Persistence in venture capital returns

ASSET CLASS

You've backed a firm whose debut venture fund ranks as a top performer. Should you also invest in its next fund? Andrew Conner *analysed the evidence.*

Investors in private equity often value gaining access to the best venture capital firms. Building a portfolio of "top-quartile" funds is a common goal. Both of these ideas implicitly assume that new funds raised by the managers of the previous best funds will themselves be superior.

In this article, we test the validity of the concept of persistence in venture capital returns. We compare the performance of one-time funds to that of fund families. We answer the question of whether venture capitalists improve their performance in subsequent funds or if they are, in fact, at their best when they make up a new team that is hungry to prove their abilities. Finally, we determine whether successor funds to top-quartile funds are more likely than average to be top-quartile funds themselves.

THE DATASET

We analysed the funds in the Venture Economics database. Our dataset included mature venture capital funds in the database from vintage years 1980-1995. As we have shown elsewhere, funds aged at least eight years are sufficiently mature to enable us to draw general conclusions regarding performance. Although from the Venture Economics database it is impossible to discern the identity of individual venture capital funds and/or firms, it is possible to link individual funds to the firms that managed them via a unique identifier. Our dataset included a total of 485 venture capital firms and 645 funds.

METHODOLOGY

We measured the cumulative performance of each fund in our dataset at December 31, 2003, the end of the observation period. We calculated two performance statistics for each fund: the internal rate of return (IRR), i.e. the discount rate that sets a fund's net present value of cash flows equal to the present value of its valuation; and the times-money-earned (TME) ratio, which is the sum of the fund's distributions of capital plus the fund valuation divided by the sum of invested capital.

After calculating performance statistics, we grouped each fund into a performance quartile for each statistic. Funds with performance equal to or above the 75th percentile of funds in the same vintage year were classified as "top-quartile." Those with performance below the 25th percentile of funds in the same vintage year were classified as "bottom-quartile" and so forth.

We then divided the dataset into two groups of funds. The first group contained those funds that were the only venture capital fund raised by a particular firm (the "single-fund" group), and the second group contained those funds that were one of two or more venture capital funds raised by a single firm (the "multi-fund" group). We compared the average performance of funds from the single-fund group with those of the multi-fund group and further divided the multi-fund group into groups of

EXHIBIT 1: HISTOGRAM OF NUMBER OF FUNDS RAISED

Source: Alignment Capital Group and Venture Economics

EXHIBIT 2: AGE WHEN RAISING A FOLLOW-ON FUND

	1 Year	2 Years	3 Years	4 Years	5 Year	6 Years	7 Year	8 Year
Proportion of funds in sample	18%	25%	24%	16%	11%	4%	1%	1%

Source: Alignment Capital Group and Venture Economics

predecessor and successor funds.

Given the groupings of predecessor and successor funds, we calculated the conditional probability that a successor fund's performance would rank in the same quartile as its predecessor fund or, alternatively, in one of the other three possible quartiles. In other words, we answered the question of whether top-quartile predecessor funds were more likely to have top-quartile successor funds (and whether bottom-quartile predecessor funds were more likely to have bottom-quartile successor funds, etc.).

THE FINDINGS

The majority of venture capital firms in our dataset raised only one fund. A total of 375 firms raised only one fund and 110 raised more than one fund. A histogram of the number of venture capital funds raised by each firm is shown in Exhibit 1.

However, the 110 firms that raised more than one fund account for 278 or 43 percent of the 645 total funds in the sample. Those funds that raised a subsequent fund did so an average of 2.9 years after raising the predecessor fund, with nearly half of those funds raising the subsequent fund in years two or three as shown in Exhibit 2.

In comparing the entire set of 645 funds to the sub-set of 278 funds in the multi-fund group, we found a counter-intuitive result. Ex ante we expected that the multi-fund group would outperform the single-fund group, as the market tends to self-select those funds that perform well by allowing them to successfully raise a follow-on fund.

However, this was not the case; the single-fund group actually outperformed the multi-fund group as measured by comparing both the average IRR of funds in the two groups and the average TME. This result could be partially attributable to the dataset's cut-off point for mature funds, by which time many successful venture capital funds from the late 1990s had not yet raised mature follow-on funds that could be included in this study. Additionally, upon dividing the multi-fund group into 160 predecessor and 160 successor funds, we found that the group of successor funds outperformed the predecessor funds, albeit with greater variability in return, as indicated by the higher mean IRR and TME for that group in Exhibit 3.

Exhibit 3 supports the idea that venture capitalists become better investors as they gain more experience. As shown in Exhibit 4 below, venture capital firms tend to improve significantly through the first two funds and performance tends to level off in funds three through five.

Finally, we assessed the probability of a successor fund having performance in the top quartile given that the predecessor fund had been top quartile. If there were no persistence in the performance of venture capital firms, we would expect to see that a successor fund had around a 25 percent chance of being in a given quartile regardless of the predecessor fund's quartile. However, as Exhibit 5 shows, this was not the case for fund IRRs.

As shown by the dark pink area in the left-most vertical bar in Exhibit 5 above, funds following a top-quartile predecessor had a 44 percent probability of being top-quartile themselves. This statistical result is very strong; the probability that random variation could produce such a high incidence of repeat top-quartile performance is less than 1 percent.[1] Successor funds to top-quartile predecessors had a 71 percent probability of performing above the median fund from the same vintage year.

Additionally, funds following bottom-quartile-ranked predecessor funds (shown by the red area in right-most bar in Exhibit 5) had a 48 percent probability of being in the bottom quartile (also supporting persistence with greater than 99 percent statistical confidence) and a 68 percent probability of being below the median. These results suggest strong persistence in both good and poor performance in venture capital funds. Interestingly, nearly as many bottom-quartile funds (40) raised a follow-on fund as top-quartile funds (48).

Exhibit 6 below shows that similar

EXHIBIT 3: SUMMARY STATISTICS OF SINGLE AND MULTI-FUND GROUPS

	Mean IRR	Median IRR	Standard Deviation of IRR	Mean TME	Median TME	Standard Deviation of TME
All Funds In Sample (n=645)	13.4%	8.5%	25.6%	2.19	1.68	2.20
Single-Fund Group (n=367)	16.4%	9.3%	31.7%	2.37	1.69	2.72
Multi-Fund Group (n=278)	9.3%	7.8%	13.1%	1.95	1.66	1.19
Predecessor Funds (n=160)	7.4%	7.1%	10.1%	1.82	1.65	1.00
Successor Funds (n=160)	10.5%	7.9%	14.9%	2.03	1.63	1.35

Source: Alignment Capital Group and Venture Economics

EXHIBIT 4: VENTURE CAPITAL FUND PERFORMANCE BY ROMAN NUMERAL

	I	II	III	IV	V	VI
Average Fund IRR	7.7%	8.4%	15.0%	16.3%	16.3%	0.9%
Average Fund TME	1.83	1.89	2.32	2.54	2.30	1.10
n	118	110	39	8	2	1

Source: Alignment Capital Group and Venture Economics

conclusions can be drawn using TME ratios as a performance metric.

CONCLUSION

In this research brief we study persistence in venture capital returns. Our results show that stand-alone funds perform fairly well and that first-time funds that raise follow-on funds tend to improve their performance in successive funds. Additionally, exceptional performance in a predecessor fund tends to be a useful indicator of similar performance in a successor fund. Follow-on funds raised by fund managers whose prior fund had a top-quartile IRR had a 44 percent chance of achieving a top-quartile IRR and those with a bottom quartile successor fund had a 48 percent chance of repeating their bottom quartile IRR, two statistical results that support the existence of persistence in the returns of venture capital funds with greater than 99 percent confidence. ■

NOTES

1. From Wolfram research:

The binomial distribution gives the discrete probability distribution of obtaining more than n successes out of N Bernoulli trials (where the result of each Bernoulli trail is true with probability p) equals:

$$\sum_{i=n+1}^{N} \frac{N!}{n!(N-n)!} p^{i}(1-p)^{N-i}$$

which follows the incomplete Beta distribution:

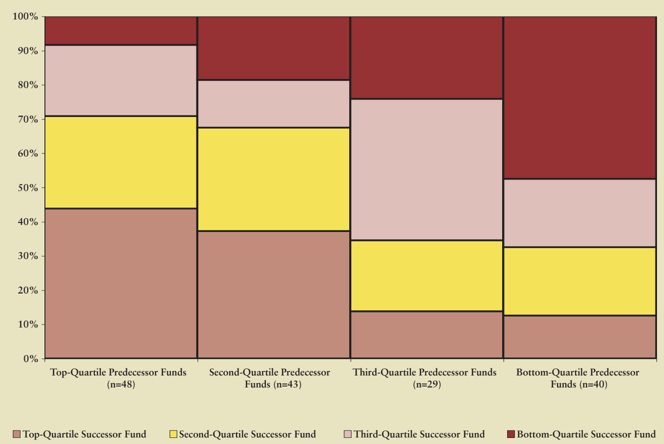
$$\beta(p;n+1,N-n)$$

In this case, random variability (no persistence) would dictate that a top-quartile fund be followed by a top-quartile fund with 25% probability. Given that 21 successors of our 48 top-quartile predecessors were also top quartile, we have the probability of greater than 20 successes equals:

$$\beta(.25;21,28)=0.0035$$

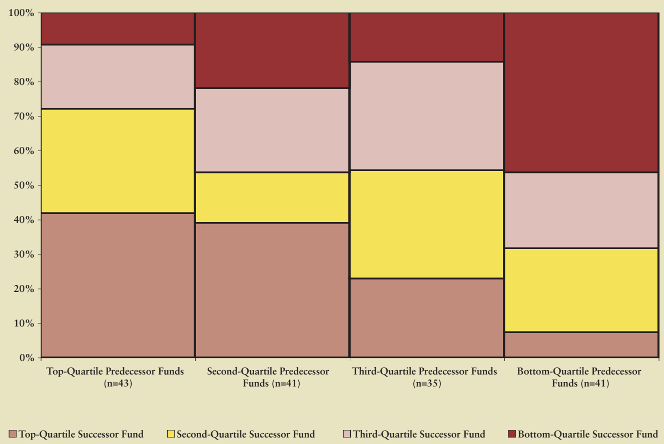
Alignment Capital Group (www.alignmentcapital.com) is a full-service private equity consulting firm based in Austin, Texas. Andrew Conner is an Associate with Alignment Capital Group. His responsibilities include performing due diligence on investment managers, providing strategic portfolio management advice and conducting original research.

EXHIBIT 5: FREQUENCY OF SUCCESSOR FUND QUARTILE GIVEN PREDECESSOR FUND QUARTILE (INTERNAL RATE OF RETURN)



Source: Alignment Capital Group and Venture Economics

EXHIBIT 6: FREQUENCY OF SUCCESSOR FUND QUARTILE GIVEN PREDECESSOR FUND QUARTILE (TIMES-MONEY-EARNED RATIO)



Source: Alignment Capital Group and Venture Economics