Smart Institutions, Foolish Choices?:

The Limited Partner Performance Puzzle

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The returns that institutional investors realize from private equity investments differ dramatically across institutions. Using detailed and hitherto unexplored records of fund investors and performance, we document large heterogeneity in the performance of different classes of limited partners. In particular, endowments' annual returns are nearly 14% greater than average. Funds selected by investment advisors and banks lag sharply. These results are robust to controlling for the type and year of the investment, as well as to the use of different specifications. Analyses of reinvestment decisions and young funds suggest that the results are not primarily due to endowments' greater access to established funds. Finally, we examine the differences in the choice of intermediaries across various institutional investors and their relationship to success. We find that LPs that have higher average IRRs also tend to invest in older funds and have a smaller fraction of GPs in their geographic area, and that the performance of university endowments is correlated with measures of the quality and loyalty of the student body.

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1. Introduction

Over the past three decades, institutional investors have controlled an increasing share of the U.S. equity markets: Gompers and Metrick (2001) calculate that their share of U.S. public equity markets exceeded the 50% threshold in 1995.[1] There is a significant and growing literature in financial economics that seeks to understand the investment decisions of institutional investors and the differences between the various classes of investors. Gompers and Metrick (2001) document that institutional investors prefer stocks that have greater market capitalizations, are more liquid, and with higher book-to-market ratios and lower returns in the prior year.[2] This literature thus far has been focused on the differences between institutional and individual investors.

One question that has attracted much less scrutiny, however, is the heterogeneity in investment strategies and sophistication *across* different types of institutional investors. (Table 2 of Gompers and Metrick (2001) is a rare exception.) This neglect is surprising because of the large differences in organizational structure, investment objectives, or even the perceived level of sophistication across various institutions. Moreover, recent theoretical literature highlights the extent to which differences in the sophistication about financial markets as well as agency problems between the ultimate

[1]Their calculation only examines institutions with greater than $100 million of securities under discretionary management that are required to file a 13F form with the U.S. Securities and Exchange Commission, and thus excludes hedge and private equity funds and those with less than $100 million in assets. Thus, their estimate is a lower bound on institutional holdings.

[2]Other studies have suggested that institutional investors are less likely to buy stocks on days with high trading volume (Barber and Odean (2003)) or to herd into particular stocks (Lakonishok, Shleifer, and Vishny (1992) and Grinblatt, Titman, and Wermers (1995)) and that their investments fall into a few well-defined styles (Froot and Teo (2004)).

investors and financial institutions can have profound implications for investment decisions, portfolio allocations, and ultimately investment returns.[3]

Moreover, many institutions do not invest all—or even most—of their funds directly, but rather do so through intermediaries. While there has been a growth of research into investment style of intermediaries in recent years,[4] the choices that institutions make when selecting intermediaries, what we may term "intermediary style," are poorly understood.

This paper looks at a specific class of investment decisions made by institutions: their investments in private equity funds. We analyze investment styles and performance across several different classes of investors, known as limited partners (LPs). We begin with the identification of a puzzle: different classes of investors in private equity have enjoyed dramatically different returns over the past two decades. Using detailed records—hitherto unexplored by academics—of the composition and performance of funds that are selected by different classes of investors, we document very substantial differences across the returns that investors enjoy. On average, endowments' average

[3]For example, Shleifer and Vishny (1997) suggest that information asymmetries between investors and intermediaries create limits to arbitrage that can affect the portfolio strategies and eventually the returns of the latter. (Similarly, see Gromb and Vayanos (2002).) Because the extent of agency problems may differ dramatically across institutions, considerable differences in the behavior of institutional investors could be expected.

[4]For example, Barberis and Shleifer (2003) theoretically discuss investors' choices between value and growth stocks and their implications.

annual returns from private equity funds are nearly 14% greater than the average investor. Funds selected by investment advisors and banks lag sharply.

Next we explore the importance of LPs' reinvestment strategies in explaining the differences in LP performance. This is the central means by which LPs can adjust their portfolio and exert governance pressure on the fund, since private equity is a very illiquid industry where investors have little recourse to their investment once the capital has been committed. We find that endowments and public pension funds generally are much less likely to reinvest in a given partnership than all other LP classes. Moreover, these two classes of LPs are better at forecasting the performance of follow-on funds. Follow-on funds in which endowments (and to a lesser extent, public pension funds) decide to reinvest show much higher performance than those funds where they decided not to reinvest. Other LP classes do not display these performance patterns. Corporate pension funds and advisors are more likely to reinvest if the *current* fund had high performance, but this often does not translate into higher future performance. These findings suggest that endowments proactively use the information they gain as inside investors to improve their investment decisions, while other LPs seem less willing or able to use this information.

A natural concern is whether these substantial performance differences between LP classes could be driven by other factors than variations in ability or sophistication. First, we want to assess whether these differences are driven by differences in the time periods in which the investments were made and other observable characteristics. Earlier

studies have shown that the private equity industry is subject to large cyclicality in returns. (See, for example, Gompers and Lerner (1998, 2001) and Kaplan and Schoar (2004).) Moreover, many endowments began investing in private equity funds before other investors. Even after controlling for fund type and the vintage year in which the investment was made, we continue to see superior annual performance of between 9 and 12 percent by endowments. The results are robust to examining patterns at the fund, rather than the investment, level: performance is positively related to the number of endowments investing in the fund, but negatively related to the number of banks investing. We also find that within the different groups, older LPs tend to have better performance than LPs that enter the industry at a later time. These differences are particularly significant for corporate pension funds, advisors, and insurance companies. We suggest that this may at least partially due to the fact that younger LPs are less experienced in private equity investing and also might have inferior access to established and successful funds.

A second important concern is whether these variations in performance could be due to systematic differences in the risk profiles of the funds that different classes of LPs choose. For example, endowments could be systematically investing in riskier funds and therefore have higher returns. To address this concern, we control for a number of observable characteristics that are often considered risk factors, such as the focus and maturity of the investments selected by the fund and the fund's size, age, and location. While our results are robust to these controls, we cannot completely rule out the possibility that unobservable differences in risk profiles are affecting our results based on

these tests. Therefore, we undertake an additional set of tests to see if the ex-post variation in portfolio returns is larger for those classes of LPs that have higher average returns. If endowments achieve their superior returns by taking on more risky investments, we should expect that they have a higher variation in performance across their private equity investments. When we compare the standard deviations of returns across the different LP classes, we indeed find that endowments are among the LP classes with higher variance, though they are not the highest. However, this variance is entirely driven by the positive skewness of the return distribution of endowments. Once we condition on the lower 75% of the funds across all LPs, we see that endowments in fact have the lowest variation across all LP classes. These results do not support the idea that endowments achieve their superior performance by relying on riskier investment strategies.

An alternative story is that performance differences across LPs could in part be the result of differences in the objectives that LPs pursue when investing in private equity (and not necessarily their ability). For example, Hellmann, Lindsey, and Puri (2004) suggest that banks as limited partners might diverge from maximizing returns on investments in order to maximize future banking income from the portfolio firms in which they invested. We find, however, that banks under perform the other LPs not only in the buyout industry (where considerations about future business might be important), but even in VC deals where the benefits from selling future services seem much smaller.

We also explore the possibility that the superior performance of endowments or public pension funds results from historical accident: *i.e.,* that these LPs through their early experience as limited partners may have greater access to established private equity groups (also known as general partners (GPs)) that manage high performing funds. To test this hypothesis, we examine investments in young private equity groups (those established after 1990) across all classes of LPs. If the performance difference is mainly driven by the superior access that older LPs have in established private equity groups, conditioning on younger GPs should erase the difference in performance between the different classes of LPs. When we repeat our analysis conditioning on young GPs, we still find a performance premium for endowments and public pension funds, though the difference is much smaller than in the analysis using all GPs. While this finding does not support the idea that the superior performance of these LPs is merely driven by historical accident, we cannot rule out that some of the performance difference is due to their early access to superior funds.

Next, we examine the LP-specific differences in the selection of intermediaries. For that purpose we undertake an analysis of LP specific fixed effects. We find significant differences in investment styles across LPs in the sample. Moreover, these investment styles are significantly correlated with the performance differences among LPs. LPs that have higher IRR fixed effects also tend to concentrate their investments in the funds of older GPs and have a smaller fraction of GPs in the same geographic area as the LP.

These results support the idea that intermediary style seems to be important, as has often been highlighted by practitioners. One of the clearest examples is the Yale endowment. The fundamental characteristics of their investments vary dramatically: in hedge funds, for instance, they prefer value-oriented funds while they heavily back technology-focused venture funds in private equity. But they have a consistent style in selecting intermediaries, whatever the investment style they employ: they favor long-term relationships with seasoned groups based in the United States which have well-aligned incentives (Lerner, Hardymon, and Leamon (2004)).

Finally, in the last part of the paper, we perform a simple cross-sectional analysis of the performance of university endowments. We find strong correlations between the LP specific fixed effects from IRR regressions and academic ranking measures. In particular, proxies for selectivity from applicant pools and for alumni loyalty exhibit strong correlations with the performance of university endowments, suggesting that the top-performing schools benefit from their close ties to accomplished alumni.

This paper is related to the literature on the establishment of private equity funds. Poterba (1989) and Gompers and Lerner (1998) explore how tax and other public policies affect venture capital (VC) fundraising. Gompers and Lerner (1996) and Lerner and Schoar (2004) examine the contracts entered into between investors and funds, and how they are affected by the nature of the targeted investments and the limited partners. Mayer, Schoors, and Yafeh (2003) examine the sources of VC financing across countries, and how these are correlated with investment choices. Kaplan and Schoar (2004) study

how the level of returns affects the ability of private equity groups to raise follow-on funds. But the drivers and consequences of the decisions by individual LPs to invest in private equity funds have been hitherto unexplored, largely because the data has been unavailable until very recently.

The results shed light on the large cycles in the private equity market that a number of papers, including Gompers and Lerner (1998, 2000) and Kaplan and Schoar (2004), have documented. The work of Lerner and Schoar (2004) implies that, optimally, LPs would use their inside information to screen out poorly performing general partners (GPs). The fact that many LPs appear not to be using their information optimally distorts the resulting equilibrium. The presence of inefficient LPs allows poorly performing GPs to raise new funds and thus makes the governance mechanism of exit by sophisticated LPs less effective.

The organization of this paper is as follows. Section 2 briefly describes the selection of private equity funds by institutional investors. Section 3 summarizes the data used in the analysis. Section 4 presents the analysis of performance. Sections 5 examines reinvestment decisions; Section 6, the performance of young funds. Section 7 presents the LP-level analysis. Section 8 examines how the cross-sectional performance among endowments varies with observable characteristics. The final section concludes the paper.

2. Institutions and Private Equity[5]

Institutional investors frequently choose to invest in private businesses through funds. This choice is largely driven by the difficulties of directly investing in private firms. The selection of appropriate direct investments requires intensive relationships and excellent due diligence skills, which few institutional investors have. Similarly, most institutional investors do not have the resources to intensively monitor a portfolio of private firms. Efforts to jointly invest in private firms with private equity groups have frequently encountered agency problems. Moreover, the limited partnership structure protects the investors from potential liability issues that could arise if they were to invest directly in a firm.

As a result, the bulk of institutional investment in private equity is done through funds. These funds are raised for a specified period (typically a decade, though extensions may be possible) and are governed by an agreement between the investors (the limited partners) and the principals in the fund (the general partners), which specifies the nature of the fund's activities, the division of the proceeds, and so forth. Private equity groups will typically raise a fund every few years, beginning the fundraising process as the process of investing the previous fund is being completed.

Institutional investors are reputed to widely differ in their sophistication in their approach to private equity investments. University and foundation endowments are often regarded as being on average the most sophisticated investors, while public pension funds

[5]This section is largely based on the industry notes and cases in Lerner, Hardymon, and Leamon (2004).

are considered the least. Universities and foundations began many of the earliest private equity investment programs. These groups thus frequently have a deeper understanding of private equity investments, as well as "grandfather" rights that allow them to continue to invest in subsequent funds of private equity groups that are closed to new investors.

By way of contrast, the investment boards at many public pension funds are often dominated by political appointees. These directors frequently have little understanding of the private equity industry, and may in some cases be seeking to direct investments in ways that are personally advantageous to themselves. These problems, while not unknown, are less severe at other classes of institutions. Moreover, many public pension funds offer compensation levels that are very modest by the standards of the financial services industry. As a result, there frequently is high turnover among their investment professionals, and average level of experience is modest. In some cases, career concerns may shape the investment decisions of some pension fund investors. Some universities have been very successful at preventing turnover by offering a variety of financial and non-pecuniary benefits to their investment professionals.

Two other classes of investors also deserve discussion. An increasingly important LP is the investment advisor, sometimes known as a "fund-of-funds." Consultants typically help institutions assess the past performance of previous funds by private equity groups, as well as evaluate the groups' future prospects. In recent years, as more public pension funds and individual investors have begun investing in private equity, funds-of-

funds have become more prominent. These groups will aggregate capital from a number of limited partners, and then invest it in a variety of private equity funds.

Banks have long been important private equity investors. The motivations for their investment activity, however, are frequently more complex than those of other LPs. While they also seek to earn high returns, their investment decisions are often shaped by indirect considerations as well. For instance, many banks garner substantial profits from lending to firms undergoing leveraged buyouts or else from advising on these transactions. As a result, they may invest in a buyout fund that they do not expect to yield high returns, if the investment will increase the probability that they will generate substantial fee income from the group's transactions.

3. The Data

As noted in the introduction, the primary barrier to research of this question has been data availability. The greater disclosure in recent years of private equity investments has allowed us to overcome this barrier. This section describes the data sources we employ.

Investment decisions. To ascertain which institutional investors had invested in which private equity funds, we employ two sources. The first comes from the investors themselves. Numerous public pension funds disclose the funds in which they have invested. In some cases, this information was contained in annual reports that were posted on the Internet; in other cases, these were provided by funds after a written

request. In addition, a number of private investors with whom the authors had personal relationships provided us with confidential listings of the funds in which they had invested. We obtained detailed information about these portfolio allocations from 20 different institutional investors.

The second source was the compilation of private equity investors by Asset Alternatives. Since 1992, Asset Alternatives has sought to compile the investors in private equity funds though informal contacts with the funds and investors themselves. This information is included as part of their *Directory of Alternative Investment Sources*, though the underlying data has not been made hitherto available to researchers. While their database is not comprehensive, it covers a large and diverse fraction of the private equity industry.

Fund characteristics. We collected information on the fund size, stage, the previous funds raised, etc., from the Asset Alternatives funds database (included as part of their *Galante's Venture Capital and Private Equity Directory*, though typically again not shared with researchers) and Venture Economics' online funds database. These two databases were merged and discrepancies reconciled. We distinguished between the overall count of the fund and the sequence of this particular family of funds. In addition, we used the data on management fees and carried interest of funds from Gompers and Lerner (1999), updated through the review of the records of a number of limited partners who gave us access to their files. In total, our database covers 1,398 separate funds that belong to an LP portfolio in our sample.

Fund returns. Our primary source for return data was Private Equity Intelligence's *2004 Private Equity Performance Monitor*, which presents return data on over 1,700 private equity funds. This information is compiled by Mark O'Hare, who over the past five years has created a database of returns from public sources (e.g., institutional investors who have posted their returns online), Freedom of Information Act requests to public funds, and voluntary disclosures by both general and limited partners.[6] We supplemented this with the return data that we had previously gathered from public sources. Note that we will only use IRR data in our sample for funds established prior to 1999 (and we verify the results for a sample of funds raised prior to 2002), since this performance metric is unlikely to be very meaningful for younger funds. IRRs are reported net of fees and carried interest. As Gompers and Lerner (1999) shows, the majority of funds have a fee structure with carried interest of 20% and management fees of 1.5% to 2.5%.

Institutional investor characteristics. We compiled information on the overall size of the assets managed by the limited partner, the length of each institution's experience with private equity investing and location from Venture Economics' *Directory of Private Equity Investors* and Asset Alternatives' *Directory of Alternative Investment Sources.*

4. Analysis

4. 1. Descriptive Statistics

[6]O'Hare has been highly successful at gathering data not only on the returns of new funds, but also many of the most established in the industry.

Table 1 presents descriptive statistics of the 1,398 funds and 417 limited partners in our main sample. Data on characteristics of interest were not always available. We indicate in Table 1 the number of non-missing observations. Panel A of Table 1 shows statistics of the funds, broken down into three categories: early-stage venture capital, later-stage venture capital, and buyout funds. Our sample is split relatively evenly across these three types of funds. We have a limited amount of data on carried interest and management fees, while we have fund performance data for close to half of the funds in our sample.

Fund Characteristics. The average fund in our sample that LPs invested in is $406 million, but there is large heterogeneity between funds. The smallest fund is $4.5 million dollars, while the largest one is $6.1 billion. Not surprisingly, buyout funds are much larger with an average size of $660 million, while later-stage venture funds average $330 million and early-stage VC funds $210 million. The average fund is a fourth fund (the average sequence number is 3.7), but there is substantial variation ranging from partnerships that are in their first fund to those that have raised 32 funds. Our sample contains funds that were raised between 1991 and 2001, and the average fund in our sample was closed in 1997. We find that venture capital funds tend to be somewhat older (average sequence number of later-stage VC funds is 4.2), reflecting the longer history of this segment of the private equity market.

Performance. In terms of performance, we find that the average fund in our sample has an (unadjusted) IRR of 6.7 percent, but again with a great amount of

dispersion: the worst fund returned negative 94 percent while the best performing fund had an IRR of more than 500 percent. The average performance in this sample might seem very low. But it is important to note that this sample includes all funds up to 2001, which might include a fair number of funds that have not been fully liquidated. Therefore we also report the average performance for all funds that were raised prior to 1999 (and thus had at least 5 years to realize returns). If we condition on this sample, we see that the average IRR across all funds in the sample is 24% (excess returns of 11%). This performance is comparable in magnitude (but a little higher) to the average performance found in Kaplan and Schoar (2004) or in Ljungqvist and Richardson (2003). Over the entire period, we also find that early and later stage venture funds in our sample had significantly higher performance than the buyout funds; 14 percent and 8 percent versus 0 percent, respectively (on an unadjusted basis).

Geographic Distribution. Finally, we see that the funds in our sample are concentrated on the East and West Coasts, with 47 percent and 31 percent of the U.S. funds in the sample respectively. Only 23 percent of the funds are based in the South or the Midwest. When differentiating by type of fund, we see that the majority of early-stage venture capital funds are based in the western United States (56 percent), while 50 percent of later-stage VC and 62% of buyout funds are based in the northeastern region. This is not surprising since the buyout industry tends to be concentrated around New York and early-stage venture funds around Silicon Valley.

Composition of Limited Partners. Panel B of Table 1 shows the distribution of limited partners in our sample and their characteristics. Endowments comprise the largest group, with 100 LPs, followed by public pension funds (74) and corporate pension funds (72). When we differentiate among the different sub-classes of endowments we find that the majority of endowments in our sample are private university endowments (63), followed by foundations (27) and public university endowments (10). There are 66 advisors in the sample, 32 insurance companies, 30 commercial and investment banks, and 43 LPs that cannot be classified in any of the above categories. (Among such LPs are investment agencies of foreign governments, corporate venturing departments of large corporations, and religious organizations.) Advisors and public pension funds constitute the largest amounts of capital committed to the industry overall (averaging $3.6 billion and $2.2 billion committed to private equity investments, respectively).

Sample Period. Panel C shows the breakdown of vintage years for the funds in our sample. The number of funds in our sample increases over the 1990s. This is due to two different phenomena. First, the coverage of the Galante's database appears to become more comprehensive in the later part of the sample period. Second, the 1990s represent a period of massive growth of the private equity industry, in terms of the number of funds raised and the number of investors participating in the industry. To alleviate concerns that sample selection issues due to improved coverage of LPs over time might drive our result, we replicate our findings for the sample of 20 LPs where we have their complete investment history.

Availability of fund performance data. Finally, Panel D shows characteristics of funds for which we were able to collect performance data, compared to the entire sample. IRR data is available for just over 40% of all funds in the sample across the various fund categories (early-stage VC, later-stage VC, and buyout funds). The funds for which we have performance data tend to be slightly larger in size, have higher sequence numbers, and have more LPs investing in them.

4.2. Performance Differences across LP Classes

Table 2 provides an overview of the investments made by each type of limited partner in the different fund categories. There is enormous heterogeneity in the performance of funds in which different groups of institutions invest. The funds that endowments invested in have by far the best overall performance. The average IRR of funds that endowments invested in is 20 percent. This high performance is, however, entirely driven by their VC investments. On average, early- and later-stage VC funds that endowments invested in returned an IRR of 35 and 19 percent, respectively. In contrast, the buyout investments of endowments only had an IRR of less than one percent. Overall, endowments had a very positive average, since they invested in many more venture capital than buyout funds.

If we again break down endowments into the different types of endowments (public, private, and foundations) we find that foundations and private university endowments have higher IRRs than public endowments. This difference becomes particularly large when we form the weighted average IRRs where each fund is weighted

by its asset size. Public endowments have a weighted average IRR of 3.2% while private university endowments and foundations have a weighted average IRR of 19.1% and 23.3%, respectively. Interestingly, public university endowments perform much worse across all different types of private equity classes than the other endowments once we weight by size. This might partly be a reflection of the fact that these endowments are much larger and thus forced to place the bulk of their investments in larger and less profitable funds. Moreover, all endowments perform relatively poorly in the buyout arena.

This difference in performance across different forms of private equity investments might suggest that endowments have specific human or organizational capital that allows them to outperform in the VC investments, rather than a model where endowments have fewer agency problems. Since we do not see the same performance differential for their buyout investments, the data suggest that endowments have specialized knowledge in the venture industry. In section 8 we will analyze in more detail what can explain this superior performance.

The picture looks quite different for public and corporate pension funds (and to some extent, insurance companies). On average, the funds that these classes of LPs invested in had more moderate IRRs (eight percent and five percent, respectively). But the drivers of positive returns are less skewed for this group. The average VC fund these LPs invested in had an IRR of slightly over 10 percent, while their buyout funds had an IRR of two percent. Finally, we see that the funds picked by advisors and banks on

average had very poor performance (IRRs of negative two and negative three percent, respectively). This trend seems to hold across all different types of private equity investments. Interestingly, bank and finance companies picked particularly poor performing funds among the early-stage VC funds (IRR of negative 14 percent). We must be careful not to interpret these findings as the overall performance of the private equity portfolio of these groups, however, since this calculation does not reflect the *actual size* of the allocations to each of the different funds. This exercise represents the ability of different groups of LPs to identify (good) funds on average.

We also estimated the LPs' investment performance by assigning weights to each LP's portfolio constituents as follows. For investments where the dollar amount committed to the fund and the overall private equity commitments by the LP are available, we weighted the returns from each fund by the amount committed to the fund in relation to the LP's total private equity commitments. For all remaining funds in an LP's portfolio for which the commitment amount was not known, we simply assumed that the LP invested an equal amount in each fund. The results of this exercise indicate that the performance changes little.[7]

4. 3. Are these Performance Patterns Robust?

[7]Panel A also reveals that public and corporate pension funds tend to invest in larger funds, whereas endowments and insurance companies invest in smaller funds. Public pension funds also tend to invest in funds with higher sequence numbers. Interestingly, we see that the smaller fund size for endowments is driven by their allocations to small buyout funds and the greater share of venture capital funds in their portfolio: the VC funds they invest in are larger on average. We find that insurance companies and banks tend to invest in early funds (lower sequence number) across all fund categories.

A natural question is whether these univariate results are robust to controlling for the time period when the investments were made, or the choice between venture and buyout funds. We address this concern through regression analyses of fund returns.

For these and subsequent analyses, we will analyze investments at the LP-fund level (except for Table 4, which is conducted at the fund level): that is, we will use each investment by a limited partner in a fund as a separate observation. We control for the fact that we have multiple observations by clustering the standard errors at the fund level. We regress the realized IRR of a fund on a set of dummies for the different classes of LPs and control variables for year fixed effects, fund category fixed effects, the year the LP's private equity investment program was launched,[8] and the geographical co-location of the fund and LP. Public pension funds are the omitted category from the set of LP dummies. We only include funds that were started before 1999 to guarantee that a majority of the returns of the funds have already been realized.

In Table 3, column (1), we find that only funds in which endowments invest outperform public pension funds, while other LPs on average pick funds that under perform relative to those groups. In particular, corporate pension funds and banks invest in funds with significantly lower IRRs. To understand the difference in the performance of endowments in more detail we also replicate this regression where we distinguish between private university endowments, public university endowments, and foundations. We find (not reported in the table) the superior performance of endowments overall is

[8]The vintage is expressed relative to that of the median LP in the sample, which began its private equity program in 1987. Thus, a program begun in 1991 would be coded as +4.

predominantly driven by the private universities. The public universities and foundations have positive but not statistically significant coefficients.

