Preliminary

Has Persistence Persisted in Private Equity?

Evidence From Buyout and Venture Capital Funds

Robert S. Harris*, Tim Jenkinson,** Steven N. Kaplan*** and Ruediger Stucke****

This Draft: April 2013

Abstract

The conventional wisdom for investors in private equity funds is to invest in partnerships that have performed well in the past, so-called top quartile funds. This conventional wisdom is based on the belief that performance in private equity persists across funds for the same partnership. We present new evidence on the persistence of U.S. private equity (buyout and venture capital) funds using a new research-quality dataset from Burgiss, sourced from over 200 institutional investors. Using detailed cash-flow data for funds, we study the persistence of buyout and venture capital fund performance of the same general partners across different funds. We pay particular attention to persistence pre- and post-2000. Previous research, studying largely pre-2000 data, has found strong persistence for both buyout and venture capital firms.

We confirm the previous findings on persistence in pre-2000 funds. There is significant persistence for buyout funds and, particularly for venture funds.

Post-2000, we find mixed evidence of persistence in buyout funds. When funds are sorted by the quartile of performance of their previous funds, performance of the current fund is statistically indistinguishable regardless of quartile. Returns for partnerships in all previous fund quartiles, including the bottom, exceed those of public markets as measured by the S&P 500. At the same time, however, regression estimates do find that current fund performance is significantly related to previous fund performance.

Post-2000, we find that performance in venture capital funds remains as statistically and economically persistent as pre-2000. Partnerships whose previous funds are below the median for their vintage year subsequently tend to be below median and have returns below those of the public markets (S&P 500). Partnerships in the top two quartiles tend to stay above the median and their returns exceed those of the public markets.

* University of Virginia Darden School of Business, ** Said Business School, University of Oxford and CEPR, and *** University of Chicago Booth School of Business and NBER, **** Said Business School, University of Oxford.
This research has been supported by the UAI Foundation and the Center for Research in Security Prices. Rui Cui provided able research assistance. We thank Burgiss for supplying data. Kaplan has consulted to private equity general partners and limited partners. He also has invested in private and public equities. Address correspondence to Steven Kaplan, University of Chicago Booth School of Business, 5807 South Woodlawn Avenue, Chicago, IL 60637 or e-mail at skaplan@uchicago.edu.

1. Introduction

The conventional wisdom for investors in private equity funds is to invest in partnerships that have performed well in the past, particularly, so-called top quartile funds.[1] This conventional wisdom is based on the belief that performance in private equity persists across funds for the same partnership. Previous research, studying largely pre-2000 data, has been consistent with this conventional wisdom. For example, Kaplan and Schoar (2005) find evidence of persistence in venture capital (VC) and buyout funds raised in the 1980s and 1990s. Robinson and Sensoy (2011a) obtain similar results for a sample of buyout funds, again raised largely in the 1980s and 1990s. Chung (2012) studies buyout and VC funds raised through 2000 and finds somewhat less persistence than in the other papers.

While previous work finds persistence, there is still some question about its existence. Kaplan and Schoar rely on Venture Economics data that Stucke (2011) shows to be flawed. Robinson and Sensoy rely on the funds invested in by just one investor or limited partner (LP). Chung does not have access to fund-level cash flows.

We present new and more recent evidence on the persistence of U.S. private equity (buyout and venture capital) funds using the research-quality dataset from Burgiss used in Harris, Jenkinson and Kaplan (2013). We refer to private equity as the asset class that includes buyout funds and VC funds. We analyze the two types of funds separately. A key attribute of the Burgiss data is that they are derived entirely from institutional investors (the limited partners or LPs) for whom Burgiss' systems provide record-keeping and performance monitoring services. This feature results in detailed, verified and cross-checked investment histories for nearly 1400 private equity funds derived from the holdings of over 200 institutional investors.

[1] For example, see Swensen (2000) and Mulcahy et al. (2012)

Using detailed cash-flow data for funds, we study the persistence of buyout and VC fund performance of the same investors or general partners (GPs) across different funds. We pay particular attention to persistence in post-2000 funds.

We confirm the previous findings on persistence in pre-2000 funds. There is significant persistence for buyout funds and, particularly for venture funds.

Post-2000, we find mixed evidence of persistence in buyout funds. When funds are sorted by the quartile of performance of their previous funds, performance of the current fund is statistically indistinguishable regardless of quartile. Returns for partnerships in all previous fund quartiles, including the bottom, exceed those of public markets as measured by the S&P 500. At the same time, however, regression estimates do find that current fund performance is significantly related to previous fund performance.

Post-2000, we find that performance in venture capital funds remains as statistically and economically persistent as pre-2000. Partnerships whose previous funds are below the median for their vintage year subsequently tend to be below median and have returns below those of the public markets (S&P 500). Partnerships in the top two quartiles tend to stay above the median and their returns exceed those of the public markets.

We conclude by considering the implications of these results.

The paper proceeds as follows. In section 2, we discuss the data we use. In section 3, we present and discuss our persistence results. In section 4, we conclude and summarize the implications of our results.

2. Data

We use vintage year performance data for U.S. buyout and venture capital funds from Burgiss for performance as of December 2011. We include all funds for whom Burgiss can identify the GP. Our results aggregate performance for funds in a particular fund raising (vintage) year. Burgiss classifies a vintage year as the year in which a fund first draws capital from its LPs. We report performance for vintages from 1984 through 2008. We do not report vintages after 2008 because those funds are relatively unseasoned. Relatively few funds have available data pre-1984.

The Burgiss dataset "is sourced exclusively from LPs and includes their complete transactional and valuation history between themselves and their primary fund investments. The flows are rescaled to be representative of the full fund." The Burgiss data include all funds and cash flows from the LPs that provide the data. The data come from "over 200 investment programs and represent over $1 trillion in committed capital." The LPs comprise a wide array of institutions and over two thirds have private equity commitments in excess of $100 million. Of these, about sixty percent are pension funds (a mix of public and corporate) and over 20% are endowments or foundations.

The underlying cash flow data of the funds are likely to be extremely accurate because LPs use Burgiss' systems for record keeping and fund investment monitoring. This "check book" data – recording the exact cash outflows made by the LPs to the GPs as well as the distributions from the GPs back to the LPs – has a number of advantages for research purposes. The fact that the data are sourced from the back-office systems used by the LPs for reporting and fund accounting, and are cross-checked across investors in the same fund, results in levels of data integrity and completeness that could not be achieved by surveys, voluntary reporting, or (largely) involuntary reporting using Freedom of Information (FOIA) requests (the method

employed by Preqin). Furthermore, when data are sourced at least in part from GPs it is possible for a GP to strategically stop reporting. The Burgiss data also are up to date – given the need for quarterly reporting by most investors – and so there are no problems resulting from a lack of updating as there can be with other commercial databases. In other words, for a given LP, there is unlikely to be any selection bias. This is an advantage over other commercial sources whose data rely on voluntary and FOIA disclosures by GPs and LPs.

The potential bias in the Burgiss data – which it shares with the other commercial sources – is how representative the LPs (and resulting GPs) are. For example, it is possible that the LPs in the Burgiss sample have had better than average experience with private equity which is why they use Burgiss and allow Burgiss to aggregate their results. The results in Harris et al. (2012) suggest that this bias is not present. Harris et al. (2013) provide a more detailed discussion of the Burgiss data and its advantages.

For each GP, we identify whether the GP has more than one type of fund. For example, some buyout fund GPs have both large cap and small cap buyout funds; and some VC fund GPs have both early stage and later stage VC funds. Because the characteristics and the partners of the different types of funds can vary, we look at persistence across the same fund type offered by the GP, not across the entire GP. For example, we look at whether the performance of a GP's early stage fund predicts the performance of the next early stage fund it raises, not the next later stage fund. In doing this, we are effectively following the sequence numbers that the GPs put on their fund.

We also eliminate annex funds and side funds. Annex funds are funds that extend an existing fund. Side funds are invested side-by-side with the main fund and have the same performance. Our results are qualitatively identical if we include these funds.

A. Buyout funds

Panel A of Table 1 reports summary information on the 607 U.S. buyout funds in the Burgiss data set. The first column reports the number of funds per vintage year. The data set includes more funds than the March 2011 data set analyzed by Harris et al. (2013). The additional funds came from additional limited partners who made their data available to Burgiss after March 2011. The second column reports the average capital committed to the funds each vintage year. Overall, these funds represent committed capital of roughly $700 billion.

