Limited Partner Performance and the Maturing of the Private Equity Industry

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Abstract

We evaluate the performance of limited partners' (LPs) private equity investments over time. Using a sample of 14,380 investments by 1,852 LPs in 1,250 buyout and venture funds started between 1991 and 2006, we find that the superior performance of endowment investors in the 1991-1998 period, documented in prior literature, is mostly due to their greater access to the top-performing venture capital partnerships. In the subsequent 1999-2006 period, endowments no longer outperform, and neither have greater access to funds who are likely restrict access nor make better investment selections than other types of institutional investors. We discuss how these results are consistent with the general maturing of the industry, as private equity has transitioned from a niche, poorly understood area to a ubiquitous part of institutional investors' portfolios.

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1. Introduction

The private equity industry has experienced dramatic changes in the last 30 years. Because of high returns on early investments, the industry has grown enormously, both in terms of assets under management and its overall importance in the economy. As illustrated in Figure 1, total fundraising by buyout and venture funds has increased from approximately $6.7 billion in 1990 to over $261.9 billion just before the financial crisis in 2008, the vast majority of which comes from institutional investors.[1] Rather than a niche alternative, private equity has become a mainstay of institutional investment portfolios.

The performance of institutions' private equity investments sheds light on a fundamental question in delegated asset management: Why do some investors, or classes of investors, have systematically different performance over time? Historically, practitioners have claimed that the best private equity partnerships have not increased fund sizes or fees to market-clearing levels. Instead they have rationed access to their funds to favored investors, most notably prestigious educational and other nonprofit endowments. Further, industry observers (e.g. Swensen, 2000) have historically argued that endowments are much better equipped to assess and evaluate emerging alternative investments, such as private equity, that are relatively unfamiliar and in which asymmetric information problems are especially severe. Lerner, Schoar and Wongsunwai (2007) document that improved access as well as experience of investing in the private equity sector led endowments to outperform other institutional investors substantially during the 1990s.

However, private equity is no longer an emerging, unfamiliar asset class, and the distribution of private equity fund returns has also changed over time. In particular, venture capital returns fell dramatically in the technology bust of the early 2000s, and the boom of the late 1990s has

[1] The numbers are estimated by summing up fund size by year in Preqin.

not repeated. Against this backdrop of a maturing industry, it is unclear whether the unusually good performance of endowments has continued.

In this paper, we evaluate the relative performance of different types of private equity investors over time. Using a sample of 14,380 limited partner (LP) investments in 1,250 buyout and venture funds raised between 1991 and 2006, we first confirm Lerner et al.'s (2007) finding that endowments substantially outperform other types of investors on their investments in funds raised between 1991 and 1998. In our sample, endowments earn an average IRR of 13.38% on private equity investments made during this period, the highest of all LP types. The performance gap is driven entirely by endowments' investments in the venture industry, which benefited most from the 1990s technology boom. However, when we examine funds raised in the subsequent eight-year period, between 1999 and 2006, endowments no longer outperform other types of limited partners. In this later period, there are no statistically or economically significant differences in returns across types of LPs.

Our evidence suggests that during the 1991-1998 period, the main source of endowments' unusually good performance was their superior access to the best venture funds. Compared to other types of institutions, endowments were more likely to invest in older partnerships, which not only were more likely to restrict access but also earned higher returns. They also were more likely to invest in the later funds of a venture capital partnership when those funds grew in size compared to the prior fund size more slowly than predicted from the prior fund's performance. Funds with such abnormally low growth were especially likely to be restricting access, and performed better over this period.

In the later 1999-2006 period, endowments are much less still more likely to invest in older partnerships, but much less so than in the earlier period. They are no longer more likely to invest

in slowly growing funds. Further, the performance advantages of both of these types of funds largely dissipate over time.

The endowment advantage in skill or sophistication in selecting investments has also declined over time. Lerner et al. (2007) propose that a way to evaluate the skill of private equity investors is to measure the quality of the reinvestment decisions of investors. Since investors in a private equity fund are usually given the option of reinvesting in a partnership's next fund, their decisions of whether to reinvest capital in this new fund reflect their skill at assessing the skill of the fund's general partners rather than any differences in access to the funds.

Like Lerner et al., we find that during the 1991-1998 period, endowments' reinvested funds outperformed funds in which they chose not to reinvest (an average IRR of 37.8% for reinvested funds compared to 24.6% for funds they chose not to reinvest), and the difference is larger than for most other LP types. Yet, with an average IRR of 24.6%, even those funds in which endowments chose not to reinvest outperformed the funds in which other types of LPs reinvested. This is especially true for investments in venture capital. The venture capital funds in which endowments reinvested in 1991-1998 earned a 62.6% IRR on average, compared to 59.1% for funds in which they did not reinvest. During the more recent 1999-2006 period, endowments' reinvested funds still outperform those in which they did not reinvest, but by a much smaller margin. Other types of LPs see similar differences in returns to reinvested and not reinvested funds. In short, in the later period, the reinvestment decisions of endowments are not economically or statistically unusual relative to other institutional investors.