In column (2), we include a dummy equal to one if the LP and GP are in the same region of the United States and a control for the age of the private equity program of the LP. We also add a number of other LP-specific controls such as the logarithm of the LP size (measured as committed capital) and dummies for the region the LP is located in. We find that the main results described above are not affected by the inclusion of these controls. The relationship between LP size and performance is negative but not significant. When we include a squared term for log of size in an unreported regression, however, we see that the average performance of the funds they invest in is concave. The direct effect of size is positive while the coefficient on the squared term is negative although not statistically significant, i.e., those LPs that are very big tend to under perform the average.[9]

The geographical proximity factor is negatively associated with fund performance, which might suggest that LPs are willing to invest in funds with lower performance if they are in the same local area. In unreported regressions, we also interact the dummy for whether LP and GP are in the same region with the dummies for different

[9]One could imagine that there are severe capacity constraints in the industry, for example, in terms of how much an LP can invest in a given fund and at what pace new fund managers enter. Under this model, larger endowments might be forced to experiment more and invest into new fund managers to secure the future choice of GPs. The need for this type of investment might further depress the performance of large funds, since we know from Kaplan and Schoar (2004) that first-time funds on average under perform the industry.

LP classes and we find that the negative effect is entirely driven by the public pension funds. Only these display a large negative coefficient on the interaction term. We also differentiate whether LP and GP are in the same region or in the same state. We find that public pension funds continue to display poor performance when investing in funds that are in the same state, while funds in the same broad region of the U.S. but not in the same state do not under perform. When we disaggregate the endowments as above, there is also a strong negative effect for public universities. These findings are consistent with the idea that public pension funds and public endowments face politically motivated pressures or constraints to invest in their local areas despite possibly unfavorable effects on performance.

The coefficient on LP vintage is positive but insignificant. We then interact the LP type dummies with the vintage of the LP's private equity investment program to find out whether, within the different classes of LPs, those that started investing in private equity earlier display different performance from those that started to invest later. We find negative coefficients on the interaction terms for most LP classes. In particular, among corporate pension funds, those LPs that started investing in private equity earlier have significantly higher IRRs.

4. 4. Importance of Market Cycles

To analyze how sensitive fund returns are to market cycles, in column (4) of Table 3 we replace year fixed effects with a measure of the aggregate annual inflow of capital into the industry. From earlier papers by Gompers and Lerner (1998, 2001) and

Kaplan and Schoar (2004) we know that capital flows and returns in private equity are very cyclical. Therefore, our measure of industry capital flows can be interpreted as a proxy for the ability of funds to time the market. The coefficient on the aggregate inflow of capital is negative and highly significant.[10] Parallel to before, we now interact the LP dummies with the measure of aggregate capital inflow. Column (5) shows that the coefficient on the interaction term between LP type and aggregate inflow of capital is negative and highly significant in general, but particularly so for advisors (at the 1% level) and for endowments and insurance companies (at the 5% level). These results suggest that advisors have significantly lower returns if they invest during periods of high capital inflows into the industry. This result is consistent with an interpretation where the latter LPs tend to display more herding behavior when the market is "hot," which leads to investments in lower return funds.

To test the robustness of this finding we also sort our data into two sub-samples, funds with vintage years from 1991-1994 and those from 1995-1998, and repeat the regressions described in Table 3 (not reported). Consistent with the herding story above, we find that the poor performance of corporate pension funds and banks are predominantly driven by their investments in the 1995-1998 period, which is usually considered the beginning of the bubble period. By way of contrast, endowments show a positive performance difference in both periods. In fact, the private endowments show

[10]This pattern continues to hold when we employ other proxies, such as the inflows into venture capital funds only or the level of the NASDAQ. We employ similar alternative controls in subsequent analyses.

no difference in performance across the two periods, but the public endowments have a more significant positive performance in the earlier period.

4. 5. Robustness Checks

We replicate the results in Table 3 using excess IRR as the performance measure. Excess IRR is measured as the fund's own IRR minus the median IRR of all private equity funds in that year and category. These results are reported in the appendix Table 3A. The results are equivalent to the results reported above. We also repeat our analysis for the full sample of LP investments, including those made after 1999. Again, the overall picture is very similar. We also repeat the analysis using median regressions to reduce the importance of extreme values and the results are qualitatively similar. The interaction terms between the different LP classes and industry capital flows become statistically more significant, while the interaction terms with LP age become less significant. The other results are unchanged.

Lastly, in Table 3, we used the individual investment decisions by LPs as an observation. We might be concerned that this overstates the amount of independent variation we have in the sample despite the fact that we are clustering at the fund level. Therefore, in Table 4 we now turn to an alternative empirical approach where we collapse the data at the fund level. We use the number of LPs of each class that invested in a given fund in our sample as explanatory variables for fund performance, together with fund size and controls for year fixed effects and fund category effects. We again use two measures of fund performance, IRR and excess IRR. As in Table 3, we find a

significant positive correlation between the performance of a fund and the number of endowments that invest in it. For all other classes of LPs, the coefficient is again negative, but it is only significantly negative for banks and corporate pension funds. Overall these results reconfirm our earlier findings in Table 3.

5. Differences in Reinvestment Decisions of LPs

In the subsequent analyses, we will try to explain what drives these differences in the performance of LPs. One of the most important decisions for LPs is whether they reinvest in the next fund of a partnership or not. Reinvestment decisions of LPs are particularly important in the private equity industry, where information about the quality of different private equity groups is more difficult to learn and is often restricted to existing investors (see Lerner and Schoar (2004) for a discussion of asymmetric information in private equity). Moreover, LPs have very few governance tools except for exit, *i.e.*, not reinvesting in the next fund.

For each fund in our sample, we identify whether the private equity organization raised a follow-on fund of the same type. For each LP investing in the fund, we then determine whether the same LP reinvested in the follow-on fund. In this way, we make sure that we do not miscode situations where no follow-on fund was raised as a decision not to reinvest.

Panel A of Table 5 shows the reinvestment outcomes by class of LP and fund type. Public pension funds and insurance companies reinvest in roughly 60 percent of the

funds where a next fund was raised. They are followed by endowments and advisors, who reinvest in about 50 percent of the cases, while corporate pension funds and banks reinvest in only 39 percent of the cases. Interestingly, endowments and advisors differ in their reinvestment rates across different fund categories. They are both more likely to reinvest in venture funds than in buyout funds. Most other LPs do not show a pronounced difference in reinvestment rate across fund categories. Moreover, funds in which endowments choose to reinvest have much higher average IRR than those of other classes of LPs. Again these higher average IRRs are especially driven by investments in venture capital funds. By way of contrast, the funds banks and advisors reinvested in show particularly poor performance.

Panel B of Table 5 explores some of the consequences of reinvestment decisions. We find that, across all LP classes, there are significant performance (IRR) differences between funds in which LPs did and did not reinvest. We see that LPs tend to reinvest in the next fund of the partnership if the current fund has a high IRR (on average these funds have an IRR of 25 percent). In those instances where LPs decided not to reinvest, the current fund on average had a significantly lower IRR of 17 percent. The same pattern holds when we look at the IRRs of the subsequent fund. Funds in which LPs reinvested have significantly higher performance than those in which they did not reinvest (seven versus negative two percent respectively).

In Panel C, we now break out the reinvestment decisions differentiated by class of LP. The difference in the average current fund performance between reinvested and

discontinued funds we found in Panel B is largely driven by the reinvestment decisions of public and corporate pension funds and advisors, who tend to reinvest when the current fund performance is higher. Interestingly, endowments do not show a significant difference in the current performance of partnerships in which they decided to reinvest versus those they did not (39 versus 37 percent). This picture reverses when we look at the performance of the next fund. Funds in which endowments decided to reinvest have much higher performance than those they decided not to (31 versus 7 percent). They appear to be able to select funds that maintain their high performance and avoid those that will have lower performance going forward. Moreover, they tend to re-invest when current funds are smaller in size. Public pension funds show a similar ability to differentiate between good and bad performers, but at, however, a much lower average performance level. Funds they reinvested in on average have six percent returns, while those they passed on had negative 2 percent. Advisors also appear to follow a similar approach of reinvesting when the current fund is smaller, but are less successful at picking the better performing next funds. In short, some investors appear far more able to benefit from and/or act on the inside information that being a limited partner provides.

In Table 6, we present the results from a linear probability model of reinvestment. The dependent variable is a dummy equal to one if an LP decided to reinvest in the next fund of a given partnership (conditional on a next fund being raised) and zero otherwise. In column (1), we find a positive but barely significant relationship between reinvestment and the past performance of the prior fund. Once we control for overall industry conditions (measured as aggregate inflows of capital into the industry), LP vintage, and a

dummy for whether LP and GP are in the same area, this relationship becomes slightly more significant (see column (2)). By way of contrast, market cycles have a much more significant effect on reinvestments: in times when more capital flows into the private equity industry, LPs are also more likely to reinvest. Moreover, we see that the LPs' vintage has no significant effect on the reinvestment decision, but LPs tend to be more likely to reinvest if the GP is geographically proximate. We add dummies for the different classes of LPs in Column (3). We see that corporate pension funds and endowments are less likely to reinvest on average. This might indicate that these groups follow a more proactive investment strategy, in which they exercise their exit right if they are not happy with the relationship.

In column (4), we now add interaction terms between the LP class dummies and the LP vintage. This allows us to test whether older LPs in different LP classes are more likely to reinvest. We find that among corporate pension fund and banks, older LPs are more likely to reinvest in a GP. This result could suggest that corporate pension funds and banks tend to be less proactive in their investment strategy. Of course one could also conjecture that these older LPs tend to have valuable long-standing relationships with their GPs. Given the lower performance results we documented for these types of LPs in Table 3, however, this interpretation seems less plausible.

Finally we also interact LP types with fund IRR or aggregate capital inflow (not reported in the table). By doing so, we hope to test whether different types of LPs are more sensitive to the past performance of a fund or the market conditions when deciding

whether to reinvest. While across most funds the coefficient on this interaction term is positive, it is not significant. We also repeated all the analyses in Table 6 using logit specifications with qualitatively the same results (not reported).

6. Are the Patterns Driven by Fund Access?

One possible explanation is that the superior performance of endowments is an accident of history. As Kaplan and Schoar (2004) document, private equity funds display a concave relationship between fund size and performance: the best funds apparently limit their size, even if they could raise far more capital. Typically, these limitations are implemented by restricting access to existing limited partners, who are given the right to reinvest a set amount, and not accepting new investors. These facts may imply that endowments enjoy superior returns not because of better fund selection, but because their early experience gave them a "seat at the table" among superior groups. To explore the possibility that the results simply reflect superior access, we analyze recent investment decisions in young private equity groups. In these cases, access to the funds is much less critical: existing limited partners should have little preferential access.[11]

Table 7 summarizes the performance of different classes of LPs for funds managed by recently established private equity groups. We use the median founding year (1990) of all private equity groups in our sample as a cut-off, and explore whether endowments continue to enjoy superior performance when they invest in the younger

[11]It is possible that existing relationships and prestige of an established limited partner help somewhat in getting access to the hottest new funds, but typically new funds are not in the position of turning away new investors.

private equity groups. Panel A shows the results if we include all funds started after 1990. In this case we find that endowments and public pension funds do not outperform the sample anymore. Moreover, the differences in performance between the different LPs are less pronounced. But advisors and banks seem to perform most poorly when we condition on the younger GPs. One might be concerned that including all funds started after 1990 in the sample could create bias, if some classes of LPs such as endowments are more likely to invest in recent years when returns have not been realized. We therefore repeat the analysis restricting the sample to young funds that closed before 1999 (Panel B). The picture changes significantly if we use this cut-off, since now endowments and public pension funds tend to outperform the rest of the LPs, while banks and other LPs do worst. The difference between the LP classes, however, is again less pronounced than in Table 2.[12]

Overall, these results suggest that some of the differences in the performance of LPs (in particular, endowments and public pension funds) might be attributable to preferential access of these LPs that have been in the industry for a long time. Over time, they may have developed good relationships with established and successful funds in the industry. But endowments still outperform other LPs to some extent, even when choosing among the younger GPs. Moreover, it might be optimal for established LPs to invest in a number of younger funds even if the expected returns on these funds are low

[12]We also repeat a regression approach along similar lines as Table 3, including only funds established after 1990 and before 1999. Parallel to the descriptive statistics we find young funds in which banks invest do significantly worse. All LP dummies except for endowments have a negative coefficient relative to the omitted category (public pension funds) but none of these are significant. When we use excess IRR as the dependent variable, endowments have significantly positive performance.

initially. The goal of this strategy could be the need to generate information about new classes of funds (e.g., Chinese venture capital) and to create a pipeline of a new generation of GPs with whom they will have preferential relationships going forward. This in turn could bias our results on the returns of young funds downwards and make the differences between LP classes less pronounced than they might otherwise be.