The third column reports the unrealized portion of the funds as a percentage of the total invested capital in the fund value. Vintage years before 2000 are largely realized, with unrealized values less than ten percent of total realized and unrealized fund value. Unrealized values make up 19% to 37% of the total fund values for vintage years between 2000 and 2003. Vintage years after 2003 more than 50% unrealized suggesting that the analysis of those funds is subject to change in the future.

While we would prefer the more recent funds to be more fully realized, the unrealized values should approximate true market values. Since the end of 2009, topic 820 of the Financial Accounting Standards Board (FASB) has required private equity firms to value their assets at fair value every quarter, rather than permitting them to value the assets at cost until an explicit valuation change. This has likely had the practical effect of making estimated unrealized values closer to true market values than in the past, particularly for buyout funds. Second, the Burgiss figures for both distributions and NAVs are up-to-date because the data are sourced directly from LPs, subject to extensive cross-checks, and part of the Burgiss systems that are used for the LPs' monitoring and record-keeping. Finally, both Brown et al. (2013), using data from Burgiss, and

Jenkinson et al. (2013), using data from CALPERS, a large LP, find that unrealized values are, on average, conservative.

The next three columns present average (annualized) IRRs, Multiples of Invested Capital (MOICs), and Public Market Equivalents (PMEs) by vintage year. See Harris et al. (2013) for definitions and discussions of these measures. The average PMEs, particularly for 2006 to 2008 vintages are somewhat higher than those in Harris et al. (2013) reflecting positive performance in 2011.

In this sample, Burgiss identify the fund manager / general partner (GP). For GPs who offer more than one type of fund or fund family, Burgiss also identifies the type of fund. Burgiss also tells us the fund sequence number for that GP. This allows us to determine whether the GP is fund raising for the first time or has raised funds for quite some time. All of these identifiers allow us to track the performance of the same types of funds managed by the same GP.

The last four columns present by vintage year, respectively, the number of funds that have previous performance history and the average IRRs, MOICs, and PMEs for those funds. We have 285 funds that have information on previous fund performance. This compares to only 76 in Kaplan and Schoar (2005).

B. Venture capital funds

Panel A of Table 1 reports summary information on the 852 U.S. VC funds in the Burgiss data set. The first column reports the number of funds per vintage year. The data set includes more funds than the March 2011 data set analyzed by Harris et al. The additional funds came from additional limited partners who made their data available to Burgiss after March 2011. The

second column reports the average capital committed to the funds each vintage year. Overall, these funds represent committed capital of over $225 billion.

The third column reports the unrealized portion of the funds as a percentage of the total realized and unrealized fund value. Vintage years before 1999 are largely realized, with unrealized values less than ten percent of total realized and unrealized fund value. Unrealized values make up less than 50% of the total fund values for vintage years between 1999 and 2002. Vintage years after 2002 are all more than 50% unrealized suggesting that the analysis of those funds is subject to change in the future.

The next three columns present average (annualized) IRRs, Multiples of Invested Capital (MOICs), and Public Market Equivalents (PMEs) by vintage year. As with the buyout funds, the average PMEs for the VC funds are somewhat higher than those in Harris et al. (2012) reflecting positive performance in 2011. VC fund vintages after 2003 consistently average PMEs greater than 1.0.

The last four columns present by vintage year, respectively, the number of funds that have previous performance history and the average IRRs, MOICs, and PMEs for those funds. We have 436 funds that have information on previous fund performance. This compares to 323 in Kaplan and Schoar (2005).

C. Top Quartile Funds

Table 2 establishes the differences in performance of funds in different performance quartiles. For each vintage year, we place each of the funds in our sample in a performance quartile based on their PME. We do this separately for buyout and VC funds.

Panel A.1 shows that top quartile buyout funds have average PMEs of 1.80 compared to average PMEs of 0.78 for bottom quartile funds. The analogous annualized IRRs are 26.1% and

-2.5%. These are large differences. Panels A.2 and A.3 distinguish between pre-2001 and post-2000 buyout funds. The PME differential between top and bottom quartiles is greater for pre-2001 funds at 1.29 than for post-2000 funds at 0.82. The IRR and MOIC differentials also are somewhat greater for pre-2001 funds.

Panel B.1 shows that the differentials between top and bottom quartile funds are much larger for VC funds than for buyout funds. Top quartile VC funds have average PMEs of 2.56 compared to average PMEs of 0.49 for bottom quartile funds. The analogous annualized IRRs are 42.5% and -9.7%. Panels A.2 and A.3 distinguish between pre-2001 and post-2000 buyout funds. The PME differentials between top and bottom quartiles are substantially larger for pre-2001 funds at 2.74 than for post-2000 funds at 1.11. The IRR and MOIC differentials also are markedly greater for pre-2001 funds.

These results show that it would be very valuable to be able to predict and invest in those funds that will end up in the top two quartiles while avoiding funds that will end up in the bottom two quartiles. In the next section, we consider whether past performance helps with that prediction.

3. Persistence

In this section, we present several different analyses of persistence. The analyses focus on the PME performance measure developed by Kaplan and Schoar (2005). The PME or public market equivalent is effectively a market-adjusted multiple of invested capital. It measures how an investment in a private equity funds compares to an investment in public equities. Sorensen and Jagannathan (2013) provide "a general justification for the use of the PME as a performance

measure …" Importantly, the PME "remains a valid economic measure of performance regardless of the risk of the capital calls and distributions."

We measure public equity performance with the return on the S&P 500. A PME of 1.5 for example implies that an investor in the fund earned a total of 50% more over the life of the fund than if the investor had left its money in the S&P 500. (Our results are qualitatively similar when we use the returns on the Russell 2000, an index for smaller capitalization stocks.) The IRR and MOIC do not adjust for stock market movements and, therefore, vary meaningfully across periods of different market returns. While we focus on PME, our persistence results are generally qualitatively similar using IRR and MOIC.

A. Persistence by Quartiles – Previous Fund

In this section, we consider the conventional wisdom of investing in top quartile funds. For each vintage year, we place each of the funds in our sample in a performance quartile based on their PME. We do this separately for buyout and VC funds. This is not possible in practice as the current PME not the final PME is known when a GP raises a subsequent fund. Our results, then, should be viewed as an upper bound as to what an investor could obtain in practice. Brown et al. (2013) and Jenkinson et al. (2013) study the interaction of fundraising and interim performance.

Once we have performance benchmarks for each vintage year, we sort all funds into one of six groups. We place funds in groups one to four based on the past performance quartile of its most recently raised fund (as of December 2011) if such performance is available. If performance of the previous fund is not available, we place the fund into a fifth group if the fund sequence number is greater than one, i.e., it does not appear to be a first-time fund. We place the

fund into a sixth group of first-time funds if its fund sequence number is equal to one. We eliminate funds that do not have a GP identification.

i. Buyout Funds

Panel A.1 of Table 3 reports the crosstabs of PME quartiles of subsequent buyout funds relative to the four PME quartiles and two other classifications of the previous fund. The panel also reports the average IRR, MOIC and PME for the six different classifications.

The panel shows that there is modest persistence in buyout fund performance. Funds with a previous fund in the top quartile are in the top quartile 27.5% and above median 55% of the time. Funds with a previous fund in the bottom quartile are in the top quartile less than 20% and above median less than 40% of the time. The differences between the top and bottom quartile are not significant at the 10% level (chi-squared test).

Funds previously in the top quartile have an average PME of 1.34 while funds in the bottom quartile have an average PME of only 1.10. The difference in means is significant at the 1% level. Funds in the second and third quartile have average PMEs lower than those in the top quartile and higher than those in the bottom quartile, but the differences are not significant.

Funds that are missing previous fund performance, both first-time funds and non-first time funds, have average performance that is between the average performance of the top quartile and second quartile funds.

Panels A.2 and A.3 report the analogous results for funds raised, respectively, before 2001 and after 2000. Panel A.2 shows stronger persistence in the pre-2001 period than in the sample overall. Funds previously in the top quartile are in the top quartile 37.5% and above median 62.5% of the time. Funds previously in the bottom quartile are in the top quartile 17.4%

and above median 43.5% of the time. Again, the previous top quartile funds have the best average PMEs. Those PMEs are significantly greater than the bottom quartile PMEs.

