Private Equity Performance: Returns, Persistence and Capital Flows

Steve Kaplan and Antoinette Schoar*

April 6, 2003

Abstract

This paper investigates the performance of private equity partnerships using a data set of individual fund returns collected by Venture Economics. We find that over the entire sample period, average fund returns do not exceed those of the S&P 500. At the same time, we find a large degree of heterogeneity among fund returns. Those returns persist strongly across funds by private equity partnerships. The returns also improve with firm experience. Better performing funds are more likely to raise follow-on funds and raise larger funds than more poorly performing firms. This relationship is concave so that top performing funds do not grow proportional to the average performing fund in the market. Finally, we show that market entry in the private equity industry is cyclical, and funds (and partnerships) that are started in boom times are less likely to raise follow-on funds, suggesting that these funds subsequently perform worse. Several of these results differ substantially from those for mutual funds.

*Very Preliminary draft. University of Chicago Graduate School of Business, NBER; MIT Sloan School of Management, NBER and CEPR. Addresses: 1101 E. 58th Street, Chicago, IL 60637; 50 Memorial Drive, E52-447, Cambridge, MA 02142. E-mail: steve.kaplan@gsb.uchicago.edu; aschoar@mit.edu. We thank Ken Morse and Jesse Reyes for making this project possible. We thank Eugene Fama, Alexander Ljungvist, Matt Richardson, seminar participants at Alberta, Arizona State, Chicago, MIT, NYSE-Stanford Conference on Entrepreneurial Finance and IPOs, NYU, and USC. All data for this project were obtained from the VentureExpert database collected by Venture Economics.

1 Introduction

The private equity industry - primarily venture capital and buyout investments - has grown tremendously over the last decade. While investors committed less than $10 billion to private equity partnerships in 1991, more than $180 billion was committed to this asset class at the peak in 2000. (Source: Jesse Reyes, Private Equity Overview and Update 2002). During this time the industry has matured from a small alternative investment vehicle to an important asset class. The increased interest is partly due to the well-publicized returns that some private equity funds achieved, especially at the end of the 1990s. Moreover, venture capital has received a great deal of attention for its role in the surge of entrepreneurship in the 1990s in the US.

Despite the heightened interest in the private equity asset class and the potential importance of private equity investments for the economy as a whole, we have only a limited understanding of the dynamics of fund returns, and the flow of capital into the industry and individual funds. One of the main obstacles has been lack of available data, because private equity firms (as their name suggests) are largely exempt from the disclosure requirements that public firms are subject to.

In this paper, we make use of a unique data set of individual fund performance collected by Venture Economics for more than 2000 private equity firms or general partners (GPs) since 1970. The Venture Economics data set is based on voluntary reporting of fund returns by the private equity firms as well as their limited partners.[1] This data set allows us to study three issues that have not been closely examined previously. First, we investigate the characteristics of fund performance in the private equity industry. We find that overall private equity returns do not exceed those of the S&P 500. However, there is a substantial amount of cross-sectional and time series variation in those returns. [2]

Second, we document a large amount of persistence in fund performance in the private equity industry - both for venture capital and buyout funds. GPs whose funds outperform the industry in one fund are likely to outperform the industry in the next, while GPs that perform below the average are likely to repeat this performance as well. We find strong persistence not only between two consecutive funds, but also between the current fund and the second previous fund.

These findings are markedly different from the results in the mutual fund industry, where

[1]We thank Jesse Reyes from Venture Economics for making the data available.

[2]Jones and Rhodes-Kropf (2003) and Ljungqvist and Richardson (2003) study related questions in contemporaneous papers.

persistence has been difficult to detect and, when detected, tends to be driven by persistent under-performance rather than over-performance. In fact, many recent papers in this literature question whether there is any evidence of actual persistence given the selection issues that many mutual fund data sets face. See Carhart et al. (2001) for a comprehensive review of this topic and Berk and Green (2003) for an explanation. Our findings on persistence also differ from those for hedge funds, which provide little or modest evidence of persistence.[3] We explore potential explanations for the difference from other asset classes in our discussion.

Third, we study the relation of capital flows fund raising, fund size and overall fund survival to fund performance. We analyze how a funds track record affects fund flows into individual partnerships and the industry overall. We document that fund flows are positively related to past performance. In contrast to the convex relationship in the mutual fund industry, however, it appears that this relationship is concave in private equity (see Chevalier and Ellison (1997), Sirri and Tufano (1998) and Chen et al. (2003)). This suggests that top performing funds grow under-proportional to the less profitable funds in the industry.

We then look at the cyclicality of new entrants and fund raising in the overall sample. We find that partnerships are more likely to be started in periods after the industry has performed especially well. Those funds that are raised in boom times (and partnerships which are started during booms) are less likely to raise a follow-on fund, indicating that these funds likely have very poor performance. The marginal dollar that flows into the industry in these times, therefore, does not appear to go to the top funds, but to funds that have a high probability of not being able to raise a next fund. Finally, we also show that the dilution of overall industry performance in periods when many new funds enter is mainly driven by the poor performance of these new entrants, while the established funds seem to show a smaller impact in their performance.

In the last section of the paper, we discuss a number of reasons that might explain the results for the private equity industry differ so markedly from those in the mutual fund literature. True heterogeneity in the skill and quality of general partners can lead to heterogeneity in performance, and result in more persistence if new entrants have difficulties competing effectively with existing funds. There are a number of forces that might make it difficult in this industry to drive down the margins of established funds. First, many practitioners assert that unlike the case for mutual

[3]See Bares, Gibson, and Gyger (2002), Brown, Goetzmann and Ibbotson (1999), Edwards and Cagalyan (2001), and Kat and Menexe (2002).

fund and hedge fund investors, private equity investors can have proprietary access to particular transactions. In other words, better funds may see better investments. This is generally described as "proprietary deal flow." Second, private equity investors typically provide management or advisory inputs along with capital. If high-quality general partners are a scarce commodity, differences in returns between funds can persist. [4] Third, there is some evidence that better venture capital funds get better deals terms (i.e. lower valuations) when negotiating with start-ups, see the paper by Hsu (2002). A start-up would be willing to do this if the investor provided superior management, advisory, or reputational inputs.

On the other hand, if the persistence results are driven by heterogeneity in GP skills, it is puzzling that these returns to superior skill are not appropriated by this scarce input factor in the form of higher fees and larger funds, as has been suggested for mutual funds (see Berk and Green (2002)). From Gompers and Lerner (1999), we know that compensation is very homogenous across private equity partnerships. Most funds use a compensation scheme of 1.5% to 2.5% annual management fees and a 20% carried interest or share of the profits. It would be important to understand why this effect may be less important in private equity.

Growing the size of the fund potentially could lead to lower marginal and average productivity, if funds operate with a concave production function. In other words, private equity investors cannot simply invest more money in particular investments or easily take on more investments without lowering their marginal returns. We find some evidence that fund returns decline when partnerships grow their next fund abnormally fast. [5] But again, from our analysis it appears that, at least in our sample period, the top performing funds on average grew proportionally slower than the median and lower performing funds.

Our results suggest that the forces operating in the private equity industry have not been strong enough to drive away persistence in our sample period. Instead, less efficient funds enter the market after periods of abnormally good industry performance. These effects might have changed in the end of the 1990s, since this was a period of substantial growth in fund size (especially for top performing funds). Moreover, the top performing venture capital funds moved towards a carried interest of 30% during that time period. However, we will not be able to say anything definite

[4] See Hellman and Puri (2002).

[5] For related evidence for mutual funds, see Chen et al. (2003).

about these effects for a number of years when the returns of these funds have been realized.[6]

1.1 Related Literature on Private Equity

There is a growing literature studying the economics of the private equity industry. However, most of the existing studies either have focused on aggregate trends in private equity or have been interested in the relation between general partners and entrepreneurs. This restriction is mainly due to the difficulty of obtaining information on individual fund performance. Two recent exceptions are Jones and Rhodes-Kropf (2003) and Ljungqvist and Richardson (2003) who study private equity returns at the partnership level. We discuss their results and the comparison to the current study in some detail in our section describing average returns.

Gompers and Lerner (1999) look at aggregate performance and capital flows. The authors find that macroeconomic factors like past performance of the industry and overall economic performance as well as changes in the capital gains tax or ERISA provisions are related to increased capital flows into private equity. A paper that characterizes venture capital returns based on the economics of individual deals is Cochrane (2001). The author finds that venture returns are very volatile, but later stage deals are less risky than early stage deals.

Papers that focus on the relation between general partners and entrepreneurs include Kaplan and Stromberg (2003) who document the structure of incentive contracts between venture capitalists and entrepreneurs. Gompers and Lerner (2000) suggest that the valuation of individual deals is affected by overall macroeconomic conditions and the degree of competition in the venture capital industry.

2 Data

The data for this study have been obtained from Venture Economics. Venture Economics collects quarterly information on individual funds in the private equity industry. The Venture Economics data set is based on voluntary reporting of fund information by the private equity firms as well as by their limited partners. Venture Economics claims that because they receive information from

[6] It is also interesting that recently many of the top funds in the industry have voluntarily returned large fractions of the committed capital to their limited partners; most likely because they are concerned about the effect of poor performance on their reputation.

both the GPs and LPs, there is "little opportunity for inconsistent reporting." Our sample covers the years 1970 to 2001. Because of the rapid growth of the industry in the 1990s, the earlier years contain fewer observations of funds than the later years.

Private equity investing is typically carried out through a limited partnership structure in which the private equity firm or partnership serves as the general partner (GP). The limited partners (LPs) consist largely of institutional investors and wealthy individuals who provide the bulk of the capital. We refer to each individual limited partnership as a fund. The LPs commit to provide a certain amount of capital to the fund. The GP then has an agreed time period in which to invest the committed capital - usually on the order of five years. The GP also has an agreed time period in which to return capital to the LPs - usually on the order of ten to twelve years in total. Each fund or limited partnership, therefore, is essentially a closed end fund with a finite life. When the GP has exhausted a substantial portion of a funds committed capital, the typical GP will attempt to obtain commitments for a subsequent fund.

The Venture Economics data for each fund include the quarterly performance measures that Venture Economics collects from GPs and LPs. These measures are the internal rate of return (IRR), the cumulative total value to paid-in capital (TVPI), and the distributed total value to paid-in capital (DPI). Venture Economics also collects the quarterly cash flows in and out of each fund for the life of the fund or through the end of 2001. All the Venture Economics performance measures as well as the cash flows are reported net of management fee and carried interest. We do not know the identities of the particular GPs, but we do know the sequence number of each fund, i.e., if the fund is the first, second, etc. raised by the particular GP.

Throughout the paper, we use two samples of the data. In the main part of the analysis, we include funds that have either been officially liquidated (they have a liquidation flag in the data) or those that were started before 1997. This means that the fund has either been liquidated or has had at least five years to realize returns on its investments. We also exclude funds with less than $5 million of committed capital in 1990 dollars to focus on economically meaningful funds. Using these sample selection criteria, we obtain a sample of 1090 funds. While each fund is one observation, private equity firms (GPs) may have a number of consecutive (or even contemporaneous) funds in the sample. For this sample, we focus on the IRRs and TVPIs reported by Venture Economics both at the last available quarter of reported performance and five years after the fund began.

Some of the funds in the primary sample have not been liquidated and, therefore, have not distributed all of their investments to limited partners. This creates the possibility that the Venture Economics IRR and TVPI performance measures are sensitive to differences in subjective reporting across funds. [7] Accordingly, we repeat our analyses with a second sample of funds which have distributed all of their investments to investors and are unlikely to be subject to a meaningful reporting bias. The second sample restricts the funds in the first sample to those funds (1) that have been officially liquidated; or (2) whose returns are unchanged for at least the final six quarters we observe and whose reported unrealized value is less than 10% of committed capital. We obtain 776 funds that satisfy these criteria. As with the previous sample, we measure performance using the IRRs and TVPIs reported by Venture Economics both at the last available quarter of reported performance and five years after the fund began. For this sample, we also are able to repeat our analyses using the actual cash flows into and out of the funds.

We report most of our results using the larger sample. All the findings reported in the paper are qualitatively and statistically unchanged when we use the second, smaller sample. We also obtain qualitatively identical results if we use all funds raised before 1997. This suggests that our results are not driven by a bias in selecting particular funds in the Venture Economics sample.

3 Descriptive Statistics

Columns (1) to (3) of table 1 report the descriptive statistics for the sub-sample of 1090 funds for which we have obtained performance measures. About two-thirds of the funds in our sample are venture capital fund and one-third are buyout funds. The first number in each cell gives the mean and the second gives the standard deviation of the variable on the left. To get a sense of the potential selection bias in our sample of fund returns, columns (4) to (6) of table 1 report the same statistics for all 2216 funds that are described in Venture Economics and were raised before 1997. We exclude funds that have a vintage year later than 1997 to match the sample period of the funds with realized IRR that we use in the analysis.[8] Our sub-sample covers about half the funds in Venture Economics over the same time period. The funds for which we have performance measures are larger on average than the funds in the full sample. The average size of the funds in

[7] See Toll (2001) for a description of the different accounting methods that venture capital funds use.

[8] We tried several different ways of constructing the benchmark sample and the results are qualitatively unchanged.

our sample is $181 million, with venture funds being substantially smaller than buyout funds, $76 million versus $416 million. In comparison, the average fund size in the full sample is $109 million, with the VC funds on average having $50 million under management and the buyout funds, $263 million.

Table 1 also documents the fraction of first time funds, second time and third time funds in the two samples. In the sample with returns, 45% of the funds are first time funds, 25% are second time funds and 15% are third time funds. The remaining 15% are funds with higher sequence numbers. For the full sample, 40% of the funds are first time funds, 21% are second time funds, 13% are third time funds, and 25% are funds with higher sequence numbers. The returns sample, therefore, over-represents first time funds and under-represents funds with very high sequence numbers.

The potential selection biases in our returns sample have two countervailing effects on our estimates of average fund returns. Larger funds tend to perform better than smaller ones, inducing an upward bias on the performance of funds with returns. On the other hand, funds with higher sequence numbers tend to have higher returns, inducing a downward bias on the performance of funds with returns. Our results for average returns, therefore, should be interpreted with these potential biases in mind.

Regarding the persistence and fundraising results, we do not think any bias in our sample is of concern. Venture Economics reassures us and the data confirm that once Venture Economics begins measuring performance for a particular fund by a particular GP, it continues to do so for as long as that fund exists. I.e., GPs of poorly performing funds do not drop out before the fund is liquidated. [9] We also obtain similar results for every performance measure we use, including measures that use only realized (rather than estimated) performance. Our persistence and fundraising results, therefore, are not likely to be driven by any survivorship bias.

3.1 Private Equity Performance

In this section, we describe the different measures of private equity performance and compare that performance to the performance of the S&P 500. Table 2 reports three different measures of performance for all private equity funds, VC funds only, and Buyout funds only for the 776 funds with largely complete cash flow data. The first number in each cell is the median return, the next

[9] Venture Economics also claims that GPs continue reporting performance measures for subsequent funds.

is the average return followed by the standard deviation. The last row in each cell contains the returns at the 25th and 75th percentile.

We report performance in three ways. First, we report the internal rate of return of the fund calculated by Venture Economics. Second, we report the internal rate of return to the fund that we calculate using the fund cash flows. Third, we calculate what is referred to in the private equity industry as the public market equivalent, or PME. The PME measures the discounted value of the cash outflows of the fund relative to the discounted value of the cash inflows (all net of fees), where discounting is undertaken using the total return to the S&P 500. This calculation has the effect of comparing investing in the fund to investing in the S&P 500. A fund with a PME greater than one outperformed the S&P 500. We (not Venture Economics) perform the PME calculations using fund cash flows.

Before proceeding, we want to point out a three issues regarding PME and performance measures in private equity more generally. If private equity returns have a beta greater than one, PME may therefore overstate the true risk-adjusted returns to private equity. In this study we do not attempt to make more complicated risk adjustments than benchmarking cash flows with the S&P 500 because of the lack of a true market value in the early years of a funds life. Jones and Rhodes-Kropf (2003) do make these calculations using the net asset values reported quarterly by Venture Economics and find that VC funds have a market beta of 1.11 while LBO funds have a beta of 0.81. Ljungqvist and Richardson (2003) use a different methodology and find that both VC funds and LBO funds have a market beta of roughly 1.10 with relatively little variation across funds.

We believe it is possible that the results in these two papers understate the market risk of private equity funds, because most venture capital funds invest in young companies in high technology industries with equity betas that exceed 1.00. Moreover, we believe that it is also likely that the market risk for buyout funds exceeds one, since these funds invest in highly leveraged companies. Ljunqvist and Richardson (2003) find portfolio betas greater than one for buyout funds under the assumption that the typical buyout fund portfolio company has the same equity beta as the typical public company in the same industry. However, because of the high leverage used in the typical buyout deal, buyout firms' equity betas are likely to be greater than those for public companies in the same industry.

We now turn to the analysis of performance measures in our sample. Panel A of Table 2 reports

the performance measures on an equal-weighted basis while panel B reports them on a commitment value-weighted basis. Panel A indicates that the equal-weighted median and average IRRs reported by Venture Economics over the sample period are 12% and 17%, respectively. Returns to buyout funds are slightly higher than the returns to venture funds. The IRRs that we calculate from the cash flows are slightly lower with a median and average of 10% and 11%, respectively. Our calculations are closer to those reported for the industry by Cambridge Associates, an alternative data provider to Venture Economics. Panel A also indicates that the median and average fund has PMEs of 0.65 and 0.80, respectively, indicating that private equity has not returned as much as an investment in the S&P 500 over the sample period. Finally, the table is suggestive of one additional quality of private equity returns. There appear to be large differences in the returns of individual funds. The funds at the 25th percentile show a cash flow IRR of 0% while the funds at the 75th percentile exhibit a cash flow IRR of more than 20% per year. The amount of variation seems qualitatively similar for all performance measures, and is even larger for VC funds only.

When value-weighting results by a fund's committed capital in Panel B of Table 2 the aggregate performance of the industry looks slightly better. The Venture Economics IRRs are a median 14% and average 18% while the cash flow IRRs are a median and average of 12%. While the PMEs increase to a median of 0.80 and an average of 0.91, they still remain less than 1.0, indicating again that an investment in private equity underperformed the S&P on average.

Table 3 presents performance results for the 1090 funds in the larger sample. To put all the funds on an equal footing, we use the Venture Economics IRR and TVPI five years after the fund began. As we noted earlier, these measures are potentially subject to a reporting bias. These results also reflect a somewhat greater number of more recent funds. Relative to the results for the smaller sample, Table 3 shows that the VC returns are slightly higher and the buyout returns slightly lower reflecting the performance of more recent funds included in this sample. The TVPI results in table 3 also indicate that the average private equity fund returns roughly twice the capital committed to it.

3.2 Performance Correlations

Tables 2 and 3 present five different measures of performance. It is reasonable to wonder whether those measures are correlated. Table 4 shows the correlation structure of the different performance

measures for the sample of 776 funds for which we can calculate all five measures. We find that all five measures are highly correlated with each other. For example, the IRR of a fund after 5 years of existence reported by Venture Economics is strongly positively correlated with PME (at 0.79) and with the IRR we calculate from the cash inflows and outflows of the fund (at 0.73). Similarly, PME, the IRR we calculate from cash flows, and the last IRR reported by Venture Economics are correlated at 0.86 or greater.

In the persistence and fundraising analyses that follow, we use the IRR after five years reported by Venture Economics as the measure of fund performance because it maximizes the size of the sample. It also enables us to use the information on some of the more recent funds. As we mentioned earlier, we repeat all our tests using the longer horizon performance measures - Venture Economics IRR, Cash flow IRR, and PME - on the smaller sample and obtain qualitatively and statistically identical results.

3.3 Industry Returns Over Time

The performance of private equity overall in tables 2 and 3 masks a great deal of time series variation in that performance. In Table 5 we detail that variation by presenting the average performance of the funds started each year from 1980 to 1997, weighted by the capital committed to each fund. We do not include returns prior to 1980, because we have fewer than three observations per vintage year in many years prior to 1980. Table 5 presents three measures of performance. For all 1090 funds, the table presents the average Venture Economics IRR and TVPI five years after the fund is begun. For the 776 funds that are largely liquidated, the table presents our estimated PME.

Column (1) of Table 5 shows a large inflow of funds in the mid-1980s as well as in the second half of the 1990s. All three measures of performance portray a consistent pattern: VC funds performed relatively poorly in most of the 1980s with IRRs in the single digits and PMEs below 1.00. Since 1988, however, VC funds have had higher IRRs as well as PMEs that generally exceed 1.00. Buyout funds exhibit almost the reverse pattern with substantial IRRs and PMEs greater than 1.00 in the first half of the 1980s, followed by lower performance in the first half of the 1990s.

3.4 Relation to Other Studies

As mentioned earlier, Jones and Rhodes-Kropf (2003) use the same data set that we employ in this paper. The focus of their paper, however, is very different from our study, since the authors investigate whether and how idiosyncratic risk is priced in private equity. While the paper uses a very different empirical methodology, similar to our study they find no evidence that funds outperform the overall equity market or that alphas are positive.

Ljungqvist and Richardson (2003) study the returns to the private equity investments of one large limited partner in funds raised from 1981 to 1993. Differently from our results, the authors find that the funds in their sample - both buyout and venture capital - outperform the equity market and have positive alphas. However, our results in Table 5 suggest that the discrepancy between Ljungqvist and Richardson (2003) and our findings most likely arises, because their sample mainly consists of buyout funds in the 1980s, a period during which we find that buyout funds performed unusually well. Moreover, their sample appears to under-sample first time funds, only 29% of the funds are first time funds versus 40% for the much larger Venture Economics universe. Similarly, they over-sample larger funds the average fund in their sample has $503 million of committed capital, well above the average of the Venture Economics universe from 1981 to 1996. Again, our study shows that larger and later round funds on average have higher performance.

4 Characteristics of Fund Returns

In this section, we explore how realized fund returns correlate with partnership and fund characteristics. The basic empirical specification is as follows:

$$IRR_{it} = \alpha_t + \beta(FundSize_{it}) + \lambda(Sequence_{it}) + \gamma_{VC} + \epsilon_{it} \quad (1)$$

where IRR_{it} is the IRR reported by Venture Economics five years after the fund began, $FundSize_{it}$ is the logarithm of the capital committed to the fund, $Sequence_{it}$ is the logarithm of the sequence number of the fund (later funds of the same firm), and γ_{VC} is a dummy equal to one if the partnership is a venture capital firm and zero otherwise. We also include year fixed effects in all specifications to control for the large inter-year variation in returns. In the regressions we report, standard errors are corrected for heteroskedasticity and clustered at the general partnership

level. We obtain, but do not report, *lower* standard errors when we cluster by year. [10]

Columns (1) to (3) of Table 6 show the cross sectional relations between fund performance and fund characteristics. The results in column (1) confirm that the VC funds in our sample perform better on average than buyout funds. The point estimate on the VC dummy is 7.17% with a standard error of 1.84. Larger funds and funds that have higher sequence numbers also have significantly higher realized returns.

In column (2) of Table 6, we include squared terms of Fund Size and Sequence number along with the direct effects in the regression to analyze the functional form of this relation. The point estimate on the linear term of Fund Size increases significantly when including the squared term, and the coefficient on squared Fund Size is negative and significant. This suggests a concave relation between Fund Size and performance. While larger funds have higher returns the increase is not linear. We find that when funds become very large, i.e. mega-funds, their performance tends to go down again.

The relationship between fund performance and the sequence number of the fund is convex. The coefficient on the squared term of Sequence Number is positive and significant while the coefficient on the linear term becomes negative. To check the robustness of this relation we also choose a different specification in column (3) where we include a dummy variable (First Time Fund) equal to one if the fund is a first time fund. The coefficient on this dummy is negative (-2.00) and significant at the 10 percent level.

When we include firm fixed effects in column (4) of Table 6, the signs on the Fund Size and Sequence Number variables switch becoming negative and significant. This indicates that while larger and higher sequence funds have higher returns in the cross section, when a given GP subsequently raises larger and larger funds, its returns go down. When we add the squared terms to the firm fixed effects regressions in column (5), we find the same concave pattern for Fund Size and the same convex pattern for Sequence Number that we found in the cross section.

In columns (6) of the table we add the returns on the S&P 500 as an explanatory variable while eliminating year fixed effects. We measure the annualized return on the S&P 500 over the first five years after the fund has begun. Loosely speaking, this is an attempt to estimate the "beta" of the private equity industry. As we discussed earlier, there are a number of theoretical as well

[10] We thank Gene Fama for suggesting that we do this.

as empirical obstacles that make it very difficult to come up with a number that is comparable to a "beta" for traded stocks. First, private equity funds are highly illiquid and do not have a continuously traded market price. Any interim measures of return before the liquidation of a fund (like quarterly reporting of returns) are necessarily based on rather subjective valuations by the fund's general partners. Second, the typical fund takes several years to invest its committed capital, making it difficult to exactly match the fund return to the analogous return on the S&P 500.

We find that the coefficient on the S&P 500 for all funds is positive and significant. In column (7), when the S&P 500 is interacted with the VC dummy, we find that the VC fund returns are positively correlated with S&P 500 returns with a beta of roughly 1.1, while buyout funds are essentially uncorrelated with the S&P 500. This analysis suggests that venture capital returns move pro-cyclically with the market. Buyout fund returns, in contrast, appear to move insignificantly with the market. This may provide some support for those who argue that buyout funds provide more diversification than venture funds.

While the results are suggestive, we caution again that they are based on very rough measurements of the appropriate market returns.

4.1 Persistence of Fund Performance

We now turn to the topic of persistence in fund performance. The results in Table 6 give us a first indication of the importance of persistence in fund performance in the private equity industry. We find that the R^2 of the regressions in columns (1) to (3) increase by about 13 to 14 percent when we include firm fixed effects, in columns (4) and (6). We also find that an F-test on the joint significance of these partnership fixed effects is strongly significant (not reported). The importance of firm fixed effects indicates that partnerships vary systematically in their average performance.

For a more direct test of persistence, we use a more parametric approach. We extend the basic specification of the previous section to include lagged performance as right hand side variables. We use the returns of the previous fund and second previous fund raised by the GP. In the specification we report, we use the IRR reported by Venture Economics five years after the fund began as the measure of performance. In some of the regressions, we also control for Fund Size and Sequence Number.

$$Return_{it} = \alpha_t + \beta(FundSize_{it}) + \lambda(SequenceNumber_{it}) + \gamma_{VC} + \delta(Return_{it-1}) + \epsilon_{it} \qquad (2)$$

Because we include the lagged return as a right hand side variable we cannot simultaneously control for firm fixed effects in this regression.

Table 7 presents our results. We find strong persistence in fund returns across different funds within the same partnership. Column (1) of Table 7 contains the results from a regression of realized IRR on lagged returns only controlling for year fixed effects and a VC dummy. The coefficient on lagged return is positive and strongly significant; the point estimate is 0.45 with a standard error of 0.05. The coefficient implies that a 1% increase in performance in a fund is associated with a 45 basis point increase in performance in the subsequent fund.[11]

The regression in column (2) includes the performance of both the previous fund and the fund before that. Again the coefficients on both performance measures are positive and significant. The coefficients imply that a 1% increase in performance is associated with a combined 60 to 67 basis point increase in performance in subsequent funds (the sum of the two coefficients on lagged performance). These persistence results also hold when we estimate the regressions for VC funds and buyout funds separately (not reported).

Next we include controls for fund size and sequence number in columns (3) to (5). We know from the previous section that fund size and sequence number are positively related to fund performance. Since these control variables might be correlated with lagged performance, we first want to show that are our persistence results are robust to controlling for fund characteristics. In column (3), we include only the IRR of the previous fund. While the coefficient on lagged performance declines slightly to 0.42, it remains positive and significant. In column (4), we include only the IRR of the second previous fund. We do this to ensure that the two subsequent funds of a partnership do not have portfolio companies in common, which might mechanically create persistence. (This is less likely for buyout funds because they typically invest only once in their portfolio companies.) Since the current fund and the second previous fund on average have a time lag of more than six year, it is very unlikely that they would invest in the same portfolio company. The regression indicates that the return of the second previous fund is positively and significantly related to the performance

[11] As mentioned earlier, all the results for performance hold if we use last reported Venture Economics IRR, cash flow IRR, TVPI, and PME as performance measures.

of the current fund. The coefficient is 0.23 with a standard error of 0.08. This point estimate is roughly 60% of the magnitude of the previous fund and still an economically big effect. In column (5), we include both lags of performance and find, again, that both are positively related to current fund performance.

These persistence results are, of course, conditional on a partnership raising a follow on fund. We will show in Table 10 that the probability of raising a follow-on fund decreases with poor performance. Therefore it is likely that we understate the amount of persistence in returns, because our observations are left censored.

We also compare the importance of persistence in returns between venture capital and buyout funds. We rerun the specifications reported above separately for the sample of buyout and venture funds (not reported). We find that the results hold in both sub-samples and the magnitude of the coefficients on the lagged returns are very similar for buyout and venture funds. However, the sample of buyout funds drops to only 100 observations when we include the returns of the fund two periods before the current one. Therefore, the coefficient on IRR_{it-2} is positive, but not statistically significant.

In column (5), we interact the one-period and two-period lagged returns for the two previous funds with the logarithm of fund size in the current fund. We find that the coefficients on the interaction terms one lag and two lags are negative. The interaction with fund returns one lag out is negative and significant, while the interaction with the returns of the fund two lags before the current is not significant. This result suggests that larger funds have lower short run predictability (we also ran this regression for changes in fund size and get the same results). However, the combined effect (direct effect and interaction term) is still positive and significant even for large firms, which means that for both groups we observe persistence in performance. We can interpret these results in the light of our previous finding that when a partnership raises increasingly larger funds the returns of the new fund start to go down relative to the performance of prior fund of the partnership.

Moreover, in column (6) of Table 7 we look at the interaction between lagged performance and the sequence number of the fund, again we include the one period and two period lagged fund returns. The coefficient on the interaction term for the one period lagged return is negative and marginally significant. The coefficient on the interaction term for the two period lagged return is

positive but not significant. [12]

Finally, we would like to know whether these persistence results might be driven either by the lower or upper tail of the performance distribution. If partnerships which have above average performance report their returns to Venture Economics while funds that start to perform poorly choose not to report their results, this type of self selection could overstate the amount of persistence that exists in the overall sample.

Therefore, in Table 8 we sort all funds for which we have follow-on funds into performance terciles and calculate the conditional probability that a partnerships next fund will either stay in the same performance tercile, or move into one of the other two terciles. The results in Panel A measure fund performance using the Venture Economics IRR at the end of five years. In Panel B, we use the residuals from a regression of IRR_{VE5} on year fixed effects, size and sequence number of the fund to sort the funds into performance terciles. Again we calculate conditional Markov probabilities as in Panel A. The results are consistent with the regression results. In both panels, funds in the top (or bottom) terciles have roughly a 50% chance of remaining in those terciles and only a 20% chance of moving to the bottom (or top) terciles. In both panels, a chi-squared test rejects the equality of all cells at the 1% level.

4.2 Robustness Checks

There have been a number of studies in the mutual fund industry which document how persistence of fund returns could be driven by sample selection and data collection issues. See for example Cahart et al. (2001) for an in-depth discussion of importance of these problems in mutual fund studies. In the following we address some of these concerns and verify the robustness of our findings for the private equity industry.

Because the persistence results are so unusual relative to the findings for mutual funds and hedge funds, we also report in table 9 the persistence results measuring performance using IRRs based on the cash inflows and outflows to the funds. The regressions confirm that performance increases with fund size and with sequence number. When squared terms are included, fund size remains concave while sequence number is not convex. Our key persistent results hold. The performance of the previous fund and the second previous fund are both statistically significant, both individually

[12] The persistence results also hold for the final Venture Economics IRR, TVPI, and PME.

and when included together.

A first-order difference between the results in our sample and the mutual fund studies is that we obtain our results using the realized returns of a fund at or near the end of its lifetime. Unlike the mutual fund studies, we are able to use such a measure because private equity funds have limited lifetimes. The advantage in this research design is that observations are not dropped from the dataset if returns in a given period fall below a certain threshold, as is sometimes the case in mutual fund data sets. In other words, we do not face this type of selection bias that is sometimes very serious in the mutual fund industry.

Furthermore, in an interview in the Asset Alternative Newsletter (Asset Alternative 2002), Jesse Reyes from Venture Economics discussed this type of selection bias in the reporting of private equity funds. He confirms that Venture Economics observes very few incidents of funds that stop reporting to when the returns worsen. This claim seems consistent with the quarterly data that we observe. Moreover, Venture Economics does not only rely on the private equity funds themselves for reporting on performance but also collects information directly from limited partners who are not prone to this type of selection bias.

One last concern that we address is the possibility that our persistence results are driven by the fact that some GPs take on more systematic or market risk than others. In a generally up market, high systematic risk GPs would have persistently higher returns. While we think this is implausible given our conversations with practitioners, we perform two checks for this possibility. First, we run (unreported) regressions in which we include the five-year return on the S&P 500 rather than year fixed effects. This should control at least to some extent for market risk. We find qualitatively and statistically even stronger results than with year fixed effects. Second, we obtain similar results when we group GPs by the stage of their investments (e.g. early stage funds, later stage funds, and buyout funds) and re-estimate the persistence results. If these stages are correlated with the differences in risk we would expect that persistence decreases after controlling for the differences. However, we do not find a decrease in persistence.

5 Capital Flows and Fund Performance

In this section, we analyze how fund performance and the track record of a partnership affect the flow of capital into funds. To take the mutual fund industry as benchmark again, we know from studies by Sirri and Tufano (1998) and Chevalier and Ellison (2000) that funds which outperform the market experience increased capital inflows. This relationship tends to be convex in the mutual fund industry, meaning that mutual funds with above average performance actually increase their share of the overall mutual fund market.

To analyze the relationship between fund size and performance, we estimate a Tobit regression to control for the left censoring in the size variable. If poorly performing GPs are unable to raise a follow-on fund, a simple OLS estimator would be biased, because poor first-time funds would just drop out of the sample. Yet not being able to raise a fund at all is clearly an outcome of poor initial performance, in fact a very extreme one.

In Table 10, we show that capital flows into private equity funds are strongly positively and significantly related to past performance. Column (1) of Table 10 shows the basic specification controlling only for sequence number and VC Dummy. (The logarithm of) Fund size is positively and significantly related to the performance of the previous fund. Not surprisingly venture capital funds on average are smaller than buyout funds, while funds with higher sequence numbers are larger than first time funds. In Column (2) we include lagged fund size to control for partnership specific effects given that we cannot use firm fixed effects in the specification with lagged return variables. The only effect of this control is to render the VC dummy insignificant. The coefficient on previous performance is unchanged.

Parallel to our analysis of persistence in returns we look at the relationship between fund size and performance in the second previous fund. Column (3) shows that current fund size is positively and significantly related to the performance of each of the two previous funds. These findings suggest that funds with persistently good performance are especially favored in the fund raising process. This timing effect makes sense given that returns take some time to realize in the private equity industry. When a GP raises the first follow-on fund, investors will not have learned completely about the true quality of the fund. By the time of the second follow-on fund, limited partners are able to observe a longer track record of the GP.

Finally, we test whether the relation between fund size and prior performance is best charac-

terized by a linear relation or whether we observe a different functional form. For this reason we again include a squared term of the IRR_{it-1} in column (4) of Table 10. The results show that the relationship between fund size and performance is positive but concave. The coefficient on the first polynomial term is negative and significant. This result differs from that for the mutual fund industry where researchers seem to find a convex relation between fund size and excess returns. In column (5) we repeat this exercise including also a squared term for the two period lagged returns along with the linear term. Again we find a convex relation between fund raising and returns, even two periods out. [13]

These findings suggest that the top performing funds in the private equity industry grow less than proportional to the increase in performance that they exhibit than the lower performers. Given that most limited partners claim that the top funds are all highly oversubscribed, it seems likely that the better funds voluntarily choose to stay small. This result, in turn, might offer an explanation for the persistence in performance that we find in the private equity industry. By growing relatively less rapidly than the market on a performance adjusted basis, top funds are able to avoid moving into regions of diminishing returns.

There are at least two reasons why superior partnerships might choose to do so. On the demand side, it is possible that the number of good deals in the economy is limited at each point in time. If partnerships believe that they face diseconomies of some sort even on their infra-marginal deals when moving down the quality curve, it could be in their interest to grow slowly. On the supply side, better funds might face constraints if GP human capital is not easily scalable and new qualified general partners are scarce. Under either of these constraints, superior GPs have to trade off staying small (and having high returns) or growing at the same speed as the market (or even a higher speed), but moving down the marginal returns curve. In the next section, we look at the flow of funds and the entry and exit decisions of partnerships in more detail.

6 Market Dynamics and Entry of Funds

In this section we want to analyze the overall dynamics of performance and capital flows in the private equity industry in more detail. So far we have shown that there is strong persistence in

[13] We also estimated, but do not report, probit regressions of the likelihood a GP raises a next fund. The likelihood of raising a next fund is negatively related to the performance of the previous fund.

performance across funds (at the upper as well as at the lower end). But at the same time we find evidence that mediocre and poor performing funds grow proportionally faster than the top funds, while the relationship of fund performance to returns is concave. This raises the question how capital is allocated to poorer performing funds and whether this has a spill over effect on the industry overall.

6.1 Timing of Entry and Cyclicality of Returns

We first consider the entry and exit of partnerships into the private equity market and the fundraising activities of existing partnerships. To this end, we turn to the general database collected by Venture Economics. The benefit of this data is that it is more comprehensive in the coverage of funds than the performance data we used thus far. Venture Economics states that this data set covers 70 percent of the overall private equity market. The drawback, obviously, is that we do not observe performance for all of the funds. Therefore, in this section we rely on aggregate measures of industry returns, as well as information on fund size and sequence number of funds, which we found to be positively related to performance in the previous analysis.

In Table 11, we look at the timing of funds raised by new private equity partnerships. For this purpose, we regress the logarithm of the total number of partnerships that are started in a given year on different measures of market returns in the current and previous year. We have 26 years of data for this exercise. In column (1) of Table 11 we relate the number of partnerships that are started per year to the returns on the Nasdaq Composite index in the current and the prior year. Lagged Nasdaq returns have a coefficient of 1.46 and a standard error 0.9, while current Nasdaq returns have a much smaller coefficient of 0.47 with a standard error of 0.88. Similarly, in column (2) of Table 11 we report current and lagged returns on the S&P 500. These have a positive and significant relation to the number of partnerships that are started each year as well. The point estimate is 2.6 with a standard error of 1.4 for the current S&P returns, and the coefficient on the lagged returns is 2.41 with a standard error of 1.4. Finally, we repeat this exercise for the aggregate returns of the venture capital industry. Column (3) of Table 11 shows that there is a big increase in partnership starts when lagged venture capital returns are high, while the contemporaneous relation between industry returns and partnership starts is positive but not significant.

We also repeat these estimates using the aggregate amount of capital that is raised by first time

partnerships in a given year. We report the results in columns (4) to (6) of the same Table 11. The results confirm the previous findings based on the number of new entrants. In fact, the relationship between lagged returns and partnership entry becomes stronger. This suggests that not only do more partnerships decide to start up after a period in which the industry performed well, but also, first time funds tend to raise bigger amounts of capital when the private equity industry performed well. Gompers and Lerner (1999) find similar results for private equity industry returns. This result is interesting because of our previous findings that first time funds perform markedly worse than established funds.

6.2 Which Type of Funds are Raised in Boom Times?

We now ask whether capital that flows into the private equity industry in boom times is allocated to worse funds than capital that enters in times that are less hyped. As mentioned before, we do not observe individual fund performance for the funds in the full Venture Economics data set. However, we can observe whether a partnership raises a follow on fund which should be a rough proxy for fund performance. Clearly, some partnerships may decide not to raise a follow on fund because of exogenous reasons that are unrelated to performance. However, it seem that this proxy is more likely to understate the amount of poor performing funds, since we saw in the earlier analysis that there is even persistence in poor performing partnerships, which means those do not drop out immediately but might raise a couple of follow on funds before the market realizes their low type.

In Table 12 we report the results from a linear probability model where we relate the likelihood of raising a follow-on fund to the market conditions at the time the initial fund was raised. We construct a dummy variable equal to one if a given partnership raises a follow-on fund and zero if the current fund is the last fund. Because we do not want to bias the results for partnerships that only recently raised a fund (and therefore, have not had enough time pass to need to raise a next fund), we drop any fund that was started after 1998. We regress this dummy variable on the measures of market performance we have used throughout the paper: Nasdaq Composite Index, S$P 500 and venture capital industry returns. We include contemporaneous performance at the time the current fund was raised, and market performance one year before the current fund started.

Columns (1), (4) and (7) of Table 12 report that funds raised in years after market returns were high are less likely to raise a follow on fund. We see that this negative relation holds for

all measures of lagged market performance. The coefficients on contemporaneous performance are negative for the Nasdaq and S&P measures, but positive for the venture capital index. Overall the evidence suggests that funds raised in boom years are more likely to perform poorly and, therefore, are unable to raise a follow on fund.

In columns (2), (5) and (8) of Table 12 we also include a measure of market returns in the third year after the current fund was raised. From anecdotal evidence, we know that partnerships tend to raise new funds about every three years. Therefore, we include this three year leading market indicator to capture market conditions at the time the partnership is most likely to be trying to raise a next fund. We find that the coefficient on this three-year leading market index is positive and strongly significant for all measures of market returns. Again, this finding is consistent with private equity firms being able to raise capital more easily when overall market conditions are good.

At last, we repeat the above estimation only for partnership starts (as opposed to new funds). We report the results in columns (3), (6) and (9) of Table 12. The same pattern we observe for individual funds holds true for partnership starts. Partnerships that enter the market in boom times are less likely to raise a follow on fund. However, if the market conditions are positive three years after the initial funds were raised, the likelihood of being able to raise a follow-on fund improves significantly.

In sum, it appears that the marginal dollar invested in boom times goes towards financing funds which are less likely to be able to raise a subsequent fund, which we interpret a proxy for poor performance.

6.3 Are Fund Returns Affected by the Number of New Entrants?

Finally, we would like to know whether the entry of new partnerships and funds in boom times has an effect on the overall industry performance, and which type of funds are mostly affected.

For that purpose, in Table13, we regress the performance of individual funds on the number of new funds entering the industry in the year that the fund was started, as well as our usual controls (fund size, sequence number and VC Dummy). The variable Entry is the logarithm of the aggregate number of new private equity funds in a given year. We also control for the returns on the Nasdaq Composite Index in the year a fund was started, as we know from the results in the previous table

that funds are more likely to get started in boom years.[14]

We report results for the overall industry in columns (1) and (2) of Table 13. Column (1) shows the correlation between realized fund returns and the logarithm of the number of new entrants. The point estimate is negative (-0.14) and statistically insignificant. However, if we include an interaction term between the entry variable and the logarithm of the sequence number of a fund, we find that the coefficient on the interaction term is positive and statistically significant (the point estimate is 0.76 with a standard error of 0.28). And the coefficient on the direct effect of entry is now negative and statistically significant as well (point estimate of -0.61 and a standard error of 0.20). These results suggest that in periods of increased entry of funds into the industry overall, we observe a larger negative effect on the young funds (those with lower sequence numbers) than on the older, more established funds.

In columns (3) and (4), we repeat the above analysis only for the sub-sample of venture capital funds. In this specification, we base the aggregate number of new entrants only on new venture capital funds that enter the industry in a given year. We find that the effect is stronger in the VC industry. In column (3), we only include the direct effect of the number of new entrants. The coefficient on this variable is negative and barely significant (coefficient of -0.34 with a standard error of 0.18). In column (4), we again include the interaction term between the entry variable and the logarithm of the sequence number of a fund. The coefficient on this term is positive and significant, with a coefficient of 1.13 and a standard error of 0.42. When we combine the direct effect and the interaction term, again the returns of older funds are almost unaffected by the inflow of new funds. However, the returns of the entering funds are significantly lower in these periods. The overall effect on the industry returns, therefore, is negative in periods with large number of new entrants.

Finally, in columns (5) and (6), we repeat these regressions for the sub-sample of buyout funds. We base the aggregate number of new entrants only on new buyout funds that enter the industry in a given year. In column (5), we find that the direct effect of the number of new entrants is negative and statistically significant for the buyout industry. The coefficient on the entry variable is -1.35 with a standard error of 0.25. Overall returns in the buyout industry are significantly

[14]We also repeat the regressions in Table 13 when measuring entry as the number of new *partnerships* entering the industry in a given year. The results are qualitatively unchanged. Similarly, we also include annual returns on the S&P 500 or the venture capital index as measures of market performance. Again the results are qualitatively the same.

diluted in periods where many new funds enter the market. In column (6), we again include the interaction term between the entry variable and the logarithm of the sequence number of a fund. The coefficient on this term is positive, but smaller than for the sample of VC funds and it is not statistically significant. This result suggests that unlike in the VC industry, the returns of older funds in the buyout industry (those with higher sequence numbers) are less isolated from the entry of new funds. Returns for all funds in the buyout entry seem diluted by the inflow of new funds.[15]

7 Summary and Implications

In this paper, we investigate the performance of private equity partnerships using a data set of individual fund returns collected by Venture Economics. Over the entire sample period (1980 to 1997), average fund returns do not exceed those of the S&P 500. These results are consistent with those obtained by Jones and Rhodes-Kropf (2003), but they differ from those of Ljungqvist and Richardson (2003) who find above market and positive risk-adjusted returns. As we discussed earlier, we think it is likely that their sample, based on the investments of only one limited partner, has a bias towards better performing funds and time periods. At the same time, while the Venture Economics sample is much larger, reflecting many limited partners, we cannot fully rule out that the funds in our sample are subject to some sort of reporting bias as well.

While the average return results might therefore not be unambiguous, the persistence results are not likely to be affected by these concerns. For all measures of fund performance and at both ends of the performance distribution, we find that performance persists strongly across funds by private equity partnerships. Moreover, performance increases with fund size and with partnership experience, but this relation is concave suggesting decreasing returns to scale. And better performing funds are more likely to raise follow-on funds and raise larger funds than more poorly performing firms. But this relationship is concave so that top performing funds do not grow proportional to their increase in performance relative to the market.

[15] One could speculate about the reasons, why we observe such a difference between the returns in the buyout versus the venture capital industry. There are a number of practitioners as well as also academics who suggest that buyout returns are more sensitive to market timing and herding effects, see for example Kaplan and Stein (1993). In contrast, it is often stated that VC returns are crucially driven by the specific human capital or networks of a funds general partners. However, since our sample of buyout funds is relatively small and less comprehensive than the sample of venture capital funds (336 versus 754 observations), we do not want to overstate the inference we can draw from the differences between the two industries.

Moreover, we find that funds that are raised in boom times (and firms that are started in boom times) are less likely to raise a follow-on fund, suggesting that these funds perform worse. In conjunction with our results on average returns, this suggests a boom and bust type cycle in which positive market-adjusted returns encourage entry that leads to negative market-adjusted returns, etc.

These empirical relations between performance and capital flows differ substantially from the ones found for mutual funds. We think the most likely explanation for these results is a model of underlying heterogeneity in the skills of GPs, and concavity in the production function. Then successful partnerships might not choose to grow their funds until the excess returns have been diluted, if there are strong diseconomies from scale and scope. This could be true for a number of non-mutually exclusive reasons. First, a successful private equity investor cannot easily scale up investments by either putting more money in any particular deal or investing in more companies, since he provides other inputs that are difficult to scale, such as time and advice. Second, it may also be difficult for a successful fund to hire partners who have equally strong skills as the existing ones. Third, it is possible that top VC choose to raise less capital than they could, since the number of good deals in the economy is limited at each point in time. However, passing up less profitable (but potentially still positive NPV projects) could only be an optimal choice for the GP, if there are negative spill-over effects on the *infra-marginal* deals from engaging in these investments.

However, if the persistence results are driven by heterogeneity in GP skills and limited scalability of superior human capital, it remains puzzling that these returns to superior skill are not appropriated by this scarce input factor in the form of higher fees and larger funds. On the other hand, it is concerning that the cyclical nature of the industry seem to result in capital flows to funds that subsequently have very lower returns.

One could conjecture that better performing funds also have better governance structures or limited partners with more bargaining power (see for example Lerner and Schoar (2002) for a possible mechanism). While these explanations are possible, we do not have a way to discern them in the current paper. These findings highlight the need for future work that aims to better understand the organizational structure of the private equity industry.

References

Bares, P., R. Gibson, and S. Gyger, Performance in the Hedge Fund Industry: An analysis of short-term and long-term Persistence, Working paper, Swiss Banking Institute, University of Zurich, 2002.

Berk, J. and R. Green, Mutual Fund Flows and Performance in Rational Markets, Working Paper No. 9275, National Bureau of Economic Research, 2002.

Brown, Goetzman, Ibbotson, Offshore Hedge Funds: Survival and Performance, *Journal of Business*, 72, 1999, 91-119.

Cahart, Mark M., On Persistence in Mutual Fund Performance, *The Journal of Finance*, Vol LII, 1997, 57-82.

Carhart, M., J. Carpenter, A. Lynch, and D. Musto, Mutual Fund Survivorship, Working paper, NYU, 2000.

Chevalier, Judith and Paul Ellison, Risk Taking by Mutual Funds as a Response to Incentives, *Journal of Political Economy*, vol 105, 1997, 1167-1200.

Cochrane, John, 2001, The Risk and Return of Venture Capital, Working paper, University of Chicago.

Edwards, E. and M. Cagalyan, Hedge Fund Performance and Manager Skill, Working Paper Columbia University, 2001.

Gompers, P., and J. Lerner, What Drives Venture Capital Fundraising? *Brookings Papers on Economic Activity and Microeconomics* (July 1998): 149-192.

Gompers, P., and J. Lerner, An Analysis of Compensation in the U.S. Venture Capital Partnership. *Journal of Financial Economics*, 51, 1999, 3-44.

Gompers, P. and J. Lerner, Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuation, *Journal of Financial Economics* 55, 2000, 281-325.

Kaplan, Steven and Jeremy Stein, The evolution of buyout pricing and financial structure in the 1980s, *Quarterly Journal of Economics*, Vol 27, 1993, 215-246.

Kaplan, S. and P. Str'omberg, Financial Contracting Theory Meets the Real World: Evidence From Venture Capital Contracts, *Review of Economic Studies*, forthcoming.

Kat, H. and F. Menexe, Persistence In Hedge Fund Performance: The True Value Of A Track Record, Working paper, University of Reading, 2002.

Khorana, Ajay and Henri Servaes, The Determinants of Mutual Fund Starts, *The Review of Financial Studies*, Vol 12, 1999, 1043-1074.

The Private equity Analyst., December 2001, Vol.11, Limited Partners Lack Complete Faith in Industry Return Data, *The Private Equity Analyst.*

Sirri, Erik R. and Peter Tufano, Costly Search and Mutual Fund Flows, *The Journal of Finance*, Vol LIII, 1998, 1589-1622.

Toll, David M., December 2001, Vol.11, Venture Write-Downs Accelerate as hope of quick rebound fades, *The Private Equity Analyst*.

Table 1: Descriptive Statistics [a]

Sample:	*Funds with Performance Data*			*Full Sample of VE Funds*		
	All Funds	*VC Funds*	*Buyout Funds*	*All Funds*	*VC Funds*	*Buyout Funds*
Size	180.62	75.64	415.83	109.1	50.3	262.9
	(403.1)	(140.6)	(634.1)	(273.6)	(75.9)	(486.4)
Closing Year	1990	1991	1990	1990	1990	1991
	(4.7)	(4.5)	(4.1)	(5.6)	(5.8)	(4.9)
Fraction 1st	0.45	0.43	0.51	0.40	0.39	0.42
Fraction 2nd	0.25	0.27	0.19	0.21	0.21	0.22
Fraction 3rd	0.14	0.15	0.11	0.13	0.13	0.11
N of Observations	1090	754	336	2216	1457	759

[a] We restrict the sample to funds that were started before 1997, since the following we will base the performance numbers on realized returns. Size is the amount of money that is committed to the fund. Sequence is the sequence number of a fund. Fraction 1st, 2nd 3rd indicates the fraction of funds in the overall sample that are first time, second time and third time funds respectively. Columns (1) to (3) are based on the sub-sample of funds from Venture Economics for which we obtained performance measures. Columns (4) to (6) are based on the full sample of private equity funds in the Venture Economics database over the equivalent time period. We exclude funds that are not private equity funds and those that have missing information on size and year of closing. Standard deviations are in parenthesis.

Table 2: Private Equity Returns: Cash Flow Based[a]

	Equal Weighted Peformance Measures		
Sample:	*All Funds*	*VC Funds*	*Buyout Funds*
IRR_{VE}	0.12	0.11	0.13
	0.17	0.17	0.19
	(0.32)	(0.34)	(0.27)
	[0.04;0.20]	[0.03;0.19]	[0.06;0.24]
IRR_{CF}	0.10	0.09	0.12
	0.11	0.12	0.11
	(0.32)	(0.30)	(0.32)
	[0;0.21]	[0;0.20]	[-0.01;0.23]
PME	0.65	0.54	0.80
	0.80	0.70	0.95
	(0.82)	(0.71)	(1.05)
	[0.38;1.02]	[0.31;0.91]	[0.52;1.11]
N of Observations	776	607	169
	Size Weighted Peformance Measures		
IRR_{VE}	0.14	0.14	0.15
	0.18	0.18	0.19
	(0.19)	(0.19)	(0.19)
	[0.08;0.22]	[0.05;0.22]	[0.09;0.23]
IRR_{CF}	0.12	0.14	0.12
	0.12	0.17	0.12
	(0.33)	(0.31)	(0.33)
	[0;0.23]	[0.04;0.26]	[0;0.21]
PME	0.80	0.73	0.83
	0.91	0.88	0.93
	(0.71)	(0.78)	(0.67)
	[0.57;1.05]	[0.41;1.15]	[0.71;1.03]
N of Observations	776	607	169

[a]Fund IRRs and PME (Public Market Equivalent) are calculated based on the actual cash flows of the funds. For each cell we report four different entries: The first is the median return, the second the average return, the third the standard deviation and finally we report the distribution of returns at the 25th and 75th percentile. The first panel of the table reports equal weighted performance measures, while the second panel reports size weighted performance measures (where size is the amount of committed capital that a fund has). PME is calculated by discounting cash inflows and outflows with the returns in the public markets over the same time period. The benchmark we use here to discount fund are the returns on the S&P500 index. Only funds that did not have a cash inflow or outflow for at least 2 years are included in this calculation. IRR_{CF} is the IRR at the end of a fund's lifetime based on actual cash inflows and outflows. On average this excludes funds which were started after 1994. IRR_{VE} contains the IRR that are reported to Venture Economics at the end of a fund's lifetime for the sample for which we can calculate IRR_{CF}.

Table 3: Private Equity Returns: Sample of Mature Funds[a]

	Equal Weighted Peformance Measures		
Sample:	*All Funds*	*VC Funds*	*Buyout Funds*
IRR_{VE5}	0.11	0.10	0.12
	0.18	0.20	0.14
	(0.36)	(0.40)	(0.24)
	[0.02;0.22]	[0.02;0.21]	[0.02;0.22]
TVPI	1.66	1.75	1.53
	2.24	2.42	1.83
	(2.30)	(2.54)	(1.55)
	[1.12;2.49]	[1.15;2.75]	[1.09;2.02]
N of Observations	1090	754	336
	Size Weighted Peformance Measures		
IRR_{VE5}	0.13	0.15	0.12
	0.18	0.30	0.13
	(0.32)	(0.46)	(0.23)
	[0.03;0.23]	[0.04;0.42]	[0.02;0.21]
TVPI	1.58	2.09	1.43
	1.97	2.87	1.61
	(1.83)	(2.83)	(1.00)
	[1.09;2.13]	[1.27;3.47]	[1.06;1.83]
N of Observations	1090	754	336

[a]Fund IRRs and TVPI (Total Value to Paid-in-Capital) are obtained from Venture Economics. IRR_{VE5} is the reported IRR after 5 years of fund existence. We only use funds that have at least a five year horizon. For each cell we report four different entries: The first is the median return, the second the average return, the third the standard deviation and finally we report the distribution of returns at the 25th and 75th percentile. The first panel of the table reports equal weighted performance measures, while the second panel reports size weighted performance measures (where size is the amount of committed capital that a fund has under management).

