories about how specialization might affect performance. Stein (1997), for example, sees organizational diversification across industries (i.e., generalist firms in the context of venture capital) as an important element of efficient cross-industry capital allocation. When investment opportunities are poor in one industry, he argues, managers can maintain their overall capital budget (which they value in and of itself) while still making good investments in their other industries. By contrast, managers of narrowly focused firms with poor investment opportunities have no place else to invest and, in an effort to maintain their capital budget, may end up investing in negative net present value projects. In the context of venture capital, Stein's model would suggest that when investment opportunities are poor in one sector (say life sciences), generalist firms will be more prone than specialist firms to scale back investments in that sector and scale up their investments in more promising sectors (say communications).

One of the critical elements of the Stein model is that the CEO—who has no vested interest in making investments in any particular sector—gets to decide where capital is allocated. However, these capital allocation decision rights are not as clear cut in venture capital firms, where partners often decide by committee where to make

investments. Thus, the advantage of a generalist form of organization may not be as large as suggested by Stein, particularly when the venture capitalists themselves are industry specialists with vested interests in making investments in their particular industry. This prediction is in line with the view that diversified firms have a difficult time redeploying capital into sectors with better investment opportunities, as suggested by Rajan, Servaes, and Zingales (2000), Scharfstein (1998), and Scharfstein and Stein (2000), .

However, there are at least three factors that could mitigate the potential for misallocation of capital within generalist firms. First, generalist venture capital firms could be comprised of venture capitalists who are themselves generalists and who presumably would have no vested interest in making investments in any particular industry. Second, venture capitalists have very high-powered incentives, with profit-sharing (carried interest) of 20% of fund returns, well in excess of the type of incentives observed in publicly traded firms. The carried interest that goes to an individual venture capitalist typically does not depend on the returns of his or her own deals, but is a set fraction of the overall fund return. Thus, the incentive to allocate resources correctly should be very powerful. (On the other hand, this share of the profits is set by negotiation among the partners, and a venture capitalist who has not made many good investments may lose bargaining power.) Third, when generalist firms are comprised of specialists, they may be more likely than generalists to spot good investment opportunities in their own industries. Thus, although they may have more at stake in having capital allocated to their own industry, they may also be more informed about good investments.

As noted above, another channel through which organizational specialization could affect performance is through the quality of investments within (not across) industries. Whether or not specialized firms are better than generalist firms at allocating capital across industries, one might think that specialized firms would make better investments if specialization makes them industry experts who have a better understanding of technology, markets, and people. This would presumably improve the quality of the investment, conditional on making an investment in the industry. Moreover, by the same reasoning, venture capitalists who are industry specialists themselves should be more likely to make higher quality investments in an industry (again conditional on committing capital to the industry).

Thus, to summarize, these theories suggest a number of alternative hypotheses.

1. Generalist venture capital firms will be better at allocating capital across industries (Stein (1997)).
2. Generalist venture capital firms will be worse at allocating capital across industries (Rajan, Servaes and Zingales (2000); Scharfstein and Stein (2000)).
3. Capital will be allocated better in generalist venture capital firms if the venture capitalists themselves are generalists.
4. To the extent that venture capitalists have high-powered financial interests in the performance of the firm as a whole, any misallocation of capital by generalist firms will be mitigated.
5. To the extent that venture capitalists are specialists, their greater knowledge of investment opportunities will lead to better allocations of capital across industries.
6. Specialization by venture capital firms and venture capitalists will lead to greater expertise and better investments within an industry.[1]

We find that generalist firms tend to *underperform* specialist firms. This underperformance exists both because generalist firms do not allocate capital as well across industries, and because they underperform in their investments within an industry.

[1]An alternative approach is suggested by Fulghieri and Sevilir (2005), who highlight the consequences of venture capitalists' portfolio choice for the decisions of entrepreneurs to devote effort to their ventures.

Importantly, however, this underperformance is mitigated to the extent that the venture capitalists in generalist firms are industry specialists. We similarly find in a supplemental analysis that firms consisting of investment specialists seem to be the most responsive to signals of investment opportunity when making investments.

Our findings are inconsistent with hypotheses (1) and (3). Generalist firms are not better than specialist firms, as predicted by (1). In fact, they are worse than specialist firms to the extent that their venture capitalists are generalists, contrary to the hypothesis (3). Moreover, there is not much difference in the performance of specialist and generalist firms, when the venture capitalists in the firms are specialists. This finding would appear to be more consistent with hypotheses (4), (5), and (6). Venture capitalist specialization increases the likelihood that venture capital firms spot good industries in which to invest, and make good investments within those industries (as suggested by (5) and (6)). And, because venture capitalists have high-powered financial incentives in the firm's overall performance, there are constraints in how much misallocation venture capitalists are willing to do (as suggested by (4)).

These findings would suggest that specialization at the individual level is more important than specialization at the firm level. However, our findings do not indicate that firm level characteristics are irrelevant. We find that venture capital firms with more experience tend to outperform those with less experience. By way of contrast, individual experience (conditional on firm experience) appears to have no effect on performance.

The paper is organized as follows. The next section describes the construction of the data and provides some basic summary statistics. Section 3 examines the

determinants of successful investments and the characteristics of the venture capital organizations and individual venture capitalists. Section 4 concludes the paper.

2. The Data

A. Constructing the Sample

Our data on venture investments come from Dow Jones Venture Source (formerly VentureOne). This database provides information about venture capital investors and the portfolio companies in which they invest, as well as the board composition of the portfolio companies. Gompers and Lerner (2004) provide a detailed description of this data set.

We consider only observations in which the venture capital investor serves on the board of the company.[2] The date associated with this relationship is the date of the first record of a venture capital organization and portfolio company pair, i.e., the first time the venture capitalist invests in a particular company, or if that information is not available, the founding date of the company. This approach results in a dataset with multiple observations for most portfolio companies since representatives of several venture capital firms typically serve on the board of a company. It does not consider the influence of other venture investors who do not serve on the board of directors. This focus seems reasonable since it is the board members who play a key role in selecting and overseeing the funds' investments.

[2]We consider the individual representing the venture capital firm on the board to be the one having made the investment decision: typically, the individual who champions the initial investment by a venture organization will also provide its oversight. While this is usually the case, there are rare instances in which one individual at the venture capital firm made the investment decision and another sits on the board.

Our analysis focuses on data covering investments from 1975 to 1998, dropping information prior to 1975 due to data quality concerns.[3] In keeping with industry estimates of a maturation period of three to five years for venture capital financed companies, we drop companies receiving their first venture capital investment after 1998 so that the outcome data can be meaningfully interpreted. As a result, we are not studying investments made at the height of the Internet boom (1999 and 2000) and the crash that followed.

In the analysis below, we will seek to relate to relate the organizational characteristics of the firm to its investment success. To do this, the organization needs to have a sufficient track record so that we can meaningfully characterize their approach. We consider only venture capital firms[4] who are associated with more than five boards, individual venture capitalists who serve on more than three boards, and firms with at least two investment professionals (that is, those firms with more than one professional serving on the board of a portfolio company in the sample period).

From 1975 to 1998, Venture Source provides information on 2,690 venture capitalists from 768 venture capital firms[5] serving on the boards of 6,168 portfolio

[3]Gompers and Lerner (2004) discuss the coverage and selection issues in Venture Economics and Venture Source data prior to 1975.

[4]We identify venture capital organizations by requiring that the organization that the board member is affiliated with be recorded as be included as an investor in the Venture Source database. This enables us to eliminate organizations that may have employees who are directors of venture-backed firms but are not venture capital investors (such as Harvard Business School).

[5]Venture capital firms typically raise funds several years apart. Except in the analysis reported in Table IX, we ignore to which fund a given venture firm assigned an investment. For instance, when computing cumulative firm experience, we consider all investments made by the Mayfield Fund, ignoring whether they were made by Mayfield III or Mayfield VI.

companies that met our criteria.[6] This results in a sample of 12,364 observations of unique venture capitalist – portfolio company pairs.

Reflecting the lack of concentration in the venture industry, no single group or set of groups dominates the sample. The most represented five venture organizations—New Enterprise Associates, Kleiner Perkins, U.S. Venture Partners, Bessemer Venture Partners, and Venrock Associates—collectively represent fewer than eight percent of the sample.

One complication is introduced by the fact that in some cases, we do not have corroboration that the fund of the venture capitalist serving on the board actually invested in the firm. In particular, we are able to confirm that the venture capitalist's firm invested in the company in 9,345 observations.[7] There are three reasons why might this discrepancy have come about. First, Venture Source codes venture capitalists with their most recent venture capital firm affiliation. Thus, for venture capitalists that have switched firms, we cannot always match the investment of their previous firm to the portfolio company. Second, the venture capitalist may serve on the board without their venture capital firm having invested, such as when he or she invests in a company as a private individual (though in many cases, limited partnership agreements prohibit such activities). Finally, the investment data may be incomplete. In supplemental regressions described below, we repeat the analysis using only the 9,345 observations where we can confirm that the venture organization invested.

[6]Venture Source provides information on all board members. We assume that a firm associated with a board member is a venture capital firm if the firm is observed making an investment in any company in the sample, although we may not have the information on the firm's investment in the company. We drop all observations for firms who we do not ever observe as making investments.

[7]Of the 12,364 observations, we confirmed that the venture capitalist invested in the company in 7,769 cases from Venture Source. We supplemented this with information from Thomson Venture Economics. Using this database, we were able to corroborate that the venture fund made the investment in an additional 1,576 observations.

B. Critical Measures and Summary Statistics

Before we turn to an analysis of the impact of organizational structure, there are two data construction issues we need to address. The first issue is how to classify the portfolio companies of the venture capitalists into industries. Our approach is to follow our earlier work (Gompers, Kovner, Lerner, and Scharfstein (2005)) and assign all investments into nine broad industry classes based on Venture Source's classification of the industry. The original sample of investments was classified into 125 separate industry segments. However, these 125 industries are too narrowly defined for our purposes, as they do not correspond to lines of specialization within or across venture capital firms. These 125 industries were thus combined to arrive at nine broader industries. The industries we construct from the narrower definitions are: Internet and Computers, Communications and Electronics, Business and Industrial, Consumer, Energy, Biotech and Healthcare, Financial Services, Business Services, and all other. While any industry classification is somewhat arbitrary, we believe that our classification scheme captures businesses that have similarities in technology and management expertise that would make specialization in such industries meaningful. In addition, this scheme minimizes the subjectivity associated with classifying firms into narrower industry groupings.

Table 1 shows the distribution across the nine broad industries. The first column is the number of companies in each industry. It is no surprise that Internet and Computers is the largest industry with 2,619 companies. Communications and Electronics, Biotech and Healthcare, and Consumer are the next largest industries with

between 334 and 1,447 companies. The other industries are considerably smaller. The table also reports the number of observations for each industry in our sample; there are more observations than companies because there are multiple board members in most of the companies in our sample. On average, there are 2.0 venture capital board members in each company who meet our criteria: that is, venture investors who serve on more then three boards and are affiliated with firms that have more than one venture capitalist, who collectively serve on more than five boards. The overall industry distribution provides some comfort that our industry classification is meaningful. While there is variation in the number of observations across industries, there are enough observations in each industry to make our analysis feasible.

The second issue is to measure the organizational structure and specialization choices of the venture capitalists and venture capital firms in the sample. The first panel of Table 2 presents data on characteristics of venture capital firms and people that we use throughout the paper. The first such characteristic, "Herfindahl," is the Herfindahl-Hirschman Index for the firm or person, i.e., the sum of the squares of the percentage of all previous investments in each industry (excluding the "all other" industry classification). Thus, a firm or person with a Herfindahl of 1 has invested in only one of the industries. We calculate this measure on the firm level and the person (venture capitalist) level. We also consider this measure for all the previous investments of the firm or person as well as for just the investments in a given year.

In addition, when considering the firm characteristics, we calculate an "average Herfindahl," which is the average of the Herfindahls of all the individual venture capitalists active at the firm. We consider a venture capitalist to be active at the firm in a

given year when they have made an investment in that year, or if they made an investment prior to that year and after that year.[8]

As controls, following our earlier paper (2005), we consider the following data items: "General Experience" is the total number of investments made by a venture capital firm prior to the time of the investment in question. "Industry Experience" is constructed similarly, but includes only investments in the same industry as the investment in question. The third characteristic, "Specialization", is the fraction of all previous investments that the venture capital organization made in a particular industry, i.e., this specialization measure is the ratio of industry to general experience. The specialization measure is not computed for the first investment by each venture organization.

Panel A of Table 2 summarizes the level of specialization for firms and individuals in our sample. We compare the Herfindahl of firms and individuals for the entire sample across all years and the Herfindahl that exists for firms at the end of our sample. First, we see that at the end of the sample, firms and individuals are more specialized than they were historically. The tabulation appears to indicate that firms on average (and at the median) have become more specialized (either as they mature, or the distribution of firms over time has changed). Individuals, on the other hand, appear to have remained similarly specialized over the sample.

Panel B of Table 2 shows the distribution of specialization by firms and people by quartile. The quartiles represent increasing degrees of specialization, where 1 indicates generalists and 4 specialists. The majority of observations are across the center diagonal, indicating that firms and venture capitalists tend to reflect each other: that is, firms of

[8]In the person-level calculations, we only compute these measures for active investors in a given fund and year.

generalists tend to be comprised of generalist partners while specialist firms are, not surprisingly, typically comprised of specialist individuals. However we do see some observations where firms of specialists have combined to become generalist firms (Firm quartile 1, Person quartiles 3 and 4).

Table 3 presents descriptive characteristics for each of the firm quartiles. Generalist firms (that is, firms in the lowest specialization quartile) have a mean firm Herfindahl of 0.24 vs. a mean firm Herfindahl of 0.82 for specialists. Generalist firms have higher levels of general experience, perhaps indicating a tendency to drift from specialization over time. (Indeed, the much greater degree of specialization in a given year for any particular venture capital firm suggests that this is the case.) Firms in the top two quartiles of generalists also appear to be larger, with more than four active people, again suggesting that there may be drift towards greater generality as a firm grows. Those in the highest specialization quartile tend to be somewhat smaller (3.2 active people) and less established (with less than half the general experience of the firms in the other quartiles).

3. The Analysis

We now turn to examining how the structure of venture capital organizations affects the success of their investments. We begin with cross-tabulations and then turn to a series of regression analyses.