The persistence appears to have weakened post-2000. Funds previously in the top quartile are in the top quartile 22% and above median 50.8% of the time. Funds in the top quartile have average PMEs that are only 0.02 greater than those in the second quartile. The average PMEs are lower than those for first-time funds and equal to those without a previous fund performance. There does seem to be modest persistence in the bottom quartile. Funds previously in the bottom quartile are in the top quartile 21.4% and above median 14.3% of the time. The average PMEs of the bottom quartile funds while economically lower than those of the top quartile funds (1.09 versus 1.26) are not statistically significantly lower. Overall, then, the results in panel A.3 suggest that persistence in buyouts has weakened and barely persisted post-2000.

Two other results in panel A are worth noting. First, fund in all six groups have average PMEs that exceed one, i.e., average performance exceeds that of the S&P 500. This is true in both subperiods.

Second, funds with better quartile performance appear to be more likely to raise a subsequent fund. Panel A includes 91 funds whose previous funds were top quartile, but only 51 funds whose previous funds were in the bottom quartile. That pattern is present in both the pre-2001 and post-2000 subsample. This is consistent with the results in Kaplan and Schoar (2005) and Chung et al. (forthcoming) that the ability to raise a subsequent fund is significantly related to past performance.

ii. Venture Capital Funds

Panel B.1 of Table 3 reports the crosstabs of PME quartiles of subsequent VC funds relative to the four PME quartiles and two other classifications of the previous fund. The panel also reports the average IRR, MOIC and PME for the six different classifications.

The panel shows that there is marked persistence in VC fund performance. Funds with a previous fund in the top quartile are in the top quartile and above median , respectively, more than 48% and 65% of the time. Funds with a previous fund in the bottom quartile are in the top quartile less than 15% and above median less than one-third of the time. The differences between the top and bottom quartile are significant at the 1% level (chi-squared test).

Funds previously in the top quartile have an average PME of 2.26 while funds in the bottom quartile have an average PME of only 0.79 The difference in means is significant. Funds in the second and third quartile have significantly lower average PMEs than those in the top quartile, but significantly higher than those in the bottom quartile.

Funds that appear to be first-time funds have average performance roughly equal to the average performance of funds in the second quartile. Funds that do not have previous performance, but may not be first-time funds have average PMEs that are between those of third and fourth quartile funds.

It is worth noting that funds in the top three quartiles have average PMEs that exceed one, i.e., average performance exceeds that of the S&P 500. This is at odds with the conventional wisdom that only top quartile funds beat the S&P 500.

Panels B.2 and B.3 report the analogous results for funds raised, respectively, before 2001 and after 2000. Panel B.2 shows very strong persistence in the pre-2001 period. Funds previously in the top quartile are in the top quartile almost 49% and above median almost 63% of the time. Funds previously in the bottom quartile are in the top quartile less than 9% and above

median less than 29% of the time. Again, the previous top quartile funds have the best average PMEs. Those PMEs are significantly greater than the average PMEs of the three other quartiles. The bottom quartile PMEs are significantly lower than those in the three other quartiles.

The persistence has continued to be strong, if not stronger post-2000. Funds previously in the top quartile are in the top quartile 48% and above median 68% of the time. Funds in the top quartile have average PMEs that are significantly greater than those in the other three quartiles. Funds previously in the bottom quartile are in the top quartile less than 23% and above median less than 38% of the time. The differences between the top and bottom quartile are significant at the 1% level (chi-squared test).

The results in panel B.3 suggest that persistence has persisted post-2000. Average PMEs exceed 1.07 for both top and second quartile funds. The results are consistent with the conventional wisdom to avoid third and bottom quartile funds. The results are, however, at odds with the conventional wisdom that only top quartile funds beat the S&P 500. Second quartile funds have done so as well, both pre- and post-2000.

Panel B for VC funds, like panel A for buyout funds, shows that the likelihood a general partner is able to raise a subsequent fund decreases with fund performance. Panel B includes 132 funds whose previous funds were top quartile, but only 81 funds whose previous funds were in the bottom quartile. That pattern is present in both the pre-2001 and post-2000 subsample and is, again, consistent with the findings in Kaplan and Schoar (2005) and Chung et al. (forthcoming).

iii. Sensitivity

As mentioned earlier, the results are qualitatively similar if we sort by previous fund IRR or previous fund MOIC quartiles for both buyout and VC funds.

Because some of the funds are largely unrealized, particularly 2007 and 2008 funds, we repeated our analyses excluding 2007 and 2008 vintages. We obtained qualitatively similar results for both buyout and VC funds. This suggests that the results are not likely to be explained by the fact that some of the post-2000 funds are not fully realized.

We also sorted previous funds on PME ranges. We considered top quartiles funds to have PMEs above 1.50; second quartile funds, PMEs between 1.25 and 1.50; third quartile funds beteween 1.0 and 1.25; and bottom quartile funds, PMEs below 1.0. Table 4 reports the results of these sorts. For both buyout and VC funds, we obtained qualitatively similar results to those found using quartile sorts.

B. Persistence by Quartiles – Second Previous Fund

It is possible that the current and previous funds of a private equity GP include investments in the same company. If some of these investments are particularly successful or unsuccessful, they might induce persistence across current and previous funds. Investments are less likely to coincide in the current fund and the second previous fund. Accordingly, table 5 repeats the analyses in table 3 using the second previous fund.

i. Buyout Funds

Panel A.1 of table 5 shows little if any persistence from the second previous fund to the current fund for buyout funds. Funds with second previous funds in the top quartile average the

highest PMEs (of 1.36), but they are not significantly different from those for any of the other quartiles.

Panel A.2 shows that funds with second previous funds in the top quartile did very well before 2001 with an average PME of 1.78 and 73% of those funds subsequently having above median performance. The second previous funds in the third quartile, however, did almost as well, with average PMEs of 1.45 and with 80% of funds above median. The few second previous funds in the bottom quartile, however, did almost as well, with average PMEs of 1.32.

Panel A.3 shows no evidence at all of persistence in post-2000 funds. Funds with second previous funds in the top quartile have average PME of 1.19 with fewer than 46% of those funds subsequently having above median performance. Funds with second previous funds in the third and fourth quartiles have higher average PMEs although the differences are not significant.

In sum, there is little evidence of persistent persistence across the entire sample and no evidence of persistent persistence post-2000 from the second previous fund to current fund performance

ii. Venture Capital Funds

Panel B.1 of table 4 shows that persistence persists from the second previous fund to the current fund for VC funds. Funds with second previous funds in the top quartile average the highest PMEs (of 2.25, and they are significantly different from those for the other quartiles. More than 67% of the top quartile funds are subsequently above median. At the same time, that is true for fewer than 41% of bottom quartile funds.

Panel B.2 shows similar patterns for pre-2001 funds. Funds with second previous funds in the top quartile have the highest average PMEs while funds with second previous funds in the

bottom quartile have the lowest average PMEs in both sub-periods. The average PMEs of the second previous top quartile funds are significantly greater than those of the second previous bottom quartiles funds.

There is still persistence across second previous funds after 2000, but it is concentrated in the bottom quartile. Funds with second previous funds in the bottom quartile have the lowest average PMEs. Fewer than 30% are above median. Funds with second previous funds not in the bottom quartile perform in both sub-periods while funds with second previous funds in the bottom quartile have the lowest average PMEs in both sub-periods. The average PMEs of the previous top quartile funds are significantly greater than those of the previous bottom quartiles funds for both sub-periods.

In sum, there is strong evidence of persistent persistence across the entire sample and in both sub-periods from the second previous fund to current fund performance.

C. Persistence Regressions: PMEs versus previous fund PMEs

In this section, we estimate regressions to explain current fund PMEs using previous fund PMEs as well as measures of fund size. We use the log of PME to reflect the fact that the distribution of PME is right skewed. The regressions include vintage year dummy variables for both the current and previous funds.

i. Buyout Funds

Panel A of table 6 reports regressions for the 285 funds in the buyout sample with previous fund performance. Previous fund PME is significantly related to current fund PME.

The coefficient in column 1 implies that a 10% increase in the previous fund PME is associated with a 2.7% increase in the current fund PME.

There is a positive, but insignificant relationship between the second previous fund PME and the current fund PME.