7. LP-Specific Differences

Our analysis so far has focused on the differences between LP classes. But not all endowment or pension fund investors are equal. Therefore, we now turn to analyzing the importance of the underlying heterogeneity among individual LPs. The analysis that follows will allow us to investigate whether differences in investment styles are systematically related to differences in the performance of LPs.

For that purpose, we estimate a model with LP-specific fixed effects. We augment the standard model we used in Table 3 by adding a full set of LP-specific fixed effects instead of dummies for LP classes. This allows us to test whether individual LPs differ in their intermediary investment styles, e.g., their propensity to invest in younger, larger, or better performing funds. Table 8 reports the results from this exercise for a number of different dependent variables. The first row of this table reports the R^2 of a regression of the raw fund IRR on controls for fund category and vintage year fixed effects. The R^2 in this regression is 28.9%. We now add the dummies for LP classes to this specification. Row 2 shows that the R^2 goes up to 29.7%. Moreover, the F-test for the joint significance of the LP class dummies is significant at the 1% level. When we

include the full set of individual LP fixed effects, the R^2 of the regression increases to 35.2%. This increase is much more pronounced relative to the base model than when we included the LP class dummies in row 2. This finding suggests that LP-specific heterogeneity explains a bigger fraction of the overall variation of LP performance than differences between LP classes. We also find that an F-test on the joint significance of the LP fixed effects is significant at the 1% level.

We also repeat this analysis using excess IRR as the dependent variable. Similarly to before, we find that R^2 between the base model and the model with LP type dummies increases from 11.7% to 12.7%, but when we include the individual LP fixed effects the R^2 goes up to 19.2%. The same patterns hold for the other dependent variables: GP founding year, GP size, and the change in size between two consecutive funds. In each case, the increase in R^2 is much larger when including the individual LP fixed effects. Overall, these findings suggest that LP-specific differences in investment styles are more important than differences between LP types in explaining the variation in LP performance.

7. 1. Differences within LP Classes

A natural question is whether some classes of LPs are more heterogeneous than others. To look at the heterogeneity in LP styles by class of LP, we collect the estimated LP fixed effects and calculate the mean, median, and standard deviations of these fixed effects by LP type. If the distribution of the estimated fixed effects is very tight around the sample mean, it would suggest that LPs do not vary greatly within LP classes, and

vice versa if the distribution is very wide. Moreover, we can analyze if there are differences in the distribution across different LP class.

The results in Table 9 suggest that the standard deviations of IRR fixed effects for endowments are somewhat larger than the other LPs. Panels A and B show that the standard deviation of the raw IRR and excess IRR fixed effects for endowments are 31 and 23 respectively, higher than for the other LP classes (except the "other" category). However, this could be driven by the positive skewness of fund returns for endowments. Indeed, when we condition on the lower 75% of funds across all LPs, the difference in spreads across the different LP classes is much less apparent (Panels C and D, and Figure 1). The standard deviations are relatively similar across the different LP classes for the other dimensions of LP investment styles, which suggest that there is no striking asymmetry in the amount of heterogeneity across LP classes.

7. 2. Correlation between the Dimensions of LP Investment Styles

Finally, we analyze how the different dimensions of an LP's investment style correlate with one another and with performance. For that purpose, we accumulate the estimated LP fixed effects in one matrix, where each row contains all the estimated fixed effects from the regressions with different dependent variables for a given LP. So an LP who has high performance across its different funds and invests with smaller GPs on average will have a high fixed effect in the performance regression and a lower fixed effect in the GP size regression. We can now correlate these different fixed effects to understand how these different investment dimensions are related to one another.

Table 10 shows the correlation structure within our sample of LPs. Each cell in this table represents the correlation between one set of fixed effects, described in the top row of the table, and another set of fixed effects described on the left hand side of the table. The first cell shows that, not surprisingly, the correlation between the raw IRR fixed effects and the excess IRR fixed effects is high (point estimate of 0.62) and strongly significant. When we look at the correlation of raw IRR fixed effects and other dimensions of LP investment style, we find that LPs who have higher fixed effects on the change in fund size and GP size are correlated with higher performance fixed effects. The interpretation of these results is that LPs who invest in larger and faster growing funds on average tend to have higher average IRRs. And finally, we document a negative correlation between the IRR fixed effect of an LP and the fixed effects on average GP founding year and the fraction of GPs in the same region as the LP.

Looking at the other dimensions of LP investment style, we find that LPs that have higher fixed effects on the change in fund size (that is, those investing in funds that increase their fund size more from one fund to the next) have lower GP founding year fixed effects, a lower fraction of GPs in the same area, higher GP size fixed effects, and higher reinvestment fixed effects. Moreover, we find positive and significant relationships between the fixed effect for GP size, reinvestment by the LP, and the fraction of GPs in the same region. And finally we find a positive correlation between

the reinvestment decision and the number of funds per GP, as well as the fraction of GPs in the same region.[13]

Overall, this supports the hypothesis that LPs vary in their overall investment styles along a number of dimensions. These include the average size, growth rate, and founding year of GPs they invest in, the tendency to reinvest in funds, and the proclivity to invest in GPs that are geographically close to the LP. Most interestingly, these different investment styles are systematically related to differences in the performance of LPs.

8. Endowments

In this section, we try to understand in more detail what explains the superior performance of endowments. For that purpose, we perform a simple cross-sectional analysis relating the variation in performance *among* endowments to their observable characteristics. Of the 73 endowments in our sample, 55 are universities for which ranking data was available in the 1995 survey of U.S. colleges and universities conducted by *U.S. News and World Report* magazine (47 private and 8 public universities). *U.S. News* compiles data from various sources and aggregates them into one overall score for each university.

[13]We also use a similar approach to take another look at the risk and return question alluded to in the introduction. We compute for each LP a rough measure of the total (not, as we would prefer, the systematic) risk of its portfolio: the standard deviation of the logarithm of raw and excess IRRs of the funds in its portfolio. (We use logarithms to reduce the impact of the skewness of the distribution.) We find a positive correlation—which in some specifications is statistically significant and in others is not—between this proxy for risk and the LP-specific fixed effects from the IRR and excess IRR regressions.

Table 11 shows descriptive statistics for the universities in our sample. The overall score of all rated universities in our sample ranged from 71.6 (the lowest score assigned to a rated university by *U.S. News*) to 100 (the highest). We also collected data on the individual measures of academic quality used by *U.S. News* to determine the rankings. Universities in our sample had academic reputation rankings ranging from 1 (the highest) to 129. The high school class standing of entering freshmen, measured as the share of freshmen in the top 10 percent of their high school classes, ranged from a low of 14% to the highest possible 100%. Acceptance rates among applicants ranged from 14% for the highly selective schools to 88%. Yield rates, or the percentage of those accepted who actually enrolled, were between 21% and 75%. Student to faculty ratios varied from 6 to 20. The strength of a school's resources was determined by its total expenditures on instruction, administration, student services and academic support divided by total full-time equivalent enrollment, with expenditure per student ranging from $8,270 to $63,575. Freshmen retention rates—representing the average percentage of freshmen entering in 1990 to 1993 who returned the following year—ranged from 71% to 99%. Graduation rates were based on the average percentage of students in the 1985 to 1988 freshman classes who graduated within six years, and ranged from 47% to 97%. Finally, alumni giving rates were based on the average percentage of living alumni who gave to fund drives in the preceding two years, and ranged from 10% to 58%.

To assess whether these characteristics and ranking factors are associated with investment performance, we employed two approaches. First, we simply compare

average performance for the different subsets of endowments. We find that, overall, university endowments outperform other endowments by 9%. Among the university endowments, we see that private universities have an average IRR of 22% while the public ones only achieve an IRR of 17%. Finally when we sort universities into the top 50% versus the bottom 50% according to the *U.S. News* ranking, we find that endowments in the upper half outperform the lower-ranked half by 11%. We confirm that these univariate results hold even when using a regression framework as in Table 3 where we include controls for fund vintage years and fund categories (not reported).

We also use an alternative approach similar to the one in section 7.2, where we collect the estimated LP fixed effects in regression models that incorporate LP-specific fixed effects. We then correlate these estimated fixed effects with the academic ranking variables. Table 12 shows the correlations obtained for the universities in our sample. The first column of figures shows the correlations between LP fixed effects in regressions using raw IRR as dependent variable on LP dummies, LP vintage, dummies for the region of the LP and for the co-location of the LP and GP, fund vintage years, and fund categories. The next two columns show the correlations when weighted IRR and excess IRR are used as dependent variables in the LP-specific regressions. We find that there is a strong positive correlation between LP fixed effects and overall ranking scores (particularly for the weighted IRR regressions, which has a correlation coefficient of 0.71, significant at the 1% confidence level). In other words, endowments that received higher scores in the *U.S. News* rankings tend to perform better. Acceptance rate and alumni giving rate also show consistently significant correlations across all

specifications: the more selective universities and those that have loyal and generous alumni tend to perform better in their private equity investments. These effects are still present but slightly weaker when we restrict the analysis to exclude funds closed in 1999 and after.

Overall, these results suggest that private endowments and those with higher academic rankings are associated with better investment performance in private equity. The fact that the proxies for the selectivity of the student body and alumni loyalty are particularly significant explanatory variables suggests that the advantage of top-performing schools may lie in the information generated by close ties to accomplished alumni, rather than simply in the wealth of the university.

9. Conclusion

The differences between institutional and individual investors have attracted growing attention by financial economists. The diversity of strategies *across* the various classes of institutional investors, however, has been much less scrutinized. This paper seeks to address this gap, examining the experience of various institutional investors in private equity funds.

Using data on investment choices and performance that have not been hitherto explored by economists, we document a puzzling pattern: dramatic differences in the performance of investments by different institutions. Endowments have an annual return some 14% better than other institutions, while funds selected by investment advisors and

banks perform particularly poorly. These differences remain present when we employ a variety of controls and specifications. We explore the importance of funds' reinvestment strategies in explaining the differences in LP performance. We find that endowments and corporate pension funds are much less likely to reinvest in a given partnership. Moreover, those LPs are better at forecasting the performance of follow-on funds. Funds in which endowments decided to reinvest show much higher performance than those where endowments decided not to reinvest. This suggest that endowments proactively use the information they gain from being an inside investor, while other LPs seem less willing or able to use information they obtained as an existing fund investor.

We also explore the possibility that the superior performance of endowments or public pension funds results from historical accident: *i.e.*, that these LPs through their early experience as limited partners may have greater access to established, high-performing funds. To test this hypothesis, we examine investments in young private equity funds (those raised after 1990) across all classes of LPs. If the performance difference is mainly driven by the superior access that older LPs have in established funds, conditioning on younger funds should erase the difference in performance between the different classes of LPs. When we repeat our analysis conditioning on young funds, we still find a performance premium for endowments and public pension funds, though the difference is much smaller than in the funds formed before 1990. While this finding does not support the idea that the superior performance of these LPs is merely driven by historical accident, we cannot rule out that some of the performance difference is due to their early access to superior funds.

Finally, we examine the LPs' "intermediary style": the systematic patterns they display when selecting private equity funds. We show that LP-specific differences in investment styles are significantly correlated with the performance differences between LPs. LPs that have higher IRR fixed effects also tend to invest in older funds and have a smaller fraction of GPs in the same geographic area as the LP. In addition, a cross-sectional examination of the variation in performance among endowments reveals that private endowments and universities with higher quality and more loyal students enjoy superior returns from their private equity investments.

This paper poses a number of follow-on questions that would reward further research:

- First, better understanding the sources of the performance puzzle is an important challenge. What specific agency problems, for instance, have led to the poor selection of funds by investment advisors and banks? While we can speculate on some of the causes—for instance, the weak incentive compensation offered many advisors and the desire on the part of many banks to attract lending and advisory business by investing in new funds—clearly more work is needed to understand these issues.
- Second, we noted in the introduction that the differing experience levels of the LPs might exacerbate cycles in the private equity market. To fully investigate this question, it would be necessary to link the records of LP investments that we have

investigated here with the characteristics of the individual companies backed by private equity funds.

- Finally, it would be interesting to explore the generality of these results. Are the same patterns seen, for instance, in the returns from hedge fund and public equity managers? If so, it may be interesting to explore the broader consequences of the changing mixture of institutional investors.

References

Barber, Brad M., and Terrance Odean, 2003, "All that Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors," Unpublished working paper, University of California at Berkeley and Davis.

Barberis, Nicholas, and Andrei Shleifer, 2003, "Style Investing," *Journal of Financial Economics*, 68, 161-199.

Froot, Kenneth, and Melvyn A. Teo, 2004, "Equity Style Returns and Institutional Investor Flows," Working paper no. 10355, National Bureau of Economic Research.

Gompers, Paul, and Josh Lerner, 1996, "The Use of Covenants: An Analysis of Venture Partnership Agreements," *Journal of Law and Economics*, 39, 463-498.

Gompers, Paul, and Josh Lerner, 1998, "What Drives Venture Capital Fundraising?," *Brookings Papers on Economic Activity: Microeconomics*, 49-192.

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

Gompers, Paul, and Josh Lerner, 2000, "Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuations," *Journal of Financial Economics*, 55, 281-325.

Gompers, Paul, and Andrew Metrick, 2001, "Institutional Investors and Equity Prices," *Quarterly Journal of Economics*, 116, 229-260.

Grinblatt, Mark, Sheridan Titman, and Russ Wermers, 1995, "Momentum Investment Strategies, Portfolio Performance and Herding: A Study of Mutual Fund Behavior," *American Economic Review*, 85, 1088-1105.

Gromb, Denis, and Dmitiri Vayanos, 2002**, "**Equilibrium and Welfare in Markets with Financially Constrained Arbitrageurs," *Journal of Financial Economics*, 66, 361-407.

Hellmann, Thomas, Laura Lindsey, and Manju Puri, 2004, "Building Relationships Early: Banks in Venture Capital," Unpublished working paper, University of British Columbia, Arizona State University, and Duke University.

Kaplan, Steven N., and Antoinette Schoar, 2004, "Private Equity Performance: Returns, Persistence and Capital Flows," *Journal of Finance*, forthcoming.

Lakonishok, Josef, Andei Shleifer, and Robert W. Vishny, 1992, "The Structure and Performance of the Money Management Industry," *Brookings Papers on Economic Activity: Microeconomics*, 339-379.

Lerner, Josh, G. Felda Hardymon, and Ann Leamon, 2004, *Venture Capital and Private Equity: A Casebook*, New York, John Wiley, 3rd edition.

Lerner, Josh, and Antoinette Schoar 2004, "The Illiquidity Puzzle: Theory and Evidence from Private Equity," *Journal of Financial Economics*, 72, 3-40.

Mayer, Colin, Koen Schoors, and Yishay Yafeh, 2003, "Sources of Funds and Investment Activities of Venture Capital Funds: Evidence from Germany, Israel, Japan, and the U.K.," Working paper no. 9645, National Bureau of Economic Research.

Poterba, James, 1989, "Venture Capital and Capital Gains Taxation," in Lawrence Summers, editor, *Tax Policy and the Economy*, Cambridge, MIT Press, volume 3, 47-68.

Shleifer, Andrei, and Robert Vishny, 1997, "The Limits of Arbitrage," *Journal of Finance*, 52, 35–55.

Table 1. Descriptive Statistics

Panel A: Descriptive statistics - Funds

	Overall					Early-stage VC funds				
	N	Mean	Std dev	Min	Max	N	Mean	Std dev	Min	Max
Total closing (MM$)	1,398	406	664	4.5	6,100	395	208	242	5.2	1,600
Overall fund sequence number	1,393	3.7	3.6	1	32	393	3.7	2.7	1	14
Closing year	1,398	1997	2.7	1991	2001	395	1998	2.6	1991	2001
Internal rate of return (%)	576	6.7	51.0	-94.2	513	159	13.8	79.3	-66.8	513
Pre-1999 funds only	341	23.9	59.1	-94.2	513	71	60.5	99.6	-66.8	513
Excess IRR[a] (%)	564	6.5	43.6	-90.5	493	156	17.2	67.8	-62.5	493
Pre-1999 funds only	332	11.0	54.9	-90.5	493.4	69	40.2	96.1	-62.5	493.4
Carried interest (%)	199	20.7	2.2	20	30	58	21.8	3.3	20	30
Management fee (%)	115	2.1	0.5	1	4	38	2.4	0.5	1	4
Total number of LPs investing in fund	1,397	5.4	5.7	1	46	394	4.9	4.5	1	31
Geographical location of US-based funds:										
West	1,117	0.31		0	1	331	0.56		0	1
Northeast	1,117	0.47		0	1	331	0.27		0	1
South	1,117	0.12		0	1	331	0.12		0	1
Midwest	1,117	0.11		0	1	331	0.06		0	1

	Later-stage VC funds					Buyout funds				
	N	Mean	Std dev	Min	Max	N	Mean	Std dev	Min	Max
Total closing (MM$)	530	328	466	4.5	4,600	473	660	953	10	6,100
Overall fund sequence number	527	4.2	4.2	1	32	473	3.0	3.3	1	29
Closing year	530	1997	2.8	1991	2001	473	1997	2.6	1991	2001
Internal rate of return (%)	224	7.6	42.4	-49.9	268.4	193	-0.4	21.2	-94.2	57.9
Pre-1999 funds only	134	25.6	45.2	-38.8	268.4	136	3.1	21.8	-94.2	57.9
Excess IRR[a] (%)	217	5.6	34.5	-78.4	249	191	-1.3	19.0	-90.5	46
Pre-1999 funds only	129	9.0	42.8	-78.4	248.8	134	-2.1	19.8	-90.5	45.5
Carried interest (%)	54	20.5	1.8	20	30	87	20.2	1.2	20	30
Management fee (%)	32	2.1	0.4	1	3	45	1.8	0.3	1	3
Total number of LPs investing in fund	530	5.2	5.4	1	33	473	6.2	6.8	1	46
Geographical location of US-based funds:										
West	442	0.27		0	1	344	0.11		0	1
Northeast	442	0.50		0	1	344	0.62		0	1
South	442	0.11		0	1	344	0.12		0	1
Midwest	442	0.12		0	1	344	0.15		0	1

[a]Excess IRR is internal rate of return minus the median IRR of the portfolio formed for each fund category every year.

Table 1 (continued). Descriptive Statistics

Panel B: Descriptive statistics – Mean characteristics of limited partners, by class of LP

	N	Year of establishment of private equity investment program	Total funds under management (MM$)	Total private equity commitments (MM$)	Percentage committed to VC funds (%)	Percentage committed to buyout funds (%)	Number of funds in which LP invested
Public pension funds	74	1987	24,753	2,212	33%	37%	31.3
Corporate pension funds	72	1986	10,728	635	44	31	10.5
Endowments	100	1985	1,565	200	41	24	14.3
Private endowments	63	1985	1,378	178	44	23	15.1
Public endowments	10	1986	2,207	200	41	21	21.4
Foundations	27	1986	1,783	239	37	26	9.9
Advisors	66	1988	4,811	3,654	43	35	25.3
Insurance companies	32	1983	36,631	1,171	31	32	18.6
Banks and finance companies	30	1983	85,435	671	27	57	19.1
Other investors	43	1989	933	108	57	31	5.7
Overall	417	1986	18,036	1,173	39%	33%	18.2

Panel C: Fund observations by vintage year and type

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	All years
Early-stage VC funds	8	15	11	24	19	21	45	41	69	102	40	395
Later-stage VC funds	22	20	31	36	49	43	66	69	76	78	40	530
Buyouts funds	8	19	28	41	35	41	72	75	52	68	34	473
Overall	38	54	70	101	103	105	183	185	197	248	114	1,398

Panel D: Availability of fund performance data

	Funds with performance data				All funds			
	All funds	Early-stage VC funds	Later-stage VC funds	Buyout funds	All funds	Early-stage VC funds	Later-stage VC funds	Buyout funds
Total closing (MM$)	584	292	431	1,002	406	208	328	660
	(836)	(294)	(574)	(1,168)	(664)	(242)	(466)	(953)
Sequence number	4.1	4.7	4.3	3.3	3.7	3.7	4.2	3.0
	(3.2)	(2.9)	(3.4)	(3.1)	(3.6)	(2.7)	(4.2)	(3.3)
Vintage year	1997	1998	1997	1997	1997	1998	1997	1997
	(2.8)	(2.8)	(2.9)	(2.6)	(2.7)	(2.6)	(2.8)	(2.6)
Total number of LPs investing in fund	8.0	7.3	7.6	9.0	5.4	4.9	5.2	6.2
	(6.5)	(5.4)	(6.4)	(7.3)	(5.7)	(4.5)	(5.4)	(6.8)
Fraction first funds	20%	14%	17%	27%	30%	27%	25%	37%
Fraction second funds	19%	13%	17%	26%	19%	17%	16%	23%
Fraction third funds	15%	12%	16%	16%	15%	13%	16%	15%
Number of observations	576	159	224	193	1,398	395	530	473
% of all funds	*41%*	*40%*	*42%*	*41%*				

Table 1 (continued). Descriptive Statistics

The sample of funds consists of 1,398 distinct funds listed by Asset Alternatives.

Panel A summarizes fund characteristics according to the type of fund (early-stage VC, later-stage VC, and buyout funds). Excess IRR is internal rate of return minus the median IRR of the portfolio formed for each fund category every year. Geographical location by region follows the U.S. Census classification of states: *West* includes California; *Northeast* includes Massachusetts, New York, Pennsylvania; *South* includes Texas; *Midwest* includes Illinois, Ohio.

Panel B summarizes overall investment characteristics of 417 limited partners (LPs) who invested in those 1,398 funds, presented according to class of LP (public pension fund, corporate pension fund, endowment, etc). Percentage committed to VC funds includes both early-stage and later-stage VC investments. Percentages committed to VC funds and to buyout funds do not add up to 100% because LPs also invest in other types of specialized private equity funds, such as oil, gas and energy, real estate, or venture leasing funds, which are not covered by our analyses.

Panel C shows the distribution of the funds by vintage year.

Panel D shows mean characteristics of funds for which performance data was available, relative to the entire sample. Standard deviations are in parentheses.

Table 2. Mean Fund Characteristics by Class of LP and by Fund Type

	Overall					Early-stage VC funds				
	N	Fund size (MM$)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)	N	Fund size (MM$)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)
Public pension funds	2,317	984	4.8	7.6	2.6	365	320	4.8	12.1	1.1
Corporate pension funds	759	826	4.6	5.1	3.1	141	228	4.4	9.4	3.1
Endowments	1,433	588	4.7	20.5	16.9	542	309	4.8	34.6	28.9
Private endowments	953	613	4.8	20.8	19.1	379	324	4.8	33.4	30.7
Public endowments	214	701	4.9	16.2	3.2	61	344	5.4	30.6	7.6
Foundations	266	404	4.1	23.9	23.3	102	233	4.1	44.3	43.4
Advisors	1,667	782	4.6	-1.8	-3.0	551	343	4.5	-0.5	-0.6
Insurance companies	594	542	4.0	5.5	2.1	148	238	4.3	2.6	-5.3
Banks and finance companies	573	721	3.5	-3.2	-4.1	89	252	3.4	-13.9	-13.2
Other investors	244	429	3.7	4.8	5.9	98	148	2.9	-6.8	-6.5
Overall	7,587	777	4.5	6.9	3.8	1,934	299	4.5	12.8	7.7

	Later-stage VC funds					Buyout funds				
	N	Fund size (MM$)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)	N	Fund size (MM$)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)
Public pension funds	910	593	5.6	10.8	4.7	1042	1,557	4.0	3.2	1.5
Corporate pension funds	260	376	5.5	10.9	8.1	358	1,389	3.9	0.3	0.3
Endowments	493	465	5.4	19.3	15.3	398	1,118	3.8	0.1	0.5
Private endowments	307	482	5.6	19.2	17.4	267	1,174	3.9	2.1	2.4
Public endowments	91	517	5.5	17.1	4.8	62	1,324	3.5	-5.0	-5.4
Foundations	95	361	4.6	22.2	20.6	69	717	3.4	-2.1	-0.3
Advisors	601	680	5.5	-1.0	-3.8	515	1,370	3.7	-4.3	-4.5
Insurance companies	218	443	4.6	12.3	7.9	228	835	3.2	-0.6	0.7
Banks and finance companies	177	444	3.8	1.0	-0.4	307	1,017	3.3	-2.2	-3.3
Other investors	86	480	5.4	17.8	20.2	60	815	2.6	-2.3	-2.3
Overall	2,745	544	5.3	9.4	5.2	2,908	1,314	3.7	0.4	-0.3

The table shows groupings of 7,587 investments by 417 LPs in 1,398 funds, and mean values of selected characteristics of those funds. *Fund size* refers to the total dollar value raised from all investors in the fund, *fund sequence number* is by reference to the private equity firm's funds portfolio, *fund IRR* is the internal rate of return of the fund obtained from *Private Equity Performance Monitor*, and *weighted fund IRR* is internal rate of return weighted by commitment to a fund as a fraction of each LP's total commitments to private equity funds.