Table 4: Fund Performance Measures [a]

	IRR_{VE}	IRR_{CF}	PME	TVPI	IRR_{VE5}
IRR_{VE}	1				
IRR_{CF}	0.86	1			
PME	0.89	0.86	1		
TVPI	0.77	0.65	0.75	1	
IRR_{VE5}	0.83	0.73	0.79	0.72	1

[a] Each entry reports the correlation between the different measures of fund perofrmance based on a sample of 776 funds that have information about cash flow data. Returns is the cummulative realized return at the end of the lifetime of a fund without any market adjustements or time weighting, calculated as TVPI-1. IRR_{VE} is based on the realized IRR of funds started in a given period as reported by Venture Economics. PME (Public Market Equivalent) is the ratio of capital outflows to capital inflows discounted by the cummulative returns on the $S\&P$ 500 during the same period. IRR_{VE5} is based on the IRR reported to Venture Economics at the end of five years after the first closing of the funds.

Table 5: Size Weighted Private Equity Returns[a]

Sample:	*All Funds*					*VC Funds*					*Buyout Funds*				
Year	Obs	TVPI	IRR_{VE}	Obs	PME	Obs	TVPI	IRR_{VE}	Obs	PME	Obs	TVPI	IRR_{VE}	Obs	PME
1980	22	2.78	0.22	22	0.97	20	2.36	0.21	20	0.93	–	–	–	–	–
1981	24	2.03	0.11	23	0.61	23	1.85	0.10	21	0.47	–	–	–	–	–
1982	29	1.45	0.05	29	0.35	28	1.42	0.04	25	0.35	–	–	–	–	–
1983	65	2.15	0.15	63	0.71	59	1.86	0.07	57	0.51	6	3.63	0.51	6	1.29
1984	74	2.47	0.14	71	0.82	68	1.54	0.06	65	0.48	6	4.09	0.28	6	1.37
1985	59	2.52	0.23	54	1.24	47	2.03	0.09	42	0.67	12	2.86	0.32	12	1.68
1986	61	2.73	0.14	59	0.89	45	2.74	1.12	43	0.74	16	2.71	0.16	16	1.07
1987	97	2.07	0.16	96	0.84	68	2.61	0.16	59	0.88	29	1.94	0.16	27	0.84
1988	71	1.91	0.14	68	0.85	48	2.48	0.20	47	1.08	23	1.75	0.13	21	0.78
1989	79	2.20	0.16	62	1.00	54	2.46	0.18	40	1.00	25	1.97	0.13	22	1.00
1990	45	2.15	0.22	36	1.00	27	2.95	0.25	22	1.29	18	1.90	0.17	14	0.90
1991	24	1.94	0.15	20	0.76	18	2.30	0.17	14	0.75	6	1.62	0.14	6	0.76
1992	50	2.11	0.23	47	0.89	26	2.97	0.32	29	1.31	24	1.81	0.21	18	0.77
1993	67	2.23	0.21	63	0.85	39	3.57	0.35	52	1.19	28	1.80	0.21	11	0.75
1994	68	2.33	0.17	62	0.71	42	3.52	0.10	51	0.83	26	1.69	0.20	9	0.67
1995	70	1.93	0.20	–	–	43	4.21	0.72	–	–	27	1.28	0.03	–	–
1996	67	1.95	0.05	–	–	31	4.54	0.09	–	–	36	1.23	0.07	–	–
1997	109	1.44	0.08	–	–	58	2.51	-0.03	–	–	51	1.19	0.10	–	–

[a]Performance measures of funds are weighted by the capital under management. For each year we use only the funds that were started in a given year. We then weigh the realized returns of each fund by the amount of capital under management. Obs is the number of observations per year. Since we have less than three observations per year for the buyout funds prior to 1983, we only start reporting annual performance measures for these funds in 1983. TVPI is the ratio of total value to paid-in-capital at the end of the lifetime of a fund without any market adjustements or time weighting. IRR_{VE} is based on the realized IRR of funds started in a given period as reported by Venture Economics. PME (Public Market Equivalent) is the ratio of capital outflows to capital inflows discounted by the cummulative returns on the $S\&P$ 500 during the same period.

Table 6: Fund Performance and Fund Characteristics[a]

Dependent Variable: IRR_{VE5} (IRR after five years)

log(Size)	2.38	13.28	2.78	-2.71	9.69	3.29	3.29
	(0.59)	(2.83)	(0.59)	(1.56)	(4.79)	(0.90)	(0.92)
$\log(Size)^2$		-1.11			-1.42		
		(0.28)			(0.63)		
log(Sequence)	3.37	-3.38		-9.01	-11.14	7.84	7.68
	(1.18)	(2.57)		(4.37)	(4.60)	(2.90)	(2.91)
$\log(Sequence)^2$		3.81			2.87		
		(1.49)			(1.17)		
First Dummy			-2.00				
			(1.12)				
VC Dummy	7.17	6.71	8.24	1.28	1.59	10.41	-1.55
	(1.84)	(1.73)	(1.92)	(4.36)	(4.33)	(2.55)	(4.94)
S&P500						0.54	-0.18
						(0.21)	(0.26)
S&P500 * VC Dummy							1.06
							(0.41)
Firm F.E.	No	No	No	Yes	Yes	No	No
Year F.E.	Yes	Yes	Yes	Yes	Yes	No	No
R^2	0.13	0.15	0.11	0.27	0.28	0.09	0.10
N of Observations	1090	1090	1090	639	639	1090	1090

[a]The dependent variable is realized fund IRR after five years of existence, which means we include one observation per fund. On average this restricts the sample to funds that were started before 1998. IRR measures are obtained from by Venture Economics. They are reported in percentage. Size is the amount of capital a fund has under management. Sequence is the sequence number of a fund. VC Dummy is equal to one if the fund is a venture capital fund and zero for buyout, LBO and mezzanine funds. First is a dummy equal one if the fund is a first time fund. $S\&P$ 500 is the annualzid return (including dividends and distributions) on the $S\&P$ 500 Index over the first five years of a fund's existence. Standard errors are in parenthesis and are adjusted for serial correlation and heteroskedasticity.

Table 7: Persistence of Fund Performance [a]

Dependent Variable: IRR_{VE5} (IRR after five years)

IRR_{t-1}	0.45	0.48	0.42		0.42	0.86	0.78
	(0.07)	(0.09)	(0.08)		(0.11)	(0.23)	(0.22)
IRR_{t-2}		0.19		0.23	0.18	0.22	0.13
		(0.08)		(0.08)	(0.10)	(0.13)	(0.19)
log(Size)			1.42	2.92	1.68	3.84	1.93
			(0.61)	(0.94)	(0.73)	(1.20)	(0.81)
log(Sequence)			3.74	5.97	4.17	3.07	5.37
			(1.48)	(3.00)	(2.46)	(2.56)	(4.65)
VC Dummy	6.59	8.59	8.18	11.42	11.49	11.24	11.34
	(1.96)	(2.03)	(2.06)	(2.61)	(2.24)	(2.27)	(2.34)
log(Size)*IRR $_{t-1}$						-0.08	
						(0.04)	
log(Size)*IRR $_{t-2}$						-0.03	
						(0.04)	
log(Sequence)*IRR $_{t-1}$							-0.24
							(0.13)
log(Sequence)*IRR $_{t-2}$							0.13
							(0.11)
Firm F.E.	No	No	No	No	No	No	No
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.21	0.22	0.24	0.23	0.29	0.30	0.29
N of Observations	639	392	639	392	392	392	392

[a] The dependent variable is realized fund IRR after five years of existence as reported by Venture Economics, which means we include one observation per fund. On average this restricts the sample to funds that were started before 1998. IRR_{t-1} and IRR_{t-2} are lagged realized IRR of a given private equity firm's previous fund and the fund before the last, respectively. Size is the amount of capital a fund has under management. Sequence is the sequence number of a fund. VC Dummy is equal to one if the fund is a venture capital fund and zero for buyout, LBO and mezzanine funds. Standard errors are in parenthesis and are adjusted for serial correlation and heteroskedasticity.

Table 8: Transition Probabilities: Fund Performance [a]

Panel A

	Lower Tercile	Medium Tercile	Upper Tercile
Lower Tercile	49%	31%	20%
Medium Tercile	30%	38%	32%
Upper Tercile	21%	31%	48%

Panel B

	Lower Tercile	Medium Tercile	Upper Tercile
Lower Tercile	52%	24%	24%
Medium Tercile	27%	42%	31%
Upper Tercile	20%	33%	47%

[a] We sort all funds for which we have follow on funds into performance terciles and calculate the conditional probability that a partnership's next fund will either stay in the same performance tercile, or move into one of the other two terciles. The results in Panel A are based on IRR_{VE5}, the IRR at the end of five years, as a measure of fund performance. In Panel B we use the residuals from a regression of IRR_{VE5} on year fixed effects, size and sequence number of the fund to sort the funds into performance terciles. Again we calculate conditional Markov probablilites as in Panel A.