The fourth and fifth columns of panel A of table 6 include measures of fund size. Some LPs believe that increases in fund size lead to poor subsequent performance. Other LPs believe that larger funds do not perform as well as smaller funds. Column four includes the (log) change in fund size from the previous fund. Column five includes the (log) of current fund size. Neither size variable is statistically significant.

Panel B repeats the regression analyses only with pre-2001 vintage year funds. The previous fund PME is again significantly related to current fund performance with a coefficient of 0.293, implying that a 10% increase in the previous fund PME is associated with a 2.9% increase in the current fund PME. Again, change in fund size and fund size are unrelated to performance.

Panel C repeats the regression analyses only with post-2000 vintage year funds. The previous fund PME is related to current fund performance with a similar and statistically significant coefficient of 0.280. This implies that a 10% increase in the previous fund PME is associated with a 2.8% increase in the current fund PME. Again, change in fund size and fund size are unrelated to performance.

By these regression measures, there is persistence in buyout fund PMEs in the sample overall as well as in both sub-periods. The magnitudes are similar in both sub-periods. These results are statistically stronger than the non-parametric results in the quartile analysis in tables 3 and 4.

ii. Venture Capital Funds

Panel A of table 6 also reports regressions for the 436 funds in the VC sample with previous fund performance. Previous fund PME is significantly related to current fund PME. The coefficient in the first VC regression implies that a 10% increase in the previous fund PME is associated with a 3.4% increase in the current fund PME. This is greater that the coefficient for buyout funds, albeit not significantly so.

There is also a significant, but economically small relationship between the second previous fund PME and the current fund PME. A 10% increase in the second previous fund PME is associated with a 1.7% increase in the current fund PME.

The fourth and fifth VC regressions of panel A of table 6 include measures of fund size. While the coefficient on the (log) change in fund size from the previous fund is not significant, the coefficient on the (log) of current fund size is positive and statistically significant. This indicates that larger funds are associated with higher PMEs. This result is not consistent with larger funds leading to lower returns in the cross-section.

Panel B repeats the regression analyses only with pre-2001 vintage year funds. The previous fund PME is again significantly related to current fund performance with a coefficient of 0.365. This implies that a 10% increase in the previous fund PME is associated with a 3.65% increase in the current fund PME. Again, the log of fund size is positively related to performance.

Panel C repeats the regression analyses only with post-2000 vintage year funds. The previous fund PME is related to current fund performance with a smaller, but still statistically significant coefficient of 0.281. This implies that a 10% increase in the previous fund PME is

associated with a 2.8% increase in the current fund PME. Again, the change in fund size is not related to performance. The log of fund size is positively, but only marginally significantly related to performance.

By these regression measures, there is persistence in VC fund performance in the sample overall as well as both sub-periods.

D. Persistence Regressions: PMEs versus previous fund quartiles

In this section, we estimate regressions to explain current fund PMEs using the previous fund PME quartile. We also include dummy variables for funds that are first-time funds as well as funds that are not first-time funds, but do not have previous fund performance information. The excluded variable is previous fund in the top quartile. Again, we use the log of PME as the dependent variable. The regressions include vintage year dummy variables for the current fund. The coefficients on the dummy variables measure the percentage change in PME from the PME of a fund that was previously in the top quartile.

i. Buyout Funds

The first regression in panel A of table 7 shows that top quartile funds have the highest average PMEs. However, previous 2nd and 3rd quartile funds as well as first-time funds and funds without previous return information do not perform significantly worse than top quartile funds. Only bottom quartile funds significantly underperform the top quartile funds.

In pre-2001 vintages, top quartile funds significantly outperform 4th quartile funds and first-time funds. In post-2000 vintages, however, top quartile funds do not significantly

outperform any of the other quartiles or fund categories. In fact, none of the fund categories is significantly different from one another.

As with the results in tables 3 and 4, the results in panel A of table 7 indicate that persistence has substantially weakened in buyouts post-2000.

ii. Venture Capital Funds

Panel B of table 7 presents the analogous regression for VC funds. The first regression in panel B shows that funds previously in the top quartile have the highest average PMEs. They have performed significantly better than all other fund categories. Funds previously in the second and third quartile have significantly outperformed funds in the bottom quartile.

For the most part, the patterns are qualitatively similar for pre-2001 and post-2000 vintages. The primary exception is that post-2000 the difference between funds that were previously in the top quartile and the other funds is economically smaller.

As with the previous results, the results in panel B of table 7 indicate that persistence has persisted in venture capital.

E. Persistence Regressions: PMEs versus previous fund PMEs with GP fixed effects

In this section, we estimate the regressions of PMEs versus previous fund PMEs using GP fixed effects. This estimate measures the variation of PMEs within particular GPs.

i. Buyout Funds

Panel A of Table 8 reports the regression results for buyout funds. Current fund PMEs are consistently negatively related to previous fund PMEs although the relations are strongly statistically significant only post-2000. The negative coefficients suggest that there has been regression to the mean for individual GPs since 2000. In other words, since 2000, GPs who perform particularly well in one fund, perform less well in the next fund. Combined with the opposite results in the earlier regressions that do not include fixed effects, these results indicate that funds that were previously high (low) performers perform better (worse) than the average fund in subsequent funds, but do not attain the same level of superior (inferior) performance as they did previously.

The regressions also indicate that increased fund size by a particular GP is associated with worse subsequent performance in the earlier pre-2001 period, but does not appear to have any effect in the later, post-2000 period.

ii. Venture Capital Funds

Panel B of Table 8 reports the regression results for VC funds. Current fund PMEs are negatively related to previous fund PMEs in both sub-periods. As with the buyout funds results, the negative coefficients suggest that there is some regression to the mean for individual GPs. In other words, GPs who perform particularly well in one fund, perform less well in the next fund. Combined with the opposite results in the earlier regressions that do not include fixed effects, these results indicate that funds that were previously high (low) performers perform better (worse) than the average fund in subsequent funds, but do not attain the same level of superior (inferior) performance as they did previously.

Surprisingly, the regressions also indicate that increased fund size by a particular GP is not associated with a decline in performance..

4. Summary and Implications

In this paper, we have used detailed cash-flow data to study the persistence of buyout and VC fund performance of the same investors or general partners (GPs) across different funds. We confirm the previous findings on persistence in pre-2000 funds. There is significant persistence for buyout funds and, particularly for venture funds.

Post-2000, we find mixed evidence of persistence in buyout funds. When funds are sorted by the quartile of performance of their previous funds, performance of the current fund is statistically indistinguishable regardless of quartile. Returns for partnerships in all previous fund quartiles, including the bottom, exceed those of public markets as measured by the S&P 500. At the same time, however, regression estimates do find that current fund performance is significantly related to previous fund performance.

It also is worth adding that our results overstate the amount of persistence because they assume that previous fund performance is known at the time the next fund is raised. In fact, previous fund performance at the time of fundraising is a noisy measure of the eventual fund performance.

These results have interesting implications for buyout fund investors. First, the decline in buyout fund persistence combined with a continuation of above public market returns is consistent with at least two explanations. It is possible that the buyout business has changed, with operating engineering becoming increasingly important. (See Kaplan and Stromberg

(2009)). Some general partners adjusted while others did not. Alternatively, it is possible that general partners learned from each other and that has led to the reduction in persistence.

Second, the decline in persistence casts doubt on the industry rule of thumb to invest only in funds that were previously in the top quartile. Except, perhaps, for the bottom quartile, previous quartile performance is not a strong predictor of current fund quartile performance.

Third, the lack of a performance-size relation suggests that buyout funds have been able to scale their performance as they have become larger. PMEs in the post-2000 period are not appreciably different from those in the earlier period despite much larger fund sizes.

For VC funds, post-2000, we find that performance more or less remains as statistically and economically persistent as pre-2000. Partnerships whose previous funds are below the median for their vintage year subsequently tend to be below median and have returns below those of the public markets (S&P 500). Partnerships in the top two quartiles tend to stay above the median and their returns exceed those of the public markets. We also fail to find a negative relation between performance and fund size. These results imply much greater stability in the venture capital industry over time. The same forces that operated in the 1980s and 1990s appear to still be in effect.

Our results on VC funds have two implications. First, the persistence of persistence suggests that the industry rule of thumb to invest in funds that have previously performed well and to avoid funds that have not remains consistent with our results. At the same time however, funds with previous performance in both the top and second quartiles outperform the S&P 500. This is not consistent with the view that only very few funds outperform. In fact, previous funds that are above median appear to do so.