Table 3. Fund Performance Regressions

Dependent variable: Fund IRR

	(1)	(2)	(3)	(4)	(5)
Dummy for LP class:					
(comparison category is public pension funds)					
Corporate pension funds	-6.59 **	-7.83 **	-10.99 ***	-9.93 ***	-7.40
	(2.83)	(3.70)	(4.16)	(3.75)	(6.01)
Endowments	11.58 ***	9.07 **	9.34 **	9.81 **	25.01 ***
	(4.37)	(4.25)	(4.32)	(4.39)	(8.15)
Advisors	2.92	2.94	3.65	1.85	26.52 **
	(2.85)	(5.11)	(5.72)	(5.41)	(10.64)
Insurance companies	-5.65	-3.44	-3.95	-4.95	7.41
	(3.89)	(4.33)	(4.64)	(4.59)	(8.59)
Banks	-9.05 ***	-4.92	-1.09	-5.81	-11.23
	(2.96)	(4.49)	(6.20)	(4.49)	(9.29)
Other LPs	-7.90	-31.33 ***	-28.07 ***	-27.62 **	-40.77 **
	(5.03)	(9.98)	(7.01)	(10.97)	(15.63)
LP and GP in same region		-7.35 ***	-7.13 ***	-6.81 ***	-6.31 ***
		(2.38)	(2.38)	(2.33)	(2.30)
LP vintage		0.35	0.85 **	0.30	0.71
		(0.22)	(0.43)	(0.24)	(0.43)
LP size (log of total commitments to private equity)		-0.80	-0.42	-0.84	-0.39
		(0.70)	(0.73)	(0.78)	(0.79)
Total private equity fund inflow				-31.55 ***	-23.05 ***
				(6.69)	(6.43)
Interaction effects:					
Corporate pension funds * LP vintage			-1.60 **		-0.99
			(0.72)		(0.65)
Endowments * LP vintage			-0.71		-0.46
			(0.61)		(0.61)
Advisors * LP vintage			-0.23		-0.07
			(0.83)		(0.83)
Insurance companies * LP vintage			-0.68		-0.86
			(0.82)		(0.86)
Banks * LP vintage			0.84		-0.69
			(1.55)		(1.29)
Other LPs * LP vintage			-1.27		-2.26
			(1.39)		(1.53)
Corporate pension funds * inflow					-8.05
					(10.60)
Endowments * inflow					-30.50 **
					(12.45)
Advisors * inflow					-48.23 ***
					(15.57)
Insurance companies * inflow					-28.28 **
					(13.93)
Banks * inflow					9.63
					(13.16)
Other LPs * inflow					38.49
					(24.64)
Year fixed effects	Yes	Yes	Yes	No	No
Fund category fixed effects	Yes	Yes	Yes	Yes	Yes
LP region dummies	No	Yes	Yes	Yes	Yes
R-squared	26.9%	23.5%	23.8%	20.9%	22.0%
Number of observations	2,755	1,582	1,582	1,531	1,531

Table 3 (continued). Fund Performance Regressions

The sample consists of investments by 417 LPs in 1,398 funds as compiled by Asset Alternatives, and excludes funds closed in 1999 and after. Several versions of the following pooled regression are run and coefficient estimates and standard errors are reported by columns in the table:

$$\text{FundIRR}_{ij} = \beta_0 + \sum_j \beta_{0j}\text{DummyLP}_j + \sum_j \beta_{1j}\text{DummyLP}_j \times \text{FundInflow}_i + \sum_k \beta_{2k}\text{DummyLP}_k \times \text{LPvintage}_j + \beta_3 \text{D\_sameregion}_{ij} + \text{controls}$$

$FundIRR_{ij}$ is the internal rate of return of fund i in %. Six dummy variables identify the class of LP for each LP-fund pair, with $DummyLP_k = 1$ for each observation consisting of an investment in fund i by LP j belonging to LP class k and = 0 otherwise. "Public pension funds" is the 'base LP class', with zero values for all LP dummy variables. $FundInflow_i$ is the year-on-year change in the amount of funds inflow into venture capital in the country and in the year of closing of fund i, and is a proxy for market conditions. $LPvintage_j$ is the year of establishment of the private equity program at LP j relative to that of the median LP in the sample, which began its private equity program in 1987. $D\_sameregion_{ij}$ is a dummy variable and = 1 if both LP j and private equity firm managing fund i are headquartered in the same region in the U.S. (Midwest (includes Illinois and Ohio), Northeast (includes Massachusetts, New York and Pennsylvania), South (includes Texas), and West (includes California)), and = 0 otherwise. Robust standard errors allowing for data clustering by funds in all the regressions are shown in brackets below the coefficient estimate. Intercepts are not reported.

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4. Fund Performance Regressions (using individual funds as observations)

Dependent variable:	Fund IRR (1)	Fund IRR (2)	Fund IRR (3)	Excess IRR (4)	Excess IRR (5)	Excess IRR (6)
Number of public pension funds investing in fund	0.32	-0.10	-0.25	-0.90	-0.86	-1.24
	(1.31)	(1.28)	(1.26)	(1.24)	(1.21)	(1.23)
Number of corporate pension funds	-5.51 *	-5.68 **	-5.61 **	-3.37	-3.35	-4.40
	(2.85)	(2.76)	(2.82)	(2.84)	(2.73)	(2.81)
Number of endowments	3.88 ***	4.02 ***	4.15 ***	5.36 ***	5.40 ***	5.10 ***
	(1.28)	(1.24)	(1.26)	(1.22)	(1.18)	(1.19)
Number of advisors	1.00	2.10	1.00	2.05	2.32	3.22 *
	(2.13)	(2.10)	(1.98)	(1.90)	(1.84)	(1.93)
Number of insurance companies	-4.13	-2.51	-1.79	-3.53	-2.20	-1.97
	(3.69)	(3.60)	(3.63)	(3.69)	(3.57)	(3.56)
Number of banks	-6.74 *	-5.81	-6.87 *	-7.60 **	-6.70 *	-6.68 *
	(3.83)	(3.80)	(3.81)	(3.76)	(3.70)	(3.69)
Number of other classes of investors	-5.14	-8.90	-8.85	-9.05	-12.70 *	-11.92
	(7.45)	(7.28)	(7.36)	(7.60)	(7.42)	(7.41)
Log(size of fund)	4.51	7.68 *	8.19 *	-0.04	3.04	4.85
	(4.12)	(4.28)	(4.29)	(3.39)	(3.61)	(3.78)
Average vintage of LPs that invest in fund		1.47	1.26		1.03	0.99
		(0.90)	(0.90)		(0.88)	(0.88)
Average total private equity commitments of LPs that invest in fund		-0.21 **	-0.19 *		-0.19 *	-0.19 *
		(0.11)	(0.11)		(0.10)	(0.10)
Total inflows into private equity			-32.79 ***			-16.78
			(10.73)			(10.72)
Year fixed effects	Yes	Yes	No	No	No	No
Fund category effects	Yes	Yes	Yes	No	No	No
Adjusted R-squared	20.0%	21.2%	18.5%	6.6%	7.9%	8.3%
Number of observations	324	309	309	316	301	301

The sample consists of 324 funds that were closed prior to 1999 and for which data is available to run the following ordinary least squares regressions:

$$\text{FundPerformance}_i = \beta_0 + \sum_k \beta_{1k} \text{NumLP}_{ik} + \beta_2 \log(\text{FundSize}_i) + \text{controls}$$

Fund performance is measured in two ways: (1) internal rates of return for individual funds, obtained from Private Equity Performance Monitor, (2) excess IRR, calculated by subtracting from each fund's IRR the median IRR of the portfolio formed that year and in that category. $NumLP_{ik}$ is the number of LPs of class *k* that invested in fund *i*. $FundSize_i$ is the total closing amount for fund *i* in MM$.

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5. Reinvestment Decisions by LPs

Panel A: Reinvestments by fund category and by class of LP

	Overall					Early-stage VC funds				
	N	Reinvested (Yes=1; No=0)	Next fund size (MM$)	Change in size, current to next fund (%)	Next fund IRR (%)	N	Reinvested (Yes=1; No=0)	Next fund size (MM$)	Change in size, current to next fund (%)	Next fund IRR (%)
Public pension funds	976	0.61	1,330	100	2.5	202	0.54	378	106.4	7.6
Corporate pension funds	346	0.38	1,181	96	0.6	88	0.36	344	100.8	11.8
Endowments	777	0.48	808	95	18.7	346	0.54	405	102.5	35.8
Advisors	671	0.48	1,041	103	-8.7	250	0.51	460	117.5	-7.3
Insurance companies	227	0.58	781	100	-1.3	86	0.66	323	101.4	-6.1
Banks and finance companies	197	0.40	1,053	108	-9.2	25	0.48	362	120.9	-17.7
Other investors	90	0.34	654	144	-5.8	37	0.35	220	188.4	-26.4
Overall	3,284	0.51	1,059	101	2.6	1,034	0.52	393	110.2	10.8

	Later-stage VC funds					Buyout funds				
	N	Reinvested (Yes=1; No=0)	Next fund size (MM$)	Change in size, current to next fund (%)	Next fund IRR (%)	N	Reinvested (Yes=1; No=0)	Next fund size (MM$)	Change in size, current to next fund (%)	Next fund IRR (%)
Public pension funds	315	0.65	765	96.4	4.4	459	0.60	2,137	100.2	-1.2
Corporate pension funds	93	0.39	649	113.9	0.0	165	0.39	1,927	84.0	-4.5
Endowments	264	0.48	613	82.1	11.9	167	0.35	1,953	101.4	-2.5
Advisors	258	0.54	924	106.7	-12.8	163	0.34	2,117	75.0	-3.2
Insurance companies	75	0.61	663	91.9	2.6	66	0.42	1,512	106.0	-0.3
Banks and finance companies	60	0.40	588	96.5	-15.0	112	0.38	1,457	111.1	-4.6
Other investors	33	0.48	520	125.9	8.3	20	0.10	1,676	92.4	-3.9
Overall	1,098	0.54	732	97.5	0.7	1,152	0.46	1,968	95.8	-2.4

Panel B: Consequences of reinvestment decisions

		LPs re-invested	LPs did not re-invest	Test p-value
Current fund IRR (%)	Mean	24.8	16.9	0.002 ***
	Median	11.2	3.4	<0.001 ***
Current fund excess IRR (%)	Mean	16.0	12.1	0.088 *
	Median	3.5	1.6	<0.001 ***
Next fund IRR (%)	Mean	6.9	-2.2	<0.001 ***
	Median	-7.0	-12.2	0.001 ***
Next fund excess IRR (%)	Mean	13.6	7.7	0.003 ***
	Median	1.6	-0.3	0.001 ***
Size of current fund (MM$)	Mean	565	676	<0.001 ***
	Median	275	311	0.007 ***
Percent change, current to next fund size	Mean	+106%	+95%	0.005 ***
	Median	+90%	+84%	<0.001 ***

Table 5 (continued). Reinvestment Decisions by LPs

Panel C: Consequences of reinvestment decisions by class of LP

		Mean fund IRR (%)	Mean excess IRR (%)	Mean next fund IRR (%)	Mean next excess IRR (%)	Mean size of current fund (MM$)	Mean change in size, current to next fund (%)
Public pension funds	Reinvested	+22.9%	+13.1%	+5.6%	+10.7%	764	+112%
	Did not reinvest	+15.8%	+7.4%	-2.4%	+5.5%	812	+82%
	t-test	0.076 *	0.105	0.021 **	0.065 *	0.444	<0.001 ***
Corporate pension funds	Reinvested	17.3	8.3	-0.6	5.4	681	105
	Did not reinvest	9.1	0.7	1.4	6.8	796	91
	t-test	0.117	0.071 *	0.692	0.734	0.281	0.153
Endowments	Reinvested	39.3	25.8	30.5	31.4	336	94
	Did not reinvest	36.6	30.6	7.1	16.7	528	96
	t-test	0.709	0.438	0.001 ***	0.017 **	<0.001 ***	0.736
Advisors	Reinvested	20.6	17.6	-7.8	7.1	527	111
	Did not reinvest	6.0	9.8	-9.7	5.3	743	96
	t-test	0.013 **	0.110	0.675	0.644	<0.001 ***	0.150
Insurance companies	Reinvested	21.7	13.3	1.7	10.4	366	104
	Did not reinvest	14.1	6.1	-6.8	3.3	444	93
	t-test	0.437	0.386	0.288	0.261	0.299	0.269
Banks and finance companies	Reinvested	4.2	0.4	-6.9	0.1	568	112
	Did not reinvest	2.3	-1.6	-10.6	-0.6	639	105
	t-test	0.698	0.644	0.294	0.817	0.564	0.644
Other investors	Reinvested	39.3	24.7	6.8	16.1	239	94
	Did not reinvest	2.2	-0.4	-14.7	1.1	414	171
	t-test	0.001 ***	0.046 **	0.044 **	0.076 *	0.171	0.189

The sample consists of 3,284 reinvestment opportunities identified by reference to the sequence number of funds within the same fund family. Each reinvestment opportunity is coded 1 if the LP reinvested and 0 if investment in the follow-on fund was "discontinued."

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6. Reinvestment Regressions

Linear probability models – Dependent variable: Reinvested (Yes = 1, No = 0)

	(1)	(2)	(3)	(4)
IRR of previous fund in same family	0.0004 *	0.0005 *	0.0004 *	0.0004 *
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Total market inflow in reinvestment decision year		0.074 **	0.082 ***	0.079 **
		(0.031)	(0.031)	(0.031)
LP vintage		0.021	0.025	-0.008
		(0.030)	(0.030)	(0.010)
LP and GP in same region		0.005 **	0.004 *	0.023
		(0.002)	(0.002)	(0.030)
Dummy for LP class (comparison category is public pension funds):				
Corporate pension funds			-0.216 ***	-0.174 **
			(0.063)	(0.068)
Endowments			-0.132 **	-0.141 **
			(0.058)	(0.063)
Advisors			-0.091	-0.084
			(0.068)	(0.073)
Insurance companies			0.010	0.005
			(0.098)	(0.102)
Banks			-0.098	0.014
			(0.113)	(0.135)
Other LPs			-0.404 ***	-0.442 ***
			(0.115)	(0.085)
Interaction effects:				
Corporate pension funds * LP vintage				0.025 **
				(0.011)
Endowments * LP vintage				0.008
				(0.011)
Advisors * LP vintage				0.012
				(0.010)
Insurance companies * LP vintage				0.010
				(0.017)
Banks * LP vintage				0.021 *
				(0.011)
Other LPs * LP vintage				0.031 **
				(0.016)
Fund category effects	Yes	Yes	Yes	Yes
R-squared	1.3%	2.4%	5.2%	6.2%
Number of observations	2,198	1,860	1,860	1,860

Table 6 (continued). Reinvestment Regressions

The sample consists of 2,198 reinvestment opportunities identified by reference to the sequence number of funds within the same fund family, for which data was available to run the following ordinary least squares regressions:

$$\begin{aligned}\Pr(\text{Reinvested}_{ij}) = {} & \beta_0 + \sum_k \beta_{0k}\text{DummyLP}_k + \sum_k \beta_{1k}\text{DummyLP}_k \times \text{CurrentIRR}_i \\ & + \sum_k \beta_{2k}\text{DummyLP}_k \times \text{FundInflow}_i + \sum_k \beta_{3k}\text{DummyLP}_k \times \text{LPvintage}_j \\ & + \beta_4 \text{D\_sameregion}_{ij} + \text{controls}\end{aligned}$$

Reinvested$_{ij}$ is a dummy variable that takes the value 1 if LP *j* reinvested in the next fund in the same family as fund *i*. Six dummy variables identify the class of LP for each LP-fund pair, with *DummyLP*$_k$ = 1 for each observation consisting of an investment in fund *i* by LP *j* belonging to LP class *k* and = 0 otherwise. "Public pension funds" is the 'base LP class,' with zero values for all LP dummy variables. *CurrentIRR*$_i$ is the internal rate of return of fund *i* in %. *FundInflow*$_i$ is the year-on-year change in the amount of funds inflow into either total private equity or venture capital in the country and in the year of closing of fund *i*, and is a proxy for market conditions. *LPvintage*$_j$ is the year of establishment of the private equity program at LP *j* relative to that of the median LP in the sample, which began its private equity program in 1987. *D_sameregion*$_{ij}$ is a dummy variable and = 1 if both LP *j* and private equity firm managing fund *i* are headquartered in the same region in the U.S. (Midwest (includes Illinois and Ohio), Northeast (includes Massachusetts, New York and Pennsylvania), South (includes Texas), and West (includes California)), and = 0 otherwise. Robust standard errors allowing for clustering by LP in all the regressions are in brackets.

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7. Recent Investments in Young Private Equity Groups

Panel A: All funds

	Overall			Early-stage VC funds			Later-stage VC funds			Buyout funds		
	N	Fund IRR (%)	Weighted IRR (%)	N	Fund IRR (%)	Weighted IRR (%)	N	Fund IRR (%)	Weighted IRR (%)	N	Fund IRR (%)	Weighted IRR (%)
Public pension funds	506	-1.9	-3.7	65	-11.3	-14.1	183	1.9	-1.0	258	-2.3	-3.0
Corporate pension funds	139	-1.6	-2.9	20	-6.1	-17.3	41	10.3	11.0	78	-6.8	-6.5
Endowments	267	-3.5	-4.2	81	-21.9	-22.1	91	12.0	10.1	95	-2.7	-2.7
Advisors	417	-11.1	-11.7	122	-22.6	-22.0	163	-5.2	-8.8	132	-7.6	-5.7
Insurance companies	103	-5.7	-5.7	23	-19.5	-17.8	37	3.9	3.0	43	-6.6	-6.8
Banks and finance companies	121	-7.7	-7.3	18	-22.4	-18.3	39	-4.5	-4.0	64	-5.6	-6.2
Other investors	33	-6.1	-6.1	11	-8.4	-8.4	11	-3.0	-3.0	11	-7.0	-7.0
Overall	1,586	-5.4	-6.3	340	-18.6	-19.3	565	1.7	-0.6	681	-4.6	-4.5

Panel B: Pre-1999 funds only

	Overall			Early-stage VC funds			Later-stage VC funds			Buyout funds		
	N	Fund IRR (%)	Weighted IRR (%)	N	Fund IRR (%)	Weighted IRR (%)	N	Fund IRR (%)	Weighted IRR (%)	N	Fund IRR (%)	Weighted IRR (%)
Public pension funds	281	8.2	4.4	18	22.5	5.5	83	23.6	16.4	180	-0.3	-1.3
Corporate pension funds	98	6.8	6.7	7	28.2	27.6	27	27.2	26.5	64	-4.2	-3.9
Endowments	134	14.6	13.1	14	2.6	-1.2	50	38.6	34.5	70	-0.1	0.6
Advisors	145	7.3	5.2	10	20.3	19.3	59	20.4	13.8	76	-4.6	-3.4
Insurance companies	58	4.0	2.7	6	3.9	6.4	18	21.3	18.0	34	-5.2	-6.1
Banks and finance companies	72	-0.2	-0.4	3	7.1	7.1	21	5.5	5.3	48	-3.1	-3.3
Other investors	17	-1.3	-1.3	1	-3.8	-3.8	7	6.8	6.8	9	-7.4	-7.3
Overall	805	7.7	5.6	59	15.0	8.9	265	24.0	19.3	481	-2.2	-2.4

Panel A shows groupings of 1,586 investments for which fund performance data was available by 366 LPs in 686 funds managed by 442 "young" private equity groups (i.e. established after 1990) as compiled by Asset Alternatives. *Fund IRR* is the internal rate of return of each fund obtained from *Private Equity Performance Monitor*, and *weighted fund IRR* is *fund IRR* weighted by proportional commitment to the fund in each LP's private equity portfolio.

Panel B excludes all funds established in 1999 and after.

Table 8. LP Class and Individual LP Effects in Regressions of Fund Performance and Other Portfolio Characteristics

		F-tests on fixed effects for:			
		LP class	Individual LPs	N	Adjusted R-squared
Fund IRR	Row 1			4,618	28.9%
	Row 2	3.64 (.002, 6) ***		4,618	29.7%
	Row 3		274 (<.001, 297) ***	4,618	35.2%
Excess IRR	Row 1			4,514	11.7%
	Row 2	3.28 (.004, 6) ***		4,514	12.7%
	Row 3		482 (<.001, 295) ***	4,514	19.2%
GP founding year	Row 1			7,080	3.1%
	Row 2	5.96 (<.001, 6) ***		7,080	4.0%
	Row 3		453 (<.001, 361) ***	7,080	15.8%
GP size	Row 1			7,115	13.8%
	Row 2	28.11 (<.001, 6) ***		7,115	17.5%
	Row 3		1,686 (<.001, 361) ***	7,115	32.9%
Percentage change in fund size between consecutive investments with same GP	Row 1			3,284	1.9%
	Row 2	1.05 (.392, 6)		3,284	2.6%
	Row 3		1,633 (<.001, 265) ***	3,284	25.4%

The sample consists of investments by 417 LPs in 1,398 funds as compiled by Asset Alternatives. Reported in the table are the results from fixed effects panel regressions, where standard errors are clustered at the fund level. For each dependent variable (as reported in column 1), the fixed effects included are:

Row 1: fund category and vintage year fixed effects;

Row 2: fund category, vintage year, and LP class fixed effects;

Row 3: fund category, vintage year, and individual LP fixed effects.

Reported are the F-tests for the joint significance of the LP class fixed effects (column 2), and individual LP fixed effects (column 3). For each F-test, we report the value of the F-statistic, the p-value and the number of constraints. Column 5 reports the number of observations and column 6 the adjusted R^2 for each regression.

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 9. Dispersion of Estimated Fixed Effects from LP Fixed Effects Regressions, by Class of LP

	Panel A: Fund IRR			**Panel B:** Excess IRR		
	Mean	Median	Std dev	Mean	Median	Std dev
Public pension funds	7.0	12.3	24.1	13.9	11.6	14.8
Corporate pension funds	-1.7	3.2	27.2	14.5	13.7	9.5
Endowments	21.4	23.6	31.4	29.9	26.3	22.9
Advisors	10.0	20.0	27.6	18.3	21.3	12.1
Insurance companies	7.9	5.7	22.0	13.8	10.9	13.3
Banks and finance companies	-5.7	-0.1	29.4	12.5	12.8	7.7
Other investors	0.7	7.7	38.3	15.3	6.5	23.0
Overall	8.4	12.0	29.1	18.6	16.1	17.7

	Panel C: Fund IRR, using lower 75% of funds across all LPs			**Panel D:** Excess IRR, using lower 75% of funds across all LPs		
	Mean	Median	Std dev	Mean	Median	Std dev
Public pension funds	0.10	-4.58	14.31	4.63	6.34	10.04
Corporate pension funds	-0.53	-3.97	14.93	6.02	6.19	8.17
Endowments	-1.58	-5.95	14.10	9.24	8.59	7.89
Advisors	-7.77	-8.42	15.33	7.84	9.40	12.34
Insurance companies	0.48	-2.10	14.27	4.59	5.55	7.45
Banks and finance companies	-1.90	-5.45	14.38	6.42	5.23	6.23
Other investors	-7.75	-8.05	12.97	0.76	-0.23	5.76
Overall	-2.00	-5.92	14.54	6.35	6.85	9.18

	Panel E: Change in fund size			**Panel F:** GP founding year		
	Mean	Median	Std dev	Mean	Median	Std dev
Public pension funds	0.24	0.29	0.70	2.81	3.34	9.74
Corporate pension funds	0.22	0.30	0.72	1.04	2.10	11.67
Endowments	0.32	0.57	0.74	-2.01	-0.91	11.63
Advisors	0.50	0.74	0.71	0.39	2.81	12.94
Insurance companies	0.46	0.70	0.75	-1.88	-5.49	10.25
Banks and finance companies	0.22	0.56	0.85	-1.53	-3.39	10.09
Other investors	0.80	0.38	1.29	0.87	0.54	11.16
Overall	0.35	0.47	0.79	0.22	0.72	11.21

Table 9 (continued). Dispersion of Estimated Fixed Effects from LP Fixed Effects Regressions, by Class of LP

	Panel G: GP size (log of total capital managed)			**Panel H:** Reinvested in next fund (Yes = 1, No = 0)		
	Mean	Median	Std dev	Mean	Median	Std dev
Public pension funds	0.42	0.70	1.39	-0.021	-0.033	0.59
Corporate pension funds	0.56	0.88	1.28	-0.070	0.024	0.64
Endowments	0.62	0.96	1.19	0.054	0.244	0.56
Advisors	0.63	0.98	1.27	0.175	0.254	0.50
Insurance companies	-0.19	-0.21	1.08	-0.060	0.050	0.66
Banks and finance companies	-0.27	0.16	1.53	0.011	0.144	0.56
Other investors	-0.35	-0.30	1.70	-0.071	0.003	0.50
Overall	0.35	0.70	1.36	0.004	0.059	0.58

	Panel I: Fraction of GPs located in same region			**Panel J:** Average number of funds managed per GP		
	Mean	Median	Std dev	Mean	Median	Std dev
Public pension funds	-0.48	-0.58	0.38	0.51	0.38	0.48
Corporate pension funds	-0.40	-0.51	0.44	0.30	0.25	0.27
Endowments	-0.38	-0.47	0.41	0.43	0.32	0.45
Advisors	-0.53	-0.58	0.37	0.22	0.17	0.21
Insurance companies	-0.49	-0.49	0.29	0.39	0.20	0.75
Banks and finance companies	-0.19	-0.38	0.53	0.25	0.12	0.35
Other investors	-0.38	-0.51	0.55	0.15	0.00	0.31
Overall	-0.42	-0.50	0.42	0.36	0.25	0.44

The table shows the mean, median, and standard deviation of the LP fixed effects, grouped by LP class, from separate regressions of fund IRR, excess IRR, change in size between successive funds, GP founding year, GP size, reinvestment decisions, fraction of GPs located in same region as the LP, and average number of funds managed per GP in each LP's portfolio on LP dummies, LP vintage, dummies for the region of the LP and for the co-location of the LP and GP, fund vintage years, and fund categories.