A. Cross-Tabulations

A natural question is how to define investment success. Ideally, one would have data on the actual returns on the firm's investment. Unfortunately, the best we can do is to determine whether the investment resulted in what would appear to be a profitable exit for the venture capital firm. This is most likely the case if the company went public, registered for an IPO (as of the date we collected the data from Venture Economics), or was acquired or merged. Venture Economics does not collect valuation information for all of the companies that were merged or acquired and it is possible that these outcomes were not as lucrative as those where the company exited with a public offering. However, investments in the category we characterize as successes are likely to have generated higher returns that the investments those that have not yet exited or have been characterized as bankrupt or defunct.

Our data also allows us to breakdown success into its components. We examine "Mean Success," i.e., the raw rate of IPO, registration, or acquisition. Our second measure, we examine a given venture firm's (individual's) abnormal performance. We define abnormal performance as the difference between the individual investment performance and the average performance of other investments in that industry in that year. We denote this as "Industry Alpha" in the tables. Finally, we adjust success to examine the ability of a venture capital group or individual to rotate their investments into industries that are more attractive, denoted "Mix" in the tables. In each year, we calculate a firm's "Mix" success rate by utilizing the average industry success rate in the year of investment and the actual percentages invested in each industry. Thus we measure industry timing ability assuming a firm achieves industry average success rates for the industries in which they invested.

To illustrate these measures, consider a firm that invested in 8 deals, 4 in Consumer and 4 in Internet in one year. Further assume that 2 of the firm's consumer deals were successful (50%) and 1 of the firm's Internet deals was successful (25%). Assume that the average success rate in Consumer deals in that year was 25%, and the average success rate in Internet deals was 75%. The "Mix" success rate in that year would be 0.50 (0.50*0.25 +0.50*0.75). The "Industry Alpha" success rate in that year would be -0.125 ((0.50-0.25)*0.5 + (0.25-0.75)*0.5)).

Table 4 provides some initial indications of the patterns of success by venture capital firm characteristics. Panel A examines our three measures of success for each quartile of specialization at both the firm and the individual level. The tabulations suggest that the industry mixture chosen by venture capital firms with more specialization—particularly on the individual level—is more successful. The specialized firms and individuals, however, appear to select poorer companies in which to invest within these industries, i.e., their industry alpha is more negative. The best overall and industry adjusted performance is associated with more generalist venture capital firms. These results, as we shall see in the regressions, are influenced by generalist firms being more experienced on average. Hence, our conclusions here are only tentative, as the univariate comparisons do not control for other factors associated with success.

In Panel B, we divide the firms into four groups, depending upon whether the degree of specialization of the firm and that of the average investment professional is above or below the median. Again, the organizations that specialize and have specialized investment professional have, on average, the best selection of an industry mixture but the worst abnormal performance. Finally, in Panel C, we look at the correlation between

these measures. Interestingly, we see that picking the right industries and industry-adjusted alpha are uncorrelated. The correlation matrix also provides important insights into other variables that we need to control for in the regressions. Firm size, firm general experience, the average experience of individuals, and the round number are all positively correlated with success.

One consideration in the definition of specialization is that young venture capital firms are more likely to be in the first or fourth quartile. We later consider the results looking only at organizations at the point in time where they made more than twenty investments and achieve consistent results. Our interpretation of these tabulations must be cautious, of course, because of the lack of controls for industry, time period, and experience.

B. Regression Analyses of Success

We approach the regression analyses of success in a similar manner to the cross-tabulations above. We first consider overall success, and then decompose success into the selection of the proper industry mixture and of firms that exceeded the average industry performance.

In Table 5, we examine overall success. We construct observations in each year for each industry in which the venture capitalist made an investment in a company. For each firm-industry-year observation, we indicate the average success of all initial investments made by the venture capital firm in that industry and year. We use as observations each year and industry in which a venture capital group made an initial investment: that is, we omit cases where the venture group did not make an investment in

a given industry and year, as well as cases where all investments were into firms in which the group had previously invested. In all regressions we add controls for the year of the investment to control for the differences across the periods.

In the basic regressions, increased specialization of the venture capital organization is associated with greater average success, indicated by the consistent positive sign on the firm Herfindahl. The interaction between firm and individual specialization, however, is significantly negative. Examining the relative size of the coefficients indicates that the marginal effect of increasing individual specialization for relatively specialized firms negatively affects performance while it enhances the performance of very generalist firms. On the other hand, holding individual investors' specialization constant, increasing firm specialization enhances firm performance. The poorest performance is associated with unspecialized firms with generalist investors. These findings are consistent with the first and third hypotheses delineated in the introduction.

In addition to the specialization measures, we include measures of investment experience for the firm and individuals to identify the impact that experience has on investment performance.[9] Experience is defined as the total number of prior investments that the firm or individual has made. We find that firm generalist experience is positively related to success while individual generalist experience is unrelated to success.[10] The result may indicate that broader reputation and network issues are present at the firm level as well as the presence of learning (knowledge spillovers) across firm partners.

[9]We want to ensure that the results from specialization are not driven by the relative experience of specialized and generalist venture capital groups (individuals).

[10]The presence of a relationship between venture firm experience and success is documented by Kaplan and Schoar (2005) and Lerner, Schoar, and Wong (2006), but those works does not attempt to disentangle the importance of individual and organizational experience.

The differences in success are also economically meaningful. For instance in column 3, a generalist firm (that is, at the 25th percentile of firm Herfindahl, or 0.306) with generalist people (a Herfindahl of 0.574) has a success rate that is 2.2% percent below that of a generalist firm with specialized people (at the 75th percentile, or a Herfindahl of 0.864). (Thus, if a generalist firm with generalist people in a given industry and year had a success rate of 50%, the success rate of an equivalent firm with more specialized people would be 52.2%.) The difference in success between a generalist firm with specialized people and a specialized firm (a Herfindahl of 0.556) with specialized people is more modest: an additional 1.0%.

These results continue to be robust when we make a number of changes. These include adding controls for the number of investment professionals and the industry mixture. In addition, we tried adding a control for the round number at which the venture group typically invested (which sharply decreases the sample size), restricting the sample to venture groups that made twenty or more investments, weighting the observations by the number of investments made by the venture capital firm in the observation year, and controlling for the percentage of transactions in each industry. The pattern was similar in magnitude for all changes.

We next examine the determinants of a successful investment mixture. The dependent variable is the average industry success for investments made in a given year for each year in which the venture capitalist made an investment. In other words, Table 6 examines what fraction of the firm's overall success is driven by picking the right industry at the right time.

Table 6 reports that both firm and individual specialization are associated with greater success, but again the interaction is strongly negative. If the individual investors within a venture capital firm are generalists, the marginal effect of increasing firm specialization will be to boost the probability of selecting a good industry mix substantially. Firm specialization enhances performance at the margin when individual investors are generalists. Said another way, when venture capitalists individually invest across industries, they are better off if their partners are investing in the same industries. If individual investors are specialists already, the marginal impact of increasing firm specialization will be close to zero. This result is consistent with the second hypothesis in the introduction.

These effects continue to be strong when we control for experience at the firm and venture capitalist level and firm size, stage of investment, control for fixed effects for the main industry focus of the firm (i.e., to control for the fact that biotechnology deals are more successful on average and also that venture firms specializing in biotechnology transactions tend to be more specialized), limit the sample to firms with more than twenty investments prior to the year of the observation, weight the observations by the number of deals done by the venture firm in a year, and control for the industry with the most investments.

While the differences have a substantial amount of statistical significance, the economic magnitude is somewhat modest. A shift from a generalist firm with generalist people to a generalist firm with specialized people only increases success by 0.7%. A change from a generalist firm with specialist people to a specialized firm with specialized people leads to an increase of only an additional 0.1%.

One interpretation of this result is that a very generalist individual may not be able to identify the better investment sectors. A modicum of specialization at the individual and/or firm level provides flexibility to move into better sectors, but also may provide the ability and knowledge to identify them (or perhaps better access to deals). However, increased specialization may mean a lack of relevant expertise or deal access in other promising sectors.

Also striking is the fact that the firm's general experience has a large positive effect on investment mix success, while the average general experience of the individual investor has no significant effect This suggests that more established venture groups' reputations cross industry boundaries. The reputation of individual investors, however, is much more likely to be confined to individual industries and not carry over to other sectors.

Table 7 looks at excess performance. The dependent variable is the difference between the firm's industry-year performance and the average industry-year performance for all venture capital investments made in that year. The patterns here are much less consistent. Initially, the familiar pattern of a positive coefficient on firm Herfindahl terms and a negative interaction term appears. But the coefficients vary wildly in significance as we add additional control variables, limit the sample to the most seasoned experienced investors, and weight the observations. Thus, this analysis provides only week support for the sixth hypothesis in the introduction.

One result that remains strong throughout the table, however, is the effect of firm general experience. Firm general experience is always significantly related to outperforming industry average success rates. Surprisingly, average individual

experience seems to have no effect on success. Firms which have invested in more deals are either selecting better investments or are better able to make their investments successful. However, experienced board members do not appear to have the same effect.

C. Robustness Checks

We next conduct a series of robustness checks. In Table 8, we use each investment by a venture group as a separate observation rather than averaging success for the venture group by industry and year. The dependent variable is the success of the individual company. Here we see the familiar pattern, with more concentrated investments at the individual and firm level being associated with greater success, but a negative interaction term. The significance of these terms, however, varies across various specifications.

We also explore other deal attributes and their effect on success. Because we are looking at individual deals, we can control for individual investor characteristics. In particular, we control for individual and firm experience in and outside of the particular industry. Only the individual's industry experience is positively related to success while both firm industry and non-industry experience are related to investment success. An individual investor's experience outside the industry is unrelated to his/her success in the particular investment. Finally, we see via the interaction terms in column 4 that greater firm experience in the industry enhances the effectiveness of the individual's industry experience, but that greater firm experience outside of the investment's industry reduces the impact of an individual investor's industry experience.

One limitation of the earlier analysis, as noted above, is that the dependent variables only measure the type of exit achieved and not the actual rates of return. Investments that are labeled as successes above may have widely different performance, with some generating spectacular returns and others much more modest ones (for evidence regarding the skewness of venture capital returns, see Cochrane [2005]).

An alternative approach is to examine the returns on a fund level. To do this, we match the investments made by each venture organization to the fund returns. Our source for return data is the *2004 Private Equity Performance Monitor*, which presents return data on over 1,700 private equity funds. This information is compiled by Mark O'Hare, who over the past five years has created a database of returns from public sources (e.g., institutional investors who have posted their returns online), Freedom of Information Act requests to public funds, and voluntary disclosures by both general and limited partners. In order to do this mapping, we need to make some assumptions. (For instance, because Mayfield V was raised in 1984 and Mayfield VI in 1988, we attribute all new investments made between 1984 and 1987 to Mayfield V.)

Table 9 presents these results. We once again see the familiar performance pattern at the industry-year and deal levels, i.e., a positive effect of firm and individual specialization on performance with a negative interaction term. While many of the coefficients are insignificant, the noise in fund returns data and the smaller sample size may account for the lower significance levels. With fund returns, the marginal effect of increasing individual specialization is always positive. Specialized individuals appear to be good for both generalist and specialist venture capitalist firms, although the marginal effect is higher for relatively generalist firms.

The magnitude of the effects is quite dramatic. Moving from a generalist firm with generalist people to a generalist firm with specialized people increases the IRR by 14.1%. There is no added premium in organizational specialization, however: moving from a generalist firm with generalist people to a specialized firm with specialized people increases the IRR by 11.2%.[11]

We also conducted a series of unreported robustness checks. It is possible that the organizational structure of a firm might change over time as partners join and exit the firm. Thus we considered an alternate measure of firm Herfindahl which looks only at the firm's investments and/or board memberships within five years, rather than the primary measure used in the paper. Results were similar consistently to those reported in the paper and in fact are slightly stronger.

We also considered an alternate specification for the measure of success due to industry mix. We ran an a two stage regression in which the first stage controlled for the fixed effect of percentage investment in industry in a year, and the second stage used the residual from the first stage as the dependent variable. The residual from the first stage regression had a correlation of 0.8943 with the primary measure of success due to mix used in the paper. The results were similar to those reported.

Finally, as noted above, in a fraction of cases, we are unable to be sure that the venture capital firm of a venture capitalist who is a director of a company invested in that concern. We repeated the analyses using only the 9,345 cases where we can confirm that the venture capitalist's firm invested in the company. The results are once again little changed.

[11]We also use as our measure of success an indicator of the percentage of portfolio companies that went public (that is, we do not count firms that were acquired or simply registered to go public as successes.) The results are little changed.

D. Regression Analysis of Market Responsiveness

A supplemental analysis looks at shifts in investment rate among investors with different levels of specialization. In our earlier paper (2005), we show that experienced and specialized groups appear to be more responsive to changing investment opportunities, as proxied for by the number of venture-backed IPOs and Tobin's q in an industry. The increased responsiveness of investment appears to be a rational response to changing opportunities, as they perform as well or even better than those made when market conditions are less favorable.

In Table 10, we examine the propensity of individual venture capitalists to make investments in given industries where they have been previously active. We look at the response to the number of IPOs in the industry in question, which, as we argued in the earlier paper, is a proxy for investment opportunities. We also look at the sensitivity to IPOs in other industries, which may affect the firm's financial resources (venture firms may find it easier to fundraise in "hot" markets), but should not affect investment opportunities in the given industry. Column 1 reports that when the number of IPOs in a given industry is higher, more specialized venture investors will increase their investment rate, while less specialized ones will not. Similarly, when there are more opportunities in *other* industries, specialized venture investors will increase their investment rate, but only if the other investment processionals in the firms are not specialized. The results in column 2, which adds a series of interaction terms, are similar: it is the firms which have the most specialists which are simultaneously the most responsive to the IPOs in a given industry, and the least responsive to IPOs in other industries.

This analysis suggests a possible reason for the poor performance of firms with generalist venture investors. If a firm is compromised exclusively of generalists, it is unlikely to be willing or able to respond to shifts in investment opportunities. If the firm adds a small number of specialists to its ranks, a second distortion appears: an apparently inefficient allocation of capital along the lines discussed by Rajan, Servaes and Zingales (2000), Scharfstein (1998), and Scharfstein and Stein (2000). It is only in organizations dominated by specialized individuals where these problems are avoided.

4. Conclusions

This paper seeks to understand the impact of organizational structure—and in particular, investment specialization—on the success of venture capital investments. Venture capital is an attractive setting to examine these issues because of the diversity of structures, the detailed information available about the activities of organizations and individuals, and the youth of the industry.

We find that the performance of specialized firms appears to be better in general. This reflects the industry-specific human capital developed by specialist venture investors: in cases where the individual partners are highly specialized, the marginal benefit of increased venture capital firm concentration appears to be very limited. Organizational characteristics, however, are not irrelevant: we see that venture capital firms with more experience outperform those with less, and that there is no marginal experience of individual experience (conditional on firm experience).

This work leaves a number of questions unanswered. One important issue is what drives the structure of venture organizations. In this paper, we have taken the

organization of the venture capital funds as given. While this may be reasonable in the short run—typically venture firms are loath to replace partners over the course of a given partnership, particularly those serving on boards of directors—over time various changes are made. In subsequent work, we hope to better understand how the mixture of both junior and senior investment professionals evolves over time.[12]

A second question relates to the generality of the results. The activity of venture capital organizations is based primarily on intangible assets, human capital in particular. We might expect other firms that have a high dependency on human, as opposed to physical, capital might be affected similarly by experience and specialization. This would argue for examining these effects in accounting, consulting, financial service, or law firms (see, for instance, Berger, et al. (2005) and Garicano and Hubbard (2003, 2006)). Examining the relative activity and performance of differentially specialized service based companies would be particularly interesting.

[12]One natural question is whether generalist venture firms are simply failed specialists. Thus, our results might be explained by the tendency of firms to abandon their initial area of specialization if their investments prove unsuccessful. In our initial analysis of this question, the evidence appears mixed. For instance, when we compare in univariate tests venture firms' specialization after their first ten and twenty deals, the firms whose first ten transactions were more successful diversify less quickly than the others. But when we estimate regressions to understand this relationship more systematically (i.e., when we regress the average Herfindahl at three-year intervals on previous success and various control variables), a consistent pattern does not appear.

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Table 1: Summary Statistics: Industry Composition

Industry	Companies	Obs.
Internet and Computers	2,619	5,219
Communications and Electronics	887	1,765
Business / Industrial	146	227
Consumer	334	591
Energy	22	30
Biotech and Healthcare	1,447	3,296
Financial Services	97	180
Business Services	330	574
All other	286	482
Total	6,168	12,364

The compilation of observations includes only cases where board members associated with firms have made more than 5 investments over the course of the sample, with more than 1 active person at the firm, and with the board member serving on more than 3 boards in the sample.

Table 2: Summary Statistics – Characteristics

Panel A: Characteristics of Firms and People

	25%	Median	75%	Mean	N
Firm Level Statistics					
Firm Herfindahl	0.3061	0.4083	0.5556	0.4753	3,621
Firm Herfindahl In Year	0.4444	0.6400	1.0000	0.6945	3,621
Avg. Herfindahl of People at Firm	0.5742	0.7222	0.8639	0.7134	3,621
End of Sample (1998 or last observation of firm)					
Firm Herfindahl	0.3332	0.4545	0.6795	0.5276	768
Firm Herfindahl In Year	0.4644	0.7083	1.0000	0.7077	768
Avg. Herfindahl of People at Firm	0.5556	0.7222	0.9087	0.7082	768
Person Level Statistics					
Person Herfindahl	0.4444	0.6250	1.0000	0.6777	8,127
Person Herfindahl In Year	0.5000	1.0000	1.0000	0.7760	8,127
End of Sample (1998 or last observation of firm)					
Person Herfindahl	0.4793	0.6296	1.0000	0.6923	2,690
Person Herfindahl In Year	0.5000	1.0000	1.0000	0.7792	2,690

Panel B: Specialization by Firm and By Person

		Average Person Herf. Quartile				
Firm Herf. Quartile		**1**	**2**	**3**	**4**	**Total**
		0 to 0.57	*0.57 to 0.72*	*0.72 to 0.86*	*0.86 to 1*	
1	*0 to 0.31*	497	272	100	30	899
2	*0.31 to 0.41*	249	326	246	88	909
3	*0.41 to 0.56*	137	214	300	257	908
4	*0.56 to 1*	22	93	252	538	905
Total		905	905	898	913	3,621

One observation per firm-year or person-year in years in which the firm or person made an investment in the company in which they are serving on the board (or the founding date of the company if investment information is not available). Includes only observations of board members associated with venture capital firms who have made more than 5 investments, with more than 1 active person at the firm, and with the board member serving on more than 3 boards in the sample.

Note: Correlation of firm Herfindahl and average Herfindahl of people at firm for this sample as of the latest pre-1999 observation was 0.7298.

Table 3: Selected Statistics by Firm Herfindahl Quartile

Firm Herf. Quartile		Mean	SD	N
1	Firm Herfindahl	0.2353	0.0520	899
	Firm Herf. In Year	0.5593	0.3347	899
	Avg. Herf. of People at Firm	0.5389	0.1796	899
	General Experience	22.04	24.38	899
	Industry Experience	4.91	7.44	899
	Average Round Number	1.92	1.32	676
	Number of Active People	4.30	2.89	899
	Mean Gen'l Experience of People	3.42	2.70	899
	Mean Industry Focus in Year	0.20	0.13	899
2	Firm Herfindahl	0.3565	0.0287	909
	Firm Herf. In Year	0.6382	0.3014	909
	Avg. Herf. of People at Firm	0.6632	0.1623	909
	General Experience	23.43	30.36	909
	Industry Experience	7.51	11.95	909
	Average Round Number	1.88	1.15	602
	Number of Active People	4.34	2.83	909
	Mean Gen'l Experience of People	3.37	2.74	909
	Mean Industry Focus in Year	0.27	0.15	909
3	Firm Herfindahl	0.4900	0.0459	908
	Firm Herf. In Year	0.7489	0.2851	908
	Avg. Herf. of People at Firm	0.7644	0.1705	908
	General Experience	11.34	14.30	908
	Industry Experience	4.67	7.58	908
	Average Round Number	1.85	1.14	503
	Number of Active People	3.17	1.77	908
	Mean Gen'l Experience of People	2.30	2.22	908
	Mean Industry Focus in Year	0.34	0.21	908
4	Firm Herfindahl	0.8210	0.1692	905
	Firm Herf. In Year	0.8326	0.2512	905
	Avg. Herf. of People at Firm	0.8830	0.1344	905
	General Experience	10.99	12.68	905
	Industry Experience	7.98	10.26	905
	Average Round Number	1.87	1.30	527
	Number of Active People	3.05	1.36	905
	Mean Gen'l Experience of People	2.39	2.45	905
	Mean Industry Focus in Year	0.73	0.28	905
Total	Firm Herfindahl	0.4760	0.2373	3,621
	Firm Herf. In Year	0.6950	0.3123	3,621
	Avg. Herf. of People at Firm	0.7127	0.2060	3,621
	General Experience	16.94	22.44	3,621
	Industry Experience	6.27	9.61	3,621
	Average Round Number	1.88	1.23	2,308
	Number of Active People	3.72	2.39	3,621
	Mean Gen'l Experience of People	2.87	2.59	3,621
	Mean Industry Focus in Year	0.38	0.29	3,621

One observation per firm year or person year in years in which the firm or person made an investment. Includes only observations of board members associated with venture capital firms who have made more than 5 investments, with more than 1 active person at the firm, and with the board member serving on more than 3 boards in the sample.

Table 4: Performance Measures

Panel A: Performance Measures by Firm and Person Quartiles

Firm Herf. Quartile		Mean	SD	N	Avg. Person Herf. Quart.		Mean	SD	N
1	Mean Success	0.5701	0.3857	899	**1**	Mean Success	0.5777	0.3935	905
	Industry Alpha	0.0116	0.3196	899		Industry Alpha	0.0134	0.3260	905
	Mix	0.5522	0.1609	899		Mix	0.5596	0.1605	905
2	Mean Success	0.5765	0.3854	909	**2**	Mean Success	0.5898	0.3679	905
	Industry Alpha	0.0079	0.3408	909		Industry Alpha	0.0312	0.3196	905
	Mix	0.5631	0.1650	909		Mix	0.5495	0.1619	905
3	Mean Success	0.5568	0.4149	908	**3**	Mean Success	0.5770	0.3883	898
	Industry Alpha	-0.0135	0.3708	908		Industry Alpha	0.0121	0.3478	898
	Mix	0.5624	0.1672	908		Mix	0.5605	0.1718	898
4	Mean Success	0.5590	0.4093	905	**4**	Mean Success	0.5185	0.4390	913
	Industry Alpha	-0.0044	0.3663	905		Industry Alpha	-0.0545	0.3956	913
	Mix	0.5564	0.1827	905		Mix	0.5646	0.1814	913

Panel B: Industry Alpha Measures by Organization Type

Organization Type		Mean	SD	N
Generalist Firm	Mean Success	0.5802	0.3807	1,344
Generalist People	Industry Alpha	0.0187	0.3212	1,344
	Mix	0.5567	0.1588	1,344
Generalist Firm	Mean Success	0.5534	0.3987	464
Specialist People	Industry Alpha	-0.0163	0.3547	464
	Mix	0.5606	0.1746	464
Specialist Firm	Mean Success	0.5940	0.3817	466
Generalist People	Industry Alpha	0.0326	0.3279	466
	Mix	0.5485	0.1680	466
Specialist Firm	Mean Success	0.5454	0.4214	1,347
Specialist People	Industry Alpha	-0.0233	0.3806	1,347
	Mix	0.5632	0.1774	1,347
Total	Mean Success	0.5656	0.3990	3,621
	Industry Alpha	0.0004	0.3500	3,621
	Mix	0.5586	0.1691	3,621

Panel C: Correlation Matrix

	Mean Success	Ind. Alpha	Mix	# of People at Firm	Gen'l Firm Exp.	Avg. Exp. of People at Firm	Mean Focus of Firm In Deals	Mean Round # of Deals
Mean Success	1.0000							
Industry Alpha	0.8830*	1.0000						
Mix	0.4060*	0.0047	1.0000					
Number of People at Firm	0.0325	0.0965*	-0.1192*	1.0000				
General Firm Experience	0.0199	0.1199*	-0.1963*	0.7958*	1.0000			
Avg. Experience of People at Firm	0.0212	0.1230*	-0.1993*	0.3150*	0.6882*	1.0000		
Mean Focus of Firm In Deals	-0.0127	-0.0020	-0.0291	-0.0607*	-0.0361*	0.0258	1.0000	
Mean Round Number of Deals	0.0954*	0.0743*	0.0578*	-0.036	-0.0332	-0.0131	-0.0109	1.0000

** indicates significance at the 5% level*

One observation per firm year or person year in years in which the firm or person made an investment. Includes only observations of board members associated with venture capital firms who have made more than 5 investments, with more than 1 active person at the firm, and with the board member serving on more than 3 boards in the sample. In Panel B, “generalist” and “specialist” refer to people below and above the median Herfindahl index.

Table 5: Mean Yearly Success

	(1) OLS		(2) OLS		(3) OLS		(4) OLS		(5) Weighted OLS		(6) OLS		(7) OLS	
Firm Herfindahl	0.5522		0.4334		0.3784		0.7390		0.3782		0.5162		0.4283	
	[3.87]	***	*[3.11]*	***	*[2.46]*	**	*[2.11]*	**	*[2.53]*	**	*[3.65]*	***	*[3.06]*	***
Avg. Herfindahl of People at Firm	0.1032		0.1025		0.1941		0.2716		0.1458		0.0712		0.0846	
	[1.35]		*[1.33]*		*[2.20]*	**	*[1.77]*	*	*[1.80]*	*	*[0.91]*		*[1.07]*	
Firm x Avg. Person Herfindahl	-0.5990		-0.4171		-0.3906		-0.7701		-0.3907		-0.5599		-0.4006	
	[3.66]	***	*[2.58]*	***	*[2.18]*	**	*[1.83]*	*	*[2.26]*	**	*[3.44]*	***	*[2.47]*	**
Firm General Experience			0.0583		0.0534		0.1131		0.0619				0.0609	
			[3.39]	***	*[2.61]*	***	*[3.46]*	***	*[3.24]*	***			*[3.53]*	***
Avg. Gen'l Experience of People at Firm			0.0028		-0.0040		-0.0073		-0.0008				0.0016	
			[0.65]		*[0.82]*		*[1.15]*		*[0.17]*				*[0.38]*	
Controls:														
Year Fixed Effects	yes		yes		yes		yes		yes		yes		yes	
Number of People at Firm			yes		yes		yes		yes		yes		yes	
Mean Round Number of Deals					yes		yes		yes					
Percent in Each Industry											yes		yes	
Experience restriction?:	*5 total*		*5 total*		*5 total*		*>20 previous*		*5 total*		*5 total*		*5 total*	
Observations	3,621		3,621		2,308		807		2,308		3,621		3,621	
R-squared	14.7%		16.6%		18.4%		24.2%		26.9%		15.2%		17.0%	

The sample consists of 768 VCs with 2,690 firm members serving on the boards of 6,168 companies from 1975 to 1998, inclusive, as compiled by Venture Source, with one observation per VC-year, including only board members associated with venture capital firms who invested in more than 5 companies in the sample with more than one active person at the firm, and with all board members who served on more than 3 boards. The fifth specification includes observations only for firms that had made more than 20 investments previous to the year of observation. The sixth specification weights observations by the number of investments made by that firm in that year. The dependent variable is *Mean Yearly Success*, the average of the success rates for all companies invested in by the VC in the sample. The success rates being averaged is a binary variable =1 if the portfolio company was acquired, merged, in registration for an IPO (as of the date we collected the Venture Source data), or went public, and =0 otherwise. *Firm Herfindahl* is the sum of the squares of the percentage of all previous investments in each industry that the VC firm partners are on the board of (excluding the industry all other). *Avg. Herfindahl of People at Firm* is the average of the Herfindahl for each active venture capitalist at the VC firm. *Firm General Experience*$_t$ is the difference between the log of the number of investments made by venture capital organization *f* prior to year t and the average in year *t* of the number of investments made by all organizations prior to year *t*. *Avg. Gen'l Experience of People at Firm*$_t$ is the average number of investments made by people associated with the firm prior to date *t*.
Standard errors are clustered at VC firm level. T-statistics are in brackets italics below coefficient estimates.
***, **, * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 6: Performance Due to Mix