References

Brown, Greg, Oleg Gredil and Steven N. Kaplan, 2013, Do Private Equity Funds Game Returns? Working Paper, University of North Carolina.

Chung, J., Performance Persistence in Private Equity Funds, working paper, Chinese University of Hong Kong.

Chung, J., B. Sensoy, L Stern and M. Weisbach, forthcoming, Pay for Performance from Future Fund Flows: The Case of Private Equity, Review of Financial Studies.

Cornelius, P., 2011, International Investments in Private Equity: Asset Allocation, Markets, and Industry Structure, London, UK: Academic Press.

Harris, R., T. Jenkinson, and R. Stucke, 2010, A White Paper on Private Equity Data and Research, UAI Foundation Working Paper, University of Virginia.

Harris, Robert S., Tim Jenkinson, and Steven N. Kaplan, 2013, Private equity performance: What do we know?, Working Paper.

Jegadeesh, N., R. Kraussl, and J. Pollet, 2009, Risk and Expected Returns of Private Equity Investments: Evidence Based on Market Prices. *Journal of Finance*.

Jenkinson, Tim, Miguel Sousa, and Rudiger Stucke, 2013, How Fair are the Valuations of Private Equity Funds? Working Paper, Oxford University.

Jones, C. and M. Rhodes-Kropf, 2004, The Price of Diversifiable Risk in Venture Capital and Private Equity. Working Paper, Columbia University

Kaplan, S. N., and A. Schoar, 2005. Private Equity Returns: Persistence and Capital flows. *Journal of Finance* 60, 1791-1823.

Kaplan, S.N. and P. Strömberg, 2009, Leveraged Buyouts and Private Equity. *Journal of Economic Perspectives*, Winter, 121-146.

Kocis, James M., James C. Bachman, Austin M. Long and Craig J. Nickels, 2009, *Inside Private Equity*, Hoboken, N.J., USA: John Wiley & Sons, Inc.

Korteweg, Arthur and Morten Sorensen, 2010. Risk and Return Characteristics of Venture Capital-Backed Entrepreneurial Companies. *Review of Financial Studies*.

Lerner, Josh, Antoinette Schoar and Wan Wongsunwai, 2007, Smart Institutions, Foolish Choices? The Limited Partner Performance Puzzle, *Journal of Finance* 62:731-64.

Ljungqvist, A. and M. Richardson, 2003, The Cash Flow, Return, and Risk Characteristics of Private Equity. Working Paper No. 9495, NBER.

Ljungqvist, A., M. Richardson, and D. Wolfenzon, 2007, The Investment Behavior of Buyout Funds: Theory and Evidence.

Metrick, Andrew, and Ayako Yasuda, 2010. The Economics of Private Equity Funds. *Review of Financial Studies* 23: 2303-2341.

Mulcahy, D., B. Weeks and H. Bradley, 2012, "WE HAVE MET THE ENEMY… AND HE IS US" Lessons from Twenty Years of the Kauffman Foundation's Investments in Venture Capital Funds and The Triumph of Hope over Experience, Working paper, Kauffman Foundation.

Phalippou, Ludovic and Oliver Gottschalg, 2009, The Performance of Private Equity Funds, *Review of Financial Studies* Vol. 22, No. 4, 1747-1776.

Robinson, D. and B. Sensoy, 2011a, Private Equity in the 21st Century: Liquidity, Cash Flows, and Performance from 1984-2010, Working Paper, Duke University and Ohio State University.

Robinson, David and Berk Sensoy, 2011b. Manager Compensation, Ownership, and the Cash Flow Performance of Private Equity Funds, Working Paper, Duke University and Ohio State University.

Sorensen, Morten and Ravi Jagannathan, 2013, The Strong Case for the Public Market Equivalent as the Premier Measure of Private Equity Performance, Working Paper, Columbia University.

Stucke, R., 2011, Updating History, Working Paper, Oxford University

Swensen, D. 2000, Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment. Free Press.

Table 1: Summary Information on Funds

Panel A : Buyout Funds

Vintage	Total	Ave. Capital Committed ($M)	% Unrealized	Average IRR	Average MOIC	Average PME	Funds with Perf. History	Average IRR	Average MOIC	Average PME
1984	1						0			
1986	6	407	0.0%	11.9%	2.15	0.93	0			
1987	8	282	0.0%	17.8%	2.87	1.32	2	18.5%	3.42	1.55
1988	6	427	0.1%	14.3%	2.06	0.98	1			
1989	11	445	3.8%	16.8%	2.33	1.12	2	8.2%	1.69	0.71
1990	3	237	0.4%	25.6%	2.53	1.30	0			
1991	3	1,170	0.2%	29.1%	2.51	1.32	2	30.7%	2.57	1.33
1992	9	233	0.2%	22.9%	2.46	1.19	2	19.1%	1.57	1.03
1993	9	314	0.1%	30.8%	2.79	1.41	2	14.9%	2.08	0.99
1994	17	470	0.1%	26.9%	2.35	1.34	5	30.0%	2.67	1.49
1995	20	705	0.8%	19.7%	1.96	1.27	7	21.5%	2.00	1.28
1996	15	440	5.3%	4.2%	1.29	1.00	8	2.4%	1.19	0.89
1997	34	753	4.1%	6.2%	1.30	1.13	20	10.3%	1.48	1.28
1998	38	1,030	6.9%	9.6%	1.57	1.48	20	6.9%	1.47	1.36
1999	30	927	8.6%	4.6%	1.32	1.20	12	1.0%	1.18	1.06
2000	46	1,190	19.4%	13.2%	1.69	1.46	23	14.7%	1.74	1.49
2001	26	1,210	29.5%	16.9%	1.65	1.39	15	16.6%	1.66	1.39
2002	20	715	32.9%	17.9%	1.81	1.50	9	14.6%	1.74	1.41
2003	15	1,300	36.5%	18.2%	1.94	1.68	7	17.4%	1.70	1.49
2004	43	822	51.2%	14.3%	1.60	1.46	19	11.8%	1.50	1.38
2005	56	1,100	66.6%	8.2%	1.36	1.28	32	9.0%	1.37	1.29
2006	66	1,740	73.7%	5.7%	1.20	1.14	33	3.0%	1.10	1.05
2007	67	1,990	81.5%	9.1%	1.23	1.12	30	10.8%	1.24	1.14
2008	58	1,540	83.5%	11.6%	1.22	1.07	34	11.9%	1.23	1.08
Total / Ave.	607	846	22.0%	15.5%	1.88	1.26	285	13.7%	1.73	1.24
Overall Sample		1,150	40.8%	11.9%	1.56	1.26		10.7%	1.46	1.24

Panel B : Venture Capital Funds

Vintage	Total	Capital Committed ($M)	% Unrealized	Average IRR	Average MOIC	Average PME	Funds with Perf. History	Average IRR	Average MOIC	Average PME
1984	18	67	0.0%	2.1%	1.60	0.63	0			
1985	19	45	0.0%	5.8%	2.00	0.73	0			
1986	12	44	0.9%	11.6%	2.30	0.97	1			
1987	18	84	0.0%	15.9%	2.68	1.17	5	17.1%	2.91	1.30
1988	18	80	0.2%	17.9%	2.40	1.17	6	19.1%	2.74	1.24
1989	22	60	0.2%	19.1%	2.83	1.28	12	23.3%	3.10	1.52
1990	13	75	0.0%	26.9%	3.05	1.55	4	37.7%	4.08	2.11
1991	8	221	4.3%	27.6%	2.78	1.34	4	19.2%	2.24	1.04
1992	18	110	0.4%	19.9%	2.60	1.22	12	23.1%	2.49	1.16
1993	21	117	0.0%	38.9%	4.83	2.13	10	52.3%	7.82	3.21
1994	21	115	0.5%	39.4%	5.17	2.35	12	51.1%	7.06	3.16
1995	27	115	0.9%	54.9%	5.21	2.98	12	47.3%	3.53	2.09
1996	21	141	2.0%	67.7%	5.92	3.78	14	90.3%	7.90	4.98
1997	37	163	3.1%	61.7%	2.88	2.32	17	101.8%	4.21	3.37
1998	50	191	9.5%	14.6%	1.52	1.40	34	19.3%	1.79	1.65
1999	78	322	18.0%	-2.8%	0.90	0.84	34	-2.5%	0.99	0.95
2000	97	427	35.6%	-2.7%	0.91	0.78	66	-2.3%	0.92	0.79
2001	50	387	46.9%	1.2%	1.13	0.92	29	2.4%	1.18	0.96
2002	17	318	48.3%	0.8%	1.08	0.87	9	0.5%	1.07	0.87
2003	27	246	59.1%	-0.3%	1.09	0.95	11	3.7%	1.31	1.15
2004	35	257	73.9%	1.0%	1.25	1.12	17	-0.4%	1.03	0.93
2005	51	337	78.0%	3.4%	1.36	1.25	36	4.5%	1.48	1.36
2006	64	395	84.1%	2.4%	1.14	1.05	31	4.2%	1.23	1.13
2007	65	345	88.1%	6.6%	1.23	1.12	35	6.8%	1.22	1.11
2008	45	340	87.9%	10.6%	1.27	1.08	25	16.4%	1.40	1.20
Total / Ave.	852	200	25.7%	17.8%	2.36	1.40	436	24.3%	2.80	1.69
Overall Sample		265	37.5%	12.5%	1.88	1.28		16.4%	2.10	1.47

Table 2: Performance by Quartile

Panel A : Buyout Funds

A.1 Total Sample	Average IRR	Average MOIC	Average PME	N
Current Fund Quartile PME				
1	26.1%	2.30	1.80	161
2	14.1%	1.59	1.32	148
3	8.1%	1.32	1.08	157
4	-2.5%	0.93	0.78	141
A.2 Pre-2001 Funds				
Current Fund Quartile PME				
1	30.2%	2.87	1.97	71
2	14.9%	1.81	1.33	61
3	7.3%	1.39	1.01	67
4	-2.7%	0.92	0.68	57
A.3 Post-2000 Funds				
Current Fund Quartile PME				
1	22.8%	1.86	1.67	90
2	13.6%	1.44	1.31	87
3	8.7%	1.27	1.14	90
4	-2.4%	0.94	0.85	84

Panel B : Venture Capital Funds

B.1 Total Sample	Average IRR	Average MOIC	Average PME	N
Current Fund Quartile PME				
1	42.5%	3.86	2.56	225
2	12.3%	1.65	1.16	208
3	2.4%	1.15	0.81	216
4	-9.7%	0.69	0.49	203
B.2 Pre-2001 Funds				
Current Fund Quartile PME				
1	58.4%	5.20	3.14	133
2	16.8%	1.98	1.23	120
3	4.6%	1.28	0.78	127
4	-8.9%	0.69	0.40	118
B.3 Post-2000 Funds				
Current Fund Quartile PME				
1	19.5%	1.93	1.72	92
2	6.0%	1.20	1.06	88
3	-0.8%	0.96	0.84	89
4	-10.9%	0.70	0.61	85

Table 3: Persistence by PME Quartile of Previous Fund

Panel A : Buyout Funds

A.1 Total Sample

Previous Fund Quartile PME	Current Fund Quartile PME 1	2	3	4	Total	Average Current Fund IRR	Average Current Fund MOIC	Average Current Fund PME
1	27.5%	27.5%	26.4%	18.7%	100.0%	13.2%	1.59	1.34
	25	25	24	17	91	91	91	91
2	26.3%	22.4%	31.6%	19.7%	100.0%	10.3%	1.42	1.23
	20	17	24	15	76	76	76	76
3	17.9%	26.9%	35.8%	19.4%	100.0%	10.2%	1.44	1.21
	12	18	24	13	67	67	67	67
4	19.6%	19.6%	31.4%	29.4%	100.0%	7.8%	1.28	1.10
	10	10	16	15	51	51	51	51
ıt not First Time	28.9%	26.1%	22.8%	22.2%	100.0%	13.5%	1.67	1.29
	52	47	41	40	180	180	180	180
First Time	29.6%	21.8%	19.7%	28.9%	100.0%	12.0%	1.61	1.27
	42	31	28	41	142	142	142	142

A.2 Pre-2001 Funds

Previous Fund Quartile PME								
1	37.5%	25.0%	18.8%	18.8%	100.0%	17.3%	1.97	1.48
	12	8	6	6	32	32	32	32
2	30.4%	21.7%	30.4%	17.4%	100.0%	7.2%	1.51	1.22
	7	5	7	4	23	23	23	23
3	21.4%	25.0%	32.1%	21.4%	100.0%	11.0%	1.63	1.23
	6	7	9	6	28	28	28	28
4	17.4%	26.1%	30.4%	26.1%	100.0%	8.2%	1.38	1.12
	4	6	7	6	23	23	23	23
ıt not First Time	30.2%	25.6%	25.6%	18.6%	100.0%	16.4%	1.99	1.33
	26	22	22	16	86	86	86	86
First Time	25.0%	20.3%	25.0%	29.7%	100.0%	11.8%	1.77	1.21
	16	13	16	19	64	64	64	64

A.3 Post-2000 Funds

Previous Fund Quartile PME								
1	22.0%	28.8%	30.5%	18.6%	100.0%	11.0%	1.39	1.26
	13	17	18	11	59	59	59	59
2	24.5%	22.6%	32.1%	20.8%	100.0%	11.6%	1.39	1.24
	13	12	17	11	53	53	53	53
3	15.4%	28.2%	38.5%	17.9%	100.0%	9.6%	1.31	1.19
	6	11	15	7	39	39	39	39
4	21.4%	14.3%	32.1%	32.1%	100.0%	7.4%	1.20	1.09
	6	4	9	9	28	28	28	28
ıt not First Time	27.7%	26.6%	20.2%	25.5%	100.0%	10.9%	1.39	1.26
	26	25	19	24	94	94	94	94
First Time	33.3%	23.1%	15.4%	28.2%	100.0%	12.1%	1.48	1.31
	26	18	12	22	78	78	78	78

Table 3: Persistence by Quartile of Previous Fund

Panel B : Venture Capital Funds

B.1 Total Sample

Previous Fund Quartile PME	Current Fund Quartile PME 1	2	3	4	Total	Average Current Fund IRR	Average Current Fund MOIC	Average Current Fund PME
1	48.5%	16.7%	24.2%	10.6%	100.0%	33.1%	3.28	2.26
	64	22	32	14	132	132	132	132
2	28.9%	34.2%	20.2%	16.7%	100.0%	14.6%	1.84	1.30
	33	39	23	19	114	114	114	114
3	22.0%	29.4%	29.4%	19.3%	100.0%	10.4%	1.74	1.19
	24	32	32	21	109	109	109	109
4	14.8%	17.3%	29.6%	38.3%	100.0%	-0.3%	1.00	0.79
	12	14	24	31	81	81	81	81
ıt not First Time	22.0%	21.2%	27.3%	29.5%	100.0%	7.6%	1.53	0.98
	52	62	72	74	260	260	260	260
First Time	23.6%	22.1%	24.4%	29.9%	100.0%	9.7%	1.86	1.26
	40	39	33	44	156	156	156	156

B.2 Pre-2001 Funds

Previous Fund Quartile PME								
1	48.7%	14.1%	23.1%	14.1%	100.0%	47.7%	4.41	2.79
	38	11	18	11	78	78	78	78
2	33.3%	27.0%	27.0%	12.7%	100.0%	22.0%	2.35	1.48
	21	17	17	8	63	63	63	63
3	26.8%	35.7%	17.9%	19.6%	100.0%	18.2%	2.33	1.40
	15	20	10	11	56	56	56	56
4	8.7%	19.6%	26.1%	45.7%	100.0%	-0.3%	1.00	0.71
	4	9	12	21	46	46	46	46
ıt not First Time	19.9%	21.9%	30.1%	28.1%	100.0%	10.9%	1.78	1.00
	30	43	50	44	167	167	167	167
First Time	24.3%	23.0%	24.3%	28.4%	100.0%	16.0%	2.36	1.40
	25	20	20	23	88	88	88	88

B.3 Post-2000 Funds

Previous Fund Quartile PME								
1	48.1%	20.4%	25.9%	5.6%	100.0%	12.1%	1.65	1.49
	26	11	14	3	54	54	54	54
2	23.5%	43.1%	11.8%	21.6%	100.0%	5.5%	1.21	1.07
	12	22	6	11	51	51	51	51
3	17.0%	22.6%	41.5%	18.9%	100.0%	2.2%	1.11	0.96
	9	12	22	10	53	53	53	53
4	22.9%	14.3%	34.3%	28.6%	100.0%	-0.3%	1.01	0.90
	8	5	12	10	35	35	35	35
ıt not First Time	25.9%	19.8%	22.2%	32.1%	100.0%	1.9%	1.08	0.94
	22	19	22	30	93	93	93	93
First Time	22.6%	20.8%	24.5%	32.1%	100.0%	1.6%	1.21	1.08
	15	19	13	21	68	68	68	68

Table 4: Persistence by PME Level of Previous Fund

Panel A : Buyout Funds

A.1 Total Sample

Previous Fund PME	Current Fund Quartile PME 1	2	3	4	Total	Average Current Fund IRR	Average Current Fund MOIC	Average Current Fund PME
Lagged PME > 1.50	30.1%	28.2%	25.2%	16.5%	100.0%	13.7%	1.55	1.34
	31	29	26	17	103	103	103	103
1.50 > PME > 1.25	17.4%	27.5%	29.0%	26.1%	100.0%	8.4%	1.35	1.22
	12	19	20	18	69	69	69	69
1.25 > PME > 1.00	26.1%	15.2%	45.7%	13.0%	100.0%	11.0%	1.45	1.17
	12	7	21	6	46	46	46	46
Lagged PME < 1.0	17.9%	22.4%	31.3%	28.4%	100.0%	8.5%	1.41	1.14
	12	15	21	19	67	67	67	67
IA, but not First Time	28.9%	26.1%	22.8%	22.2%	100.0%	13.5%	1.67	1.29
	52	47	41	40	180	180	180	180
First Time	29.6%	21.8%	19.7%	28.9%	100.0%	12.0%	1.61	1.27
	42	31	28	41	142	142	142	142

A.2 Pre-2001 Funds

Previous Fund PME								
Lagged PME > 1.50	37.5%	29.2%	12.5%	20.8%	100.0%	18.5%	1.92	1.48
	9	7	3	5	24	24	24	24
1.50 > PME > 1.25	33.3%	27.8%	27.8%	11.1%	100.0%	11.4%	1.69	1.45
	6	5	5	2	18	18	18	18
1.25 > PME > 1.00	31.6%	10.5%	36.8%	21.1%	100.0%	8.7%	1.64	1.15
	6	2	7	4	19	19	19	19
Lagged PME < 1.0	17.8%	26.7%	31.1%	24.4%	100.0%	9.0%	1.50	1.17
	8	12	14	11	45	45	45	45
IA, but not First Time	30.2%	25.6%	25.6%	18.6%	100.0%	16.4%	1.99	1.33
	26	22	22	16	86	86	86	86
First Time	25.0%	20.3%	25.0%	29.7%	100.0%	11.8%	1.77	1.22
	16	13	16	19	64	64	64	64

A.3 Post-2000 Funds

Previous Fund PME								
Lagged PME > 1.50	27.5%	28.8%	28.8%	15.0%	100.0%	12.3%	1.44	1.30
	22	23	23	12	80	80	80	80
1.50 > PME > 1.25	11.8%	27.5%	29.4%	31.4%	100.0%	7.3%	1.24	1.14
	6	14	15	16	51	51	51	51
1.25 > PME > 1.00	22.2%	18.5%	51.9%	7.4%	100.0%	12.6%	1.32	1.19
	6	5	14	2	27	27	27	27
Lagged PME < 1.0	18.2%	13.6%	31.8%	36.4%	100.0%	7.4%	1.23	1.09
	4	3	7	8	22	22	22	22
IA, but not First Time	27.7%	26.6%	20.2%	25.5%	100.0%	10.9%	1.39	1.26
	26	25	19	24	94	94	94	94
First Time	33.3%	23.1%	15.4%	28.2%	100.0%	12.1%	1.48	1.31
	26	18	12	22	78	78	78	78

Table 4: Persistence by PME Level of Previous Fund

Panel B : Venture Capital Funds

B.1 Total Sample

Previous Fund PME	Current Fund Quartile PME 1	2	3	4	Total	Average Current Fund IRR	Average Current Fund MOIC	Average Current Fund PME
Lagged PME > 1.50	50.0%	17.6%	18.6%	13.7%	100.0%	43.8%	3.72	2.54
	51	18	19	14	102	102	102	102
1.50 > PME > 1.25	42.1%	26.3%	21.1%	10.5%	100.0%	20.5%	2.67	1.63
	16	10	8	4	38	38	38	38
1.25 > PME > 1.00	26.4%	22.2%	36.1%	15.3%	100.0%	8.5%	1.61	1.23
	19	16	26	11	72	72	72	72
Lagged PME < 1.0	21.0%	28.1%	25.9%	25.0%	100.0%	5.8%	1.41	1.02
	47	63	58	56	224	224	224	224
VCA, but not First Time	22.0%	21.2%	27.3%	29.5%	100.0%	7.6%	1.53	0.98
	52	62	72	74	260	260	260	260
First Time	23.6%	22.1%	24.4%	29.9%	100.0%	9.7%	1.86	1.26
	40	39	33	44	156	156	156	156

B.2 Pre-2001 Funds

Previous Fund PME								
Lagged PME > 1.50	45.8%	19.3%	19.3%	15.7%	100.0%	49.9%	4.21	2.80
	38	16	16	13	83	83	83	83
1.50 > PME > 1.25	39.1%	21.7%	21.7%	17.4%	100.0%	24.6%	3.32	1.71
	9	5	5	4	23	23	23	23
1.25 > PME > 1.00	21.4%	14.3%	42.9%	21.4%	100.0%	10.6%	1.85	1.09
	6	4	12	6	28	28	28	28
Lagged PME < 1.0	22.9%	29.4%	22.0%	25.7%	100.0%	10.1%	1.75	1.10
	25	32	24	28	109	109	109	109
VCA, but not First Time	19.9%	21.9%	30.1%	28.1%	100.0%	10.9%	1.78	1.00
	30	43	50	44	167	167	167	167
First Time	24.3%	23.0%	24.3%	28.4%	100.0%	16.0%	2.36	1.40
	25	20	20	23	88	88	88	88

B.3 Post-2000 Funds

Previous Fund PME								
Lagged PME > 1.50	68.4%	10.5%	15.8%	5.3%	100.0%	16.8%	1.59	1.41
	13	2	3	1	19	19	19	19
1.50 > PME > 1.25	46.7%	33.3%	20.0%	0.0%	100.0%	14.2%	1.67	1.50
	7	5	3	0	15	15	15	15
1.25 > PME > 1.00	29.5%	27.3%	31.8%	11.4%	100.0%	7.2%	1.46	1.32
	13	12	14	5	44	44	44	44
Lagged PME < 1.0	19.1%	27.0%	29.6%	24.3%	100.0%	1.8%	1.09	0.96
	22	31	34	28	115	115	115	115
VCA, but not First Time	25.9%	19.8%	22.2%	32.1%	100.0%	1.9%	1.08	0.94
	22	19	22	30	93	93	93	93
First Time	22.6%	20.8%	24.5%	32.1%	100.0%	1.6%	1.21	1.08
	15	19	13	21	68	68	68	68

Table 5: Persistence by Quartile of Second Previous Fund

Panel A : Buyout Funds

A.1 Total Sample

Second Previous Fund Quartile PME	Current Fund Quartile PME 1	2	3	4	Total	Average Current Fund IRR	Average Current Fund MOIC	Average Current Fund PME
1	28.8%	25.0%	26.9%	19.2%	100.0%	13.9%	1.60	1.36
	15	13	14	10	52	52	52	52
2	20.0%	20.0%	25.7%	34.3%	100.0%	6.7%	1.28	1.15
	7	7	9	12	35	35	35	35
3	28.6%	25.7%	37.1%	8.6%	100.0%	14.3%	1.49	1.28
	10	9	13	3	35	35	35	35
4	29.4%	17.6%	29.4%	23.5%	100.0%	9.6%	1.40	1.29
	5	3	5	4	17	17	17	17

A.2 Pre-2001 Funds

Second Previous Fund Quartile PME								
1	46.7%	26.7%	20.0%	6.7%	100.0%	25.0%	2.28	1.78
	7	4	3	1	15	15	15	15
2	18.2%	18.2%	27.3%	36.4%	100.0%	7.3%	1.43	1.20
	2	2	3	4	11	11	11	11
3	50.0%	30.0%	10.0%	10.0%	100.0%	16.2%	1.81	1.45
	5	3	1	1	10	10	10	10
4	25.0%	25.0%	25.0%	25.0%	100.0%	6.8%	1.38	1.32
	1	1	1	1	4	4	4	4

A.3 Post-2000 Funds

Second Previous Fund Quartile PME								
1	21.6%	24.3%	29.7%	24.3%	100.0%	9.5%	1.32	1.19
	8	9	11	9	37	37	37	37
2	20.8%	20.8%	25.0%	33.3%	100.0%	6.4%	1.22	1.12
	5	5	6	8	24	24	24	24
3	20.0%	24.0%	48.0%	8.0%	100.0%	13.5%	1.36	1.22
	5	6	12	2	25	25	25	25
4	30.8%	15.4%	30.8%	23.1%	100.0%	10.5%	1.41	1.29
	4	2	4	3	13	13	13	13

Table 5: Persistence by Quartile of Second Previous Fund

Panel B : Venture Capital Funds

B.1 Total Sample

Second Previous Fund Quartile PME	Current Fund Quartile PME 1	2	3	4	Total	Average Current Fund IRR	Average Current Fund MOIC	Average Current Fund PME
1	40.7%	26.7%	19.8%	12.8%	100.0%	33.4%	3.30	2.25
	35	23	17	11	86	86	86	86
2	35.2%	23.9%	23.9%	16.9%	100.0%	17.0%	2.62	1.73
	25	17	17	12	71	71	71	71
3	27.6%	34.5%	24.1%	13.8%	100.0%	17.7%	1.87	1.44
	16	20	14	8	58	58	58	58
4	16.2%	24.3%	35.1%	24.3%	100.0%	2.4%	1.11	0.94
	6	9	13	9	37	37	37	37

B.2 Pre-2001 Funds

Second Previous Fund Quartile PME								
1	47.1%	23.5%	13.7%	15.7%	100.0%	50.5%	4.63	2.98
	24	12	7	8	51	51	51	51
2	42.4%	21.2%	15.2%	21.2%	100.0%	29.2%	3.90	2.16
	14	7	5	7	33	33	33	33
3	27.6%	31.0%	24.1%	17.2%	100.0%	29.6%	2.46	1.74
	8	9	7	5	29	29	29	29
4	30.0%	40.0%	20.0%	10.0%	100.0%	9.6%	1.44	1.11
	3	4	2	1	10	10	10	10

B.3 Post-2000 Funds

Second Previous Fund Quartile PME								
1	31.4%	31.4%	28.6%	8.6%	100.0%	8.4%	1.37	1.18
	11	11	10	3	35	35	35	35
2	28.9%	26.3%	31.6%	13.2%	100.0%	6.4%	1.51	1.36
	11	10	12	5	38	38	38	38
3	27.6%	37.9%	24.1%	10.3%	100.0%	5.9%	1.27	1.13
	8	11	7	3	29	29	29	29
4	11.1%	18.5%	40.7%	29.6%	100.0%	0.0%	0.99	0.88
	3	5	11	8	27	27	27	27

Table 6
Relation of Current Fund (log) PME to Past Fund (log) PMEs

	Panel A: All Vintage Years									
	Buyout Funds					VC Funds				
Previous Fund PME	0.273*** [0.053]		0.407*** [0.087]	0.271*** [0.053]	0.269*** [0.053]	0.338*** [0.044]		0.272*** [0.062]	0.339*** [0.044]	0.321*** [0.044]
2nd Previous Fund PME		0.053 [0.075]	-0.002 [0.082]				0.167*** [0.060]	0.063 [0.060]		
(Log) Change Fund Size				0.019 [0.057]					0.057 [0.069]	
(Log) Fund Size					0.0273 [0.021]					0.157*** [0.042]
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	285	139	139	285	285	436	252	252	436	436
Adj. R-squared	0.20	0.01	0.25	0.19	0.20	0.32	0.38	0.44	0.32	0.34
	Panel B: Vintage Years 2000 and Earlier									
Sample:	Buyout Funds					VC Funds				
Previous Fund PME	0.293*** [0.094]		0.570*** [0.162]	0.286*** [0.096]	0.296*** [0.094]	0.365*** [0.063]		0.252** [0.097]	0.367*** [0.063]	0.340*** [0.062]
2nd Previous Fund PME		0.131 [0.154]	-0.045 [0.157]				0.171 [0.109]	0.064 [0.109]		
(Log) Change Fund Size				-0.092 [0.154]					0.110 [0.113]	
(Log) Fund Size					0.051 [0.051]					0.265*** [0.075]
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	106	40	40	106	106	243	123	123	243	243
Adj. R-squared	0.14	0.00	0.27	0.14	0.14	0.34	0.41	0.46	0.34	0.38
	Panel C: Vintage Years 2001 and Later									
Sample:	Buyout Funds					VC Funds				
Previous Fund PME	0.280*** [0.062]		0.320*** [0.107]	0.258*** [0.074]	0.271*** [0.062]	0.281*** [0.053]		0.319*** [0.073]	0.282*** [0.053]	0.270*** [0.053]
2nd Previous Fund PME		-0.017 [0.098]	-0.004 [0.098]				0.133** [0.058]	0.057 [0.054]		
(Log) Change Fund Size				0.074 [0.050]					0.010 [0.063]	
(Log) Fund Size					0.025 [0.019]					0.061* [0.036]
Year Dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	179	99	99	179	179	193	129	129	193	193
Adj. R-squared	0.20	0.00	0.14	0.21	0.21	0.17	0.01	0.16	0.16	0.18

Table 7
Relation of Current Fund Log PME to Past Fund PME Quartiles

	A. Buyout Funds			B. Venture Capital Funds		
	All Years	Pre-2001	Post-2000	All Years	Pre-2001	Post-2000
Previous Fund Performance						
2nd Quartile	-0.048	-0.170	0.015	-0.275***	-0.312***	-0.218**
	[0.062]	[0.136]	[0.059]	[0.085]	[0.134]	[0.085]
3rd Quartile	-0.070	-0.180	-0.010	-0.317***	-0.311***	-0.299***
	[0.065]	[0.132]	[0.065]	[0.087]	[0.133]	[0.085]
4th (Lowest) Quartile	-0.194***	-0.331**	-0.110	-0.631***	-0.811***	-0.381***
	[0.071]	[0.140]	[0.072]	[0.095]	[0.141]	[0.095]
No Previous Fund Info	-0.023	-0.095	0.008	-0.504***	-0.600***	-0.361***
	[0.052]	[0105]	[0.052]	[0.073]	[0.111]	[0.080]
First-Time Fund	-0.078	-0.209*	-0.00	-0.421***	-0.502***	-0.311***
	[0.054]	[0.111]	[0.054]	[0.080]	[0.126]	[0.080]
Year Dummies	Y	Y	Y	Y	Y	Y
N	607	256	351	852	498	354
R-squared	0.09	0.06	0.11	0.21	0.24	0.09

Table 8
Relation of Current Fund PME to Past Fund PME With GP Fixed Effects

	A. Buyout Funds					
	All Years	All Years	Pre-2001	Pre-2001	Post-2000	Post-2000
Previous Fund Performance						
Previous Fund PME	-0.045	-0.067	0.033	-0.044	-0.319***	-0.318***
	[0.063]	[0.065]	[0.081]	[0.077]	[0.094]	[0.094]
(Log) Fund Size		-0.080**		-0.283***		-0.00
		[0.061]		[0.096]		[0.077]
Year Dummies	Y	Y	Y	Y	Y	Y
GP Fixed Effects	Y	Y	Y	Y	Y	Y
N	285	285	106	106	179	179
R-squared	0.06	0.04	0.10	0.04	0.02	0.02

	B. Venture Capital Funds					
	All Years	All Years	Pre-2001	Pre-2001	Post-2000	Post-2000
Previous Fund Performance						
Previous Fund PME	-0.081*	-0.089*	-0.219***	-0.219***	-0.245*	-0.232
	[0.049]	[0.048]	[0.082]	[0.083]	[0.141]	[0.140]
(Log) Fund Size		-0.131		0.008		0.172
		[0.109]		[0.127]		[0.118]
Year Dummies	Y	Y	Y	Y	Y	Y
GP Fixed Effects	Y	Y	Y	Y	Y	Y
N	436	436	243	243	193	193
R-squared	0.15	0.12	0.13	0.13	0.00	0.01