Table 10. Correlations among Estimated LP Fixed Effects

	Fund IRR	Exess IRR	Change in fund size	GP founding year	GP size	Reinvested in follow-on fund	Average number of funds per GP
Excess IRR	0.62 ***						
Change in fund size	0.47 ***	0.13 *					
GP founding year	-0.54 ***	-0.37 ***	-0.43 ***				
GP size	0.16 **	0.33 ***	0.34 ***	-0.27 ***			
Reinvested in follow-on fund	0.02	0.19 ***	0.34 ***	-0.34 ***	0.62 ***		
Average number of funds per GP	0.10	0.11	-0.06	-0.08	0.04	0.23 ***	
Fraction of GPs in same region	-0.52 ***	-0.01	-0.20 ***	0.14 **	0.22 ***	0.45 ***	-0.09

The table shows pairwise correlations of estimated LP fixed effects when each of the listed variables is used as dependent variable in a regression on LP dummies, LP vintage, dummies for the region of the LP and for the co-location of the LP and GP, fund vintage years, and fund categories.

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Table 11. University Characteristics

	N	Mean	Min	Median	Max
Overall ranking score	42	90.3	71.6	93.9	100
Academic reputation	55	29.6	1	18	129
Freshmen in top 10 % of class	55	62.1	14	63	100
Acceptance rate	55	51.8	14	51	88
Yield	55	38.4	21	38	75
Student to faculty ratio	55	12.3	6	11	20
Education expenditure per student ($'000)	55	22.7	8.3	18.8	63.6
Freshman retention rate	55	91.5	71	93	99
Graduation rate	55	81.6	47	87	97
Alumni giving rate	55	33.9	10	38	58

The above table shows descriptive statistics for university rankings that were obtained from the 1995 *U.S. News and World Report* survey of colleges and universities in the U.S..

Overall ranking score is a weighted measure calculated by *U.S. News* based on several individual measures, which included the following:

Academic reputation is an ordinal rank compiled from responses by college presidents, deans and admissions directors who participated in *U.S. News*' survey. *Freshmen in top 10 % of class* refers to the share of freshmen in the top 10 percent of their high school classes and is a measure of the high school class standing of entering freshmen. *Acceptance rate* is the percentage of total applicants who received offers of admission. *Yield* is the percentage of those accepted who actually enrolled. *Student to faculty ratio* is the ratio of full-time-equivalent students to full-time-equivalent faculty. *Education expenditure per student* is a measure of the strength of a school's resources and is equal to its total expenditures on instruction, administration, student services and academic support divided by total full-time equivalent enrollment. *Freshmen retention rate* represents the average percentage of freshmen entering in 1990 to 1993 who returned the following year. *Graduation rate* is the average percentage of students in the 1985 to 1988 freshman classes who graduated within six years. *Alumni giving rate* is the average percentage of living alumni who gave to fund drives in the preceding two years.

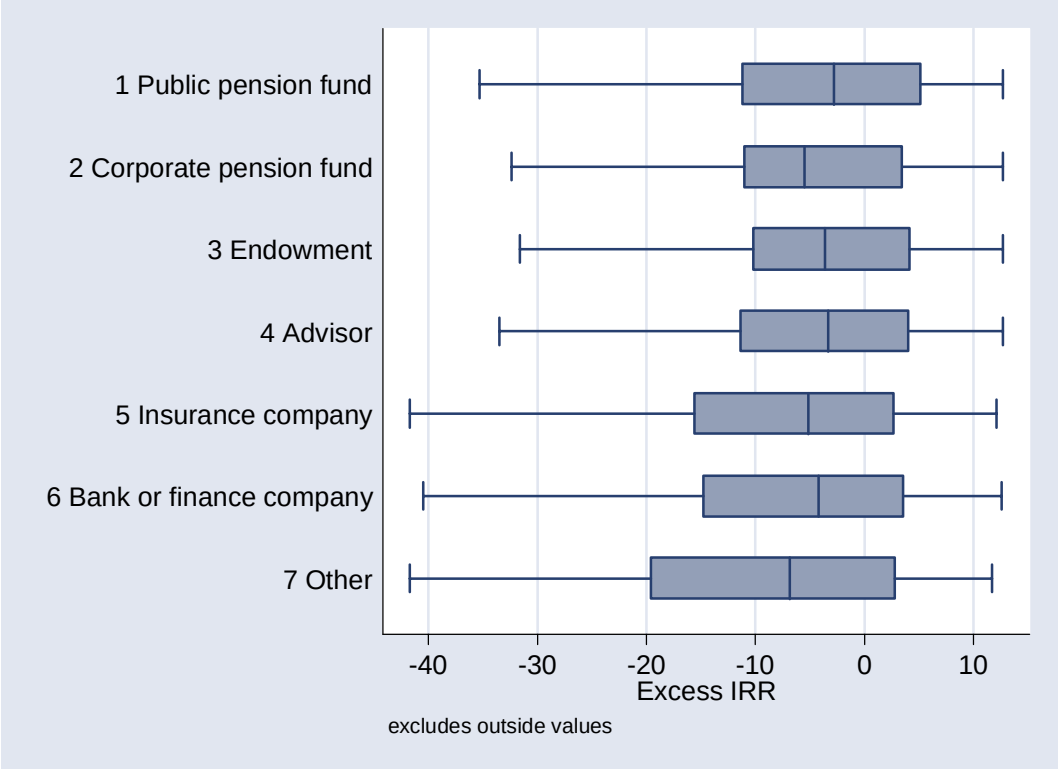
Table 12. Correlations among Estimated LP Fixed Effects and University Characteristics

	Fund IRR	Weighted IRR	Excess IRR
Overall ranking score	0.39 *	0.71 ***	0.47 **
Academic reputation (rank)	-0.12	-0.07	-0.35 *
Freshmen in top 10 % of class	0.24	0.43 **	0.50 ***
Acceptance rate	-0.33 *	-0.60 ***	-0.62 ***
Yield	0.04	0.21	0.36 **
Student / faculty ratio	-0.37 **	-0.31 *	-0.27
Education expenditure per student	0.27	0.38 **	0.31 *
Freshman retention rate	0.15	0.23	0.37 **
Graduation rate	0.27	0.34 *	0.47 ***
Alumni giving rate	0.40 **	0.34 *	0.51 ***

The table shows pairwise correlations between each of the variables listed in the first column and estimated LP fixed effects when the variables listed at the top of each subsequent column is used as dependent variable in a regression on LP dummies, LP vintage, dummies for the region of the LP and for the co-location of the LP and GP, fund vintage years, and fund categories.

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Figure 1. Box Plot of Excess IRR Fixed Effects by Class of LP, Conditioned on Lower 75% of Funds across all LPs



The graph shows the relative distribution of excess IRR fixed effects when conditioned on the lower 75% of funds across all LPs, grouped by LP class, from regressions of excess IRR on LP dummies, LP vintage, dummies for the region of the LP and for the co-location of the LP and GP. The line in the middle of the shaded box indicates the median, the left and right edges of the box are the 25th and 75th percentiles respectively, and the ends of the line indicate adjacent values of the distribution of LP-specific excess IRR fixed effects for each class of LP. Outside values (extreme outliers) are not shown in the plot.

APPENDIX

Table 3A. Fund Performance Regressions Using Excess IRR as Dependent Variable

Dependent variable: Excess IRR

	(1)	(2)	(3)	(4)	(5)
Dummy for investor type:					
(comparison category is public pension funds)					
Corporate pension funds	-4.77 *	-8.62 **	-11.45 ***	-10.25 ***	-9.63
	(2.61)	(3.65)	(4.22)	(3.70)	(6.24)
Endowments	21.70 ***	15.72 ***	15.47 ***	16.63 ***	26.69 ***
	(6.83)	(4.56)	(4.49)	(4.71)	(8.38)
Advisors	7.63 **	11.35 **	11.14 **	11.51 **	27.90 ***
	(3.40)	(4.92)	(5.52)	(4.86)	(10.14)
Insurance companies	-0.57	2.09	1.10	0.85	12.68
	(3.73)	(4.37)	(4.67)	(4.50)	(9.24)
Banks	-9.11 ***	-3.55	-2.08	-4.17	-10.19
	(2.88)	(3.84)	(6.29)	(3.83)	(7.78)
Other LPs	-2.51	-39.36 ***	-39.26 ***	-37.02 ***	-53.89 ***
	(5.20)	(8.93)	(8.22)	(9.78)	(9.32)
LP vintage		0.26	-8.64 ***	0.34	0.87 *
		(0.23)	(2.55)	(0.24)	(0.46)
LP and GP in same region		-8.90 ***	0.89 *	-8.75 ***	-8.34 ***
		(2.57)	(0.45)	(2.57)	(2.52)
Total private equity fund inflow			-1.10	-13.56 **	-7.28
			(0.75)	(6.04)	(5.67)
LP size (log of total commitments to private equity)		-1.42 *		-1.13	-0.86
		(0.78)		(0.78)	(0.75)
Interaction effects:					
Corporate pension funds * LP vintage			-1.55 **		-1.01
			(0.72)		(0.69)
Endowments * LP vintage			-0.98		-0.83
			(0.65)		(0.66)
Advisors * LP vintage			-0.67		-0.57
			(0.88)		(0.87)
Insurance companies * LP vintage			-1.00		-0.70
			(0.69)		(0.79)
Banks * LP vintage			-0.03		-0.62
			(1.46)		(1.16)
Other LPs * LP vintage			-0.60		-1.23 *
			(0.76)		(0.69)
Corporate pension funds * inflow					-4.00
					(9.35)
Endowments * inflow					-21.66 *
					(12.57)
Advisors * inflow					-33.75 **
					(14.52)
Insurance companies * inflow					-27.00 **
					(13.65)
Banks * inflow					11.67
					(10.37)
Other LPs * inflow					36.91 ***
					(8.71)
Year fixed effects	No	No	No	No	No
Fund category fixed effects	No	No	No	No	No
LP region dummies	No	Yes	Yes	Yes	Yes
R-squared	3.9%	5.2%	5.6%	5.9%	6.8%
Number of observations	2,684	1,541	1,541	1,491	1,491

Table 3A (continued). Fund Performance Regressions
Using Excess IRR as Dependent Variable

The sample consists of investments by 417 LPs in 1,398 funds as compiled by *Asset Alternatives*, and excludes funds closed in 1999 and after. Several versions of the following pooled regression are run and coefficient estimates and standard errors are reported by columns in the table:

$$\text{ExcessIRR}_{ij} = \beta_0 + \sum_j \beta_{0j}\text{DummyLP}_j + \sum_j \beta_{1j}\text{DummyLP}_j \times \text{FundInflow}_i + \sum_k \beta_{2k}\text{DummyLP}_k \times \text{LPvintage}_j + \beta_3 \text{D\_sameregion}_{ij} + \text{controls}$$

$ExcessIRR_{ij}$ is the internal rate of return of fund *i* in % minus the median IRR of the portfolio formed for each fund category every year. Six dummy variables identify the class of LP for each LP-fund pair, with $DummyLP_k = 1$ for each observation consisting of an investment in fund *i* by LP *j* belonging to LP class *k* and = 0 otherwise. "Public pension funds" is the 'base LP class', with zero values for all LP dummy variables. $FundInflow_i$ is the year-on-year change in the amount of funds inflow into venture capital in the country and in the year of closing of fund *i*, and is a proxy for market conditions. $LPvintage_j$ is the year of establishment of the private equity program at LP *j* relative to that of the median LP in the sample, which began its private equity program in 1987. $D\_sameregion_{ij}$ is a dummy variable and = 1 if both LP *j* and private equity firm managing fund *i* are headquartered in the same region in the U.S. (Midwest (includes Illinois and Ohio), Northeast (includes Massachusetts, New York and Pennsylvania), South (includes Texas), and West (includes California)), and = 0 otherwise. Robust standard errors allowing for data clustering by funds in all the regressions are shown in brackets below the coefficient estimate. Intercepts are not reported.

***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.