	(1) OLS		(2) OLS		(3) OLS		(4) OLS		(5) Weighted OLS		(6) OLS	
Firm Herfindahl	0.1320		0.1279		0.1746		0.3515		0.1720		0.1000	
	[4.03]	***	*[3.74]*	***	*[4.18]*	***	*[4.15]*	***	*[5.53]*	***	*[3.14]*	***
Avg. Herfindahl of People at Firm	0.0392		0.0350		0.0842		0.1533		0.0588		0.0366	
	[2.33]	**	*[2.06]*	**	*[4.06]*	***	*[3.64]*	***	*[3.60]*	***	*[2.23]*	**
Firm x Avg. Person Herfindahl	-0.1306		-0.1186		-0.1980		-0.4542		-0.1781		-0.1112	
	[3.53]	***	*[3.10]*	***	*[4.16]*	***	*[4.55]*	***	*[4.87]*	***	*[3.12]*	***
Firm General Experience			0.0044		0.0129		0.0360		0.0108		-0.0078	
			[0.84]		*[2.46]*	**	*[3.57]*	***	*[2.89]*	***	*[1.46]*	
Avg. Gen'l Experience of People at Firm			-0.0002		-0.0020		-0.0031		-0.0006		0.0018	
			[0.18]		*[1.40]*		*[1.77]*	*	*[0.53]*		*[1.33]*	
Controls:												
Year Fixed Effects	yes		yes		yes		yes		yes		yes	
Number of People at Firm			yes		yes		yes		yes		yes	
Mean Round Number of Deals					yes		yes		yes			
Max Industry Fixed Effects											yes	
Experience restriction?:	*5 total*		*5 total*		*5 total*		*>20 previous*		*5 total*		*5 total*	
Observations	3,621		3,621		2,308		807		3,621		3,621	
R-squared	73.3%		73.4%		79.1%		83.6%		82.6%		75.5%	

The sample consists of 768 VCs with 2,690 firm members serving on the boards of 6,168 companies from 1975 to 1998, inclusive, as compiled by Venture Source, with one observation per VC-year, including only board members associated with venture capital firms who invested in more than 5 companies in the sample in the sample with more than one active person at the firm, and with all board members who served on more than 3 boards. The sixth specification includes observations only for firms that had made more than 20 investments previous to the year of observation. The seventh specification weighted observations by the number of investments made by that firm in that year. The dependent variable is *Yearly Success due to Mix*, the product of the percentage of deals by the VC firm in given industries and the average success rate for all VCs in that industry in that year. The success rates being averaged across all VCs is a binary variable =1 if the portfolio company was acquired, merged, in registration for an IPO (as of the date we collected the Venture Source data), or went public, and =0 otherwise. *Firm Herfindahl* is the sum of the squares of the percentage of all previous investments in each industry that the VC firm partners are on the board of (excluding the industry all other). *Avg. Herfindahl of People at Firm* is the average of the Herfindahl for each active venture capitalist at the VC firm. *Firm General Experience*$_t$ is the difference between the log of the number of investments made by venture capital organization *f* prior to year t and the average in year *t* of the number of investments made by all organizations prior to year *t*. *Avg. Gen'l Experience of People at Firm*$_t$ is the average number of investments made by people associated with the firm prior to date *t*.
Standard errors are clustered at VC firm level. T-statistics are in brackets italics below coefficient estimates.
***, **, * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 7: Performance Due to Industry Alpha

	(1) OLS		(2) OLS		(3) OLS		(4) OLS		(5) Weighted OLS	
Firm Herfindahl	0.3861		0.2785		0.1912		0.3963		0.1396	
	[3.10]	***	*[2.28]*	**	*[1.41]*		*[1.20]*		*[1.10]*	
Avg. Herfindahl of People at Firm	0.0352		0.0406		0.0995		0.0907		0.0404	
	[0.52]		*[0.60]*		*[1.33]*		*[0.63]*		*[0.59]*	
Firm x Avg. Person Herfindahl	-0.4259		-0.2660		-0.1760		-0.3075		-0.1220	
	[2.95]	***	*[1.86]*	*	*[1.12]*		*[0.78]*		*[0.85]*	
Firm General Experience			0.0398		0.0378		0.0703		0.0476	
			[2.54]	**	*[2.00]*	**	*[2.21]*	**	*[2.69]*	***
Avg. Gen'l Experience of People at Firm			0.0063		-0.0006		-0.0021		0.0013	
			[1.61]		*[0.14]*		*[0.36]*		*[0.29]*	
Controls:										
Year Fixed Effects	yes		yes		yes		yes		yes	
Number of People at Firm			yes		yes		yes		yes	
Mean Round Number of Deals					yes		yes			
Experience restriction?:	*5 total*		*5 total*		*5 total*		*>20 previous*		*5 total*	
Observations	3,621		3,621		2,308		807		2,308	
R-squared	1.2%		3.2%		2.7%		5.2%		4.7%	

The sample consists of 768 VCs with 2,690 firm members serving on the boards of 6,168 companies from 1975 to 1998, inclusive, as compiled by Venture Source, with one observation per VC-year, including only board members associated with venture capital firms who invested in more than 5 companies in the sample with more than one active person at the firm, and with all board members who served on more than 3 boards. The sixth specification includes observations only for firms that had made more than 20 investments previous to the year of observation. The seventh specification weights observations by the number of investments made by that firm in that year. The dependent variable is *Yearly Success due to Performance*, the weighted average of the difference between the mean success rate of a given VC firm and the average success of all VC firms in that industry, with weights equal to a firm's actual mix. The success rate being averaged across all VCs is a binary variable =1 if the portfolio company was acquired, merged, in registration for an IPO (as of the date we collected the Venture Source data), or went public, and =0 otherwise. *Firm Herfindahl* is the sum of the squares of the percentage of all previous investments in each industry that the VC firm partners are on the board of (excluding the industry all other). *Avg. Herfindahl of People at Firm* is the average of the Herfindahl for each active venture capitalist at the VC firm. *Firm General Experience*$_t$ is the difference between the log of the number of investments made by venture capital organization *f* prior to year t and the average in year *t* of the number of investments made by all organizations prior to year *t*. *Avg. Gen'l Experience of People at Firm*$_t$ is the average number of investments made by people associated with the firm prior to date *t*.
Standard errors are clustered at VC firm level. T-statistics are in brackets italics below coefficient estimates.
***, **, * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 8: Deal-Level Performance

	(1) OLS		(2) OLS		(3) OLS		(4) OLS		(5) OLS	
Firm Herfindahl	0.0791		0.0571		0.2904				0.4448	
	[0.80]		*[0.58]*		*[1.61]*				*[2.27]*	**
Avg. Herfindahl of People at Firm	0.0422		0.0525		0.0611				0.0288	
	[1.90]	*	*[2.39]*	**	*[2.03]*	**			*[0.53]*	
Firm x Avg. Person Herfindahl	-0.1272		-0.1086		-0.2622				-0.2475	
	[1.32]		*[1.13]*		*[1.41]*				*[1.30]*	
Industry Experience (Person)							0.0227		0.0018	
							[2.99]	***	*[0.06]*	
Non-Industry Experience (Person)							-0.0043			
							[0.59]			
Non-Industry Experience							0.0239			
(Firm ex. Person)							*[3.75]*	***		
Industry Experience							0.0149			
(Firm ex. Person)							*[2.09]*	**		
Non-Industry Experience (Firm)									0.0260	
									[0.77]	
Industry Experience (Firm)									0.0255	
									[0.75]	
General Experience (Person)									0.0056	
									[0.23]	
Interactions:										
Ind. Exp. (Person) x							0.0140			
Ind. Exp. (Firm ex. Person)							*[1.75]*	*		
Ind. Exp. (Person) x							-0.0152			
Non Ind. Exp. (Firm ex. Person)							*[2.27]*	**		
Non Ind. Exp. (Person) x Non Ind.							0.0091			
Exp. (Firm ex. Person)							*[1.22]*			
Non Ind. Exp. (Person) x							-0.0110			
Ind. Exp. (Firm ex. Person)							*[1.32]*			
Controls:										
Year Fixed Effects	yes				yes		yes		yes	
Industry Fixed Effects	yes				yes		yes		yes	
Round Fixed Effects	yes		yes		yes		yes		yes	
Industry x Year Fixed Effects			yes							
Experience restriction?:	*5 total*		*5 total*		*>20 Previous*		*5 total*		*>20 Previous*	
Observations	8,362		8,362		4,818		8,583		4,609	
R-squared	11.5%		14.6%		10.6%		12.4%		10.9%	

The sample consists of 768 VCs with 2,690 firm members serving on the boards of 6,168 companies from 1975 to 1998, inclusive, as compiled by Venture Source, with one observation per VC-company, including only board members associated with venture capital firms who invested in more than 5 companies in the sample with more than one active person at the firm, and with all board members who served on more than 3 boards. The dependent variable is *Success*, a binary variable =1 if the portfolio company was acquired, merged, in registration for an IPO (as of the date we collected the Venture Source data), or went public, and =0 otherwise. *Firm Herfindahl* is the sum of the squares of the percentage of all previous investments in each industry that the VC firm partners are on the board of (excluding the industry all other). *Avg.*

Herfindahl of People at Firm is the average of the Herfindahl for each active venture capitalist at the VC firm. Experience is the difference between the log of the number of investments made by venture capital organization *f* (or person *p*) prior to year *t* and the average in year *t* of the number of investments made by all organizations prior to year *t*. *Industry Experience* is the difference between the log of the number of investments made by venture capital organization *f* in industry *g* prior to year *t* and the average in year *t* of the number of investments made by all organizations in industry g prior to year *t*. *Non Industry Experience* is the difference between the log of the number of investments made by venture capital organization *f* (or person *p*) in industries other than *g* (~*g*) prior to year *t* and the average in year *t* of the number of investments made by all organizations in all industries other than *g* (~*g*) prior to year *t*.
Standard errors are clustered at the portfolio company level. T-statistics are in brackets italics below coefficient estimates.
***, **, * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 9: Results on Fund Level

	(1) OLS		(2) OLS		(3) OLS		(4) Median		(5) OLS
Fund Herfindahl	46.8027		63.6882		51.6117		-7.4266		
	[0.96]		*[0.93]*		*[0.95]*		*[0.43]*		
Avg. Herf. of People Active in Fund	54.4482		75.7604		70.9948		6.5681		
	[1.70]	*	*[1.77]*	*	*[1.71]*	*	*[0.45]*		
Fund x Avg. Person Herfindahl	-77.3550		-77.3771		-73.0305		14.3594		
	[1.22]		*[0.95]*		*[0.99]*		*[0.59]*		
Firm General Experience									0.8252
									[0.19]
Avg. Gen'l Experience									-2.2121
of People Active in Fund									*[0.54]*
Controls:									
Vintage Year Fixed Effects	yes		yes		yes		yes		yes
Firm Experience			yes		yes		yes		yes
Fund Size			yes		yes		yes		yes
Percentage in Each Industry			yes		yes		yes		yes
Average Round Number					yes		yes		
Observations	432		391		380		380		391
R-squared	31.7%		39.3%		40.6%				38.2%

The sample consists of 364 VC funds with information from the 2004 Private Equity Performance Monitor. The dependent variable is the IRR of the fund. *Fund Herfindahl* is the sum of the squares of the percentage of previous investments in each industry that the VC firm partners are on the board of (excluding the industry all other) made between the inception of that fund and the inception of the firm's subsequent fund. *Avg. Herfindahl of People Active in Fund* is the average of the Herfindahl for each venture capitalist active at the VC firm between the inception of that fund and the inception of the firm's subsequent fund. *Firm General Experience*$_t$ is the difference between the log of the number of investments made by venture capital organization *f* prior to year t and the average in year *t* of the number of investments made by all organizations prior to year *t*. *Avg. Gen'l Experience of People Active in Fund*$_t$ is average number of investments made by people associated with the firm between the inception of that fund and the inception of the firm's subsequent fund.
Standard errors are clustered at VC firm level. T-statistics are in brackets italics below coefficient estimates.
***, **, * indicate statistical significance at the 1%, 5% and 10% level, respectively.

Table 10: Responsiveness to Market Conditions

	(1) OLS		(2) OLS	
Person Herfindahl	0.0065		-1.0055	
	[0.15]		*[4.99]*	***
Avg. Herfindahl of People at Firm	0.7774		-0.2842	
	[8.48]	***	*[1.21]*	
Person Herfindahl			1.4730	
x Avg. Person Herf. At Firm			*[4.85]*	***
IPOs in Industry	0.0165		-0.1022	
	[1.46]		*[4.11]*	***
IPOs in Firm's Other Industries	0.2188		0.0403	
	[7.40]	***	*[0.84]*	
IPOs in Industry x Person Herf.	0.0226		0.1920	
	[2.77]	***	*[5.84]*	***
IPOs in Industry	0.0006		0.1820	
x Avg. Person Herf. At Firm	*[0.04]*		*[4.91]*	***
IPOs in Industry x Avg. Person			-0.2495	
Herf. At Firm x Person Herf			*[5.36]*	
Other IPOs x Person Herf.	0.2188		0.0403	
	[7.40]	***	*[0.84]*	
Other IPOs x Avg. Firm Herf.	-0.2637		0.0078	
	[9.08]	***	*[0.10]*	
Other IPOs in Industry x Avg. Person			-0.3848	
Herf. At Firm x Person Herf			*[3.89]*	***
Controls:				
Year Fixed Effects	yes		yes	
Industry Fixed Effects	yes		yes	
Observations	21,911		21,911	
R-Squared	9.4%		9.9%	

The sample consists of 2,690 venture capitalists active in 768 firms from 1975 to 1998, with one observation per person industry year. Industries are included only if that person has been on the board of a company in that industry from 1975 to 2003. The dependent variable is the log of the number of investments by a person in an industry in a year plus one. *IPOs in Industry* is the log of one plus the number of venture-backed IPOs in that industry in the previous year. *Person Herfindahl* is the sum of the squares of the percentage of all previous investments in each industry that the person is on the board of (excluding the industry all other). *Avg. Herfindahl of People at Firm* is the average of the Herfindahl for each active venture capitalist at the VC firm. *IPOs in Firm's Other Industries (Other IPOs)* is the log of one plus the number of venture-backed IPOs in other industries in the previous year weighted by the percentage of deals the venture firm has done in those industries in all previous deals.
Standard errors are clustered at person level. Robust t-statistics are in brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5% and 10% level, respectively.