Table 9: Fund Performance Based on Actual Cash Flows [a]

Dependent Variable: IRR - Cash Flows Based					
IRR_{t-1}			0.32		0.26
			(0.07)		(0.10)
IRR_{t-2}				0.27	0.19
				(0.08)	(0.9)
log(Size)	3.23	5.98	4.05	5.83	4.98
	(1.06)	(3.13)	(1.37)	(1.57)	(1.64))
$\log(\text{Size})^2$		-0.89			
		(0.42)			
log(Sequence)	4.75	5.02	4.98	6.91	4.35
	(1.66)	(2.53)	(2.90)	(5.01)	(3.62)
$\log(\text{Sequence})^2$		-3.74			
		(4.65)			
VC Dummy	2.32	1.83	8.91	11.62	12.35
	(3.41)	(3.46)	(4.12)	(5.63)	(5.23)
Year F.E.	Yes	Yes	Yes	Yes	Yes
R^2	0.15	0.16	0.28	0.27	0.32
N of Observations	776	776	430	233	233

[a] The dependent variable is realized fund IRR at the end of the fund's existence. IRR is calculated based on the actual cash flows of the fund (takedowns and distributions), as reported to venture Economics. On average this restricts the sample to funds that were started before 1998. Return_{t-1} and Return_{t-2} are lagged realized returns of a given private equity firm's previous fund and the fund before the last, respectively. Size is the amount of capital a fund has under management. Sequence is the sequence number of a fund. VC Dummy is equal to one if the fund is a venture capital fund and zero for buyout, LBO and mezzanine funds. Standard errors are in parenthesis and are adjusted for serial correlation and heteroskedasticity.

Table 10: Fund Size and the Track Record of the Firm[a]

Dependent Variable: Logarithm of Fundsize					
IRR_{t-1}	0.04	0.04	0.03	0.06	0.04
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
IRR_{t-2}			0.03		0.03
			(0.01)		(0.01)
IRR^2_{t-1}				-0.03	-0.03
				(0.01)	(0.01)
IRR^2_{t-2}					-0.02
					(0.01)
log(Lagsize)		0.85	0.83	0.86	0.74
		(0.11)	(0.09)	(0.11)	(0.12)
log(Sequence)	1.05	0.75	0.73	0.76	0.50
	(0.14)	(0.13)	(0.22)	(0.23)	(0.21)
VC Dummy	-1.17	-0.07	-1.31	-0.12	-0.12
	(0.26)	(0.24)	(0.21)	(0.20)	(0.23)
Year F.E.	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	0.14	0.21	0.24	0.22	0.27
N of Observations	1090	1090	640	1090	640

[a] The dependent variable (fund size) is the logarithm of the amount of capital committed to the next fund of a partnership. We estimate a Tobit regression, since the size variable is censored a zero. If a partnership does not raise a follow on fund, the size of the next fund is zero. IRR_{t-1} and IRR_{t-2} are the realized fund IRR of the previous fund and the one prior to this, respectively. Again we only include funds that are raised prior to 1998, and only one observation per fund. Lagsize is the amount of capital a fund has under management in the fund before the current one. Sequence is the sequence number of a fund. VC Dummy is equal to one if the fund is a venture capital fund and zero for buyout, LBO and mezzanine funds. Standard errors are in parenthesis and are adjusted for serial correlation and heteroskedasticity.

Table 11: Entry of Private Equity Firms into the Industry[a]

Dependent Variable:	Number of New PE Firms				Capital Raised by New PE Firms			
Nasdaq_t	0.47				1.53			
	(0.88)				(1.66)			
Nasdaq_{t-1}	1.46				3.20			
	(0.90)				(1.81)			
$S\&P_t$		2.60				5.11		
		(1.41)				(2.66)		
$S\&P_{t-1}$		2.41				5.01		
		(1.41)				(2.60)		
VC Returns_t			0.02				-0.08	
			(0.07)				(0.13)	
VC Returns_{t-1}			0.20				0.45	
			(0.06)				(0.13)	
Buyout Returns_t				0.00				-0.03
				(0.01)				(0.02)
$\text{Buyout Returns}_{t-1}$				-0.01				-0.01
				(0.01)				(0.02)
R^2	0.02	0.11	0.55	0.21	0.08	0.13	0.56	0.21
N of Observations	26	26	20	20	26	26	20	20

[a]The dependent variable in columns (1) to (3) is the aggregate number of new partnerships that are started in a given year from 1975 to 2000. The dependent variable in columns (4) to (6) is the logarithm of the total amount of capital raised by first time funds in a given year, again from 1975 to 2000. Nasdaq and Nasdaq_{t-1} are the annual returns on the Nasdaq Composite index in the current and the prior year, respectively. Similarly, $S\&P$ and $S\&P_{t-1}$ are the annual returns on the $S\&P$ 500 index in the current and the prior year, respectively. And finally, VC Returns and Buyout Returns are the aggregate annual returns of the venture capital and the buyout industry, respectively, as reported by Venture Economics. Since we only have venture industry return since 1980 the number of observations in columns (3), (4), (7) and (8) drops to 20. Moreover, entering firms in columns (3) and (7) are restricted to venture capital firms. Similarly entering firms in column (4) and (8) are restricted only to buyout firms. Standard errors are in parenthesis and are adjusted for serial correlation and heteroskedasticity.

Table 12: Probability of Raising a Follow-on Fund [a]

	Dependent Variable: Does Fund Raise a Follow-on Fund?								
Nasdaq$_t$	-0.26	-0.15	-0.16						
	(0.03)	(0.04)	(0.09)						
Nasdaq$_{t-1}$	-0.12	-0.06	-0.03						
	(0.04)	(0.04)	(0.09)						
Nasdaq$_{t+3}$		0.10	0.12						
		(0.04)	(0.05)						
$S\&P_t$				-0.30	-0.23	-0.24			
				(0.05)	(0.05)	(0.11)			
$S\&P_{t-1}$				-0.44	-0.25	-0.31			
				(0.05)	(0.06)	(0.11)			
$S\&P_{t+3}$					0.15	0.17			
					(0.05)	(0.10)			
VC Returns$_t$							0.04	0.01	0.01
							(0.00)	(0.01)	(0.01)
VC Returns$_{t-1}$							-0.04	-0.01	-0.01
							(0.00)	(0.00)	(0.01)
VC Returns$_{t+3}$								0.00	0.02
								(0.00)	(0.00)
log(Sequence)	0.09	0.07		0.09	0.07		0.09	0.07	
	(0.01)	(0.01)		(0.01)	(0.01)		(0.01)	(0.01)	
log(Size)	-0.01	-0.01	-0.01	-0.01	-0.02	-0.00	0.00	0.00	0.04
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)
R^2	0.07	0.04	0.03	0.07	0.04	0.01	0.06	0.02	0.03
N of Observations	2789	2467	751	2831	2503	756	1608	1147	481

[a] Linear probability regression of the likelihood that an existing fund raises a follow on fund. The dependent variable is a dummy equal to one if the fund raises a next fund and zero otherwise. Nasdaq is the annual return on the Nasdaq Composite Index in the year the fund was raised, $Nasdaq_{t-1}$ and $Nasdaq_{t+3}$ are the returns in the one year lagged and the three year leading Nasdaq Composite index, respectively. The former captures the market conditions in which the current fund was raised and the latter capture the market conditions in which the next fund will be raised. Similarly, $S\&P_i$ is the annual return on the S&P 500 and VC Returns is the annual return of the venture capital industry as reported by Venture Economics. To avoid bias for funds that were only raised very recently, we drop the last three years of data, 1999-2001. Size is the amount of capital under management in the current fund. Sequence is the sequence number of the current fund. VC Dummy is equal to one if the fund is a venture capital fund and zero for buyout, LBO and mezzanine funds. Columns (3), (6) and (9) only include the sup-sample of first time funds. Standard errors are in parenthesis and are adjusted for serial correlation and heteroskedasticity.

Table 13: Market Entry and Fund Performance[a]

Dependent Variable: IRR_{VE5} (IRR after five years)

	All Funds		*VC Funds*		*Buyout Funds*	
Entry	-0.14	-0.61	-0.34	-0.89	-1.35	-1.54
	(0.14)	(0.20)	(0.18)	(0.36)	(0.25)	(0.36)
Entry*log(Sequence)		0.76		1.13		0.33
		(0.28)		(0.42)		(0.28)
log(Sequence)	0.44	-3.36	0.57	-4.86	0.12	-1.21
	(0.15)	(1.34)	(0.21)	(1.86)	(0.08)	(1.21)
log(Size)	0.09	0.09	0.20	0.15	0.01	0.01
	(0.05)	(0.05)	(0.08)	(0.08)	(0.04)	(0.05)
Nasdaq_t	0.28	0.29	0.79	0.50	0.17	0.17
	(0.11)	(0.11)	(0.31)	(0.16)	(0.11)	(0.11)
VC Dummy	0.66	0.63				
	(0.19)	(0.19)				
R^2	0.05	0.07	0.06	0.10	0.22	0.23
N of Obs	1090	1090	754	754	336	336

[a]The dependent variable is realized fund IRR after five years of existence, which means we include one observation per fund. On average this restricts the sample to funds that were started before 1998, and only one observation per fund. Entry is logarithm of the number of private equity funds overall which are started in the same year as a given fund. This variable is calculated based on the full Venture Economics database. In columns (1) and (2) we use the sample of venture capital and buyout funds. In columns (3) and (4) we use only the sub-sample of venture capital funds. Accordingly the entry variable in these columns is based only on the number of venture capital funds entering the market in a given year. And in columns (5) and (6) we use only the sub-sample of buyouts funds. Parallel to before, we use only the number of buyout funds entering the market in a given year to calculate the entry variable. Nasdaq_t is the annual return on the Nasdaq Composite Index. Size is the amount of capital a fund has under management in the current fund. Sequence is the sequence number of the fund. VC Dummy is equal to one if the fund is a venture capital fund and zero for buyout, LBO and mezzanine funds. Standard errors are in parenthesis and are adjusted for serial correlation and heteroskedasticity.