Another way to analyze the quality of investment decisions independent of differences in access is to examine investments in a partnership's very first fund. Such funds are unlikely to restrict access because they lack a track record and compete with established partnerships for

capital. We find no evidence that endowments show superior ability to select among first-time funds, in any time period.

Overall, our findings suggest that endowments enjoyed an embarrassment of riches in the 1991-1998 period in terms of their access to the best private equity, especially venture, groups. Since then, their access, investment decisions, and ultimate performance have been unremarkable compared to other types of LPs. These results are consistent with DaRin and Phalippou's (2012) survey of LPs, which reveals few if any differences between the organizational approach to PE investing of endowments and that of other LP types.

The disappearance of abnormal performance by endowments is consistent with changes in the economics underlying the private equity industry. In the industry's early years, high returns to buyout were earned in part by purchasing mismanaged companies and improving their operations (Kaplan (1989)), and investments in high-tech companies in the 1990s were an important driver of venture capital returns. The large recent capital inflows into the sector suggest that whatever "low-hanging fruit" existed previously should naturally dissipate. Indeed, venture performance has never recovered from the technology crash of 2000-2002, and while recent buyout returns have not declined from the earlier period, they no longer appear to be attributable to operating gains (see Robinson and Sensoy (2011), Harris et al. (2012), and Guo et al. (2011), as well as our results below). Also consistent with increasing commoditization of the industry, the dispersion of returns across different private equity groups has shrunk dramatically over time. Consequently, it is likely that as the industry matured and became more competitive, the relationships between general partners and investors in their funds changed as well. If limited access reflects rents being distributed to limited partners, then as the rents decline over

time, it is natural to expect a concurrent decline in rationing access to limited partner stakes and in the dispersion of limited partner returns.

The remainder of the paper is structured as follows: Section 2 describes the historical importance of access to private equity funds. Section 3 discusses the sample. Sections 4 presents the industry changes that we observe. Sections 5 and 6 present our empirical results on changing LP returns and the role of investment selection and access, while Section 7 concludes.

2. Access to Private Equity Funds

Private equity firms are usually limited partnerships, structured to facilitate investments that would not be financed by traditional sources of capital. A private equity partnership typically serves as the general partner (GP) in a particular fund, and raises funds from limited partners (LPs), who are usually large institutional investors. The funds then use that money to provide venture capital to start up firms, or to facilitate a change in control through a leveraged buyout. If a fund earns sufficient returns for its investors, the private equity partnership will usually attempt to raise subsequent funds; both the partnership's ability to raise a subsequent follow-on fund and the size of such a fund are highly related empirically to the performance of the original fund (see Kaplan and Schoar (2005) and Chung et al. (2012)).

The ability to raise larger funds subsequent to earning high returns from preceding funds likely comes from LPs updating their assessments of a partnership's ability, which increases investors' expectations of fund performance (see Berk and Green (2004) and Chung et al. (2012)). In other words, good performance leads to an increase in demand for stakes in follow on funds. Yet, because of diminishing returns to investments and the scarcity of partners' time, the most successful general partners, especially in venture capital funds, sometimes limit the

quantity of capital they will take in a particular fund. As documented by Kaplan and Scholar (2005), top performing funds do not grow as rapidly as they could if they maximized capital under management. These partnerships sometimes do raise their fees in response to good performance, but not sufficiently to equate the demand for their funds with the amount of capital they are willing to accept.[2] The combination of high demand for funds from successful partnerships and lack of growth in these funds can lead to limited access. As a result, LPs often claim that the top-performing funds are all highly oversubscribed, and GPs with high returns can often choose their investors (see Hochberg et al. (2012)).

If GPs are restricting access to their funds, they are charging fees lower than the level at which demand for their fund equals the quantity of capital they wish to raise. Since charging fees lower than the market-clearing level has monetary costs to the GPs, there must be some offsetting benefit that they receive. One possible benefit is that restricting access gives GPs control over who their investors are. Keating (2006) surveys General Partners and finds that they claim to prefer knowledgeable, long-term investors who will invest in future funds as well as the current one. Given that GPs place value on a long-term relationship with investors, LPs' portfolio strategies can in turn be affected by concern about being able to invest in future funds. For example David Swensen, the head of the Yale endowment and perhaps the most well-known and successful investor in private equity, explicitly follows a policy of reinvesting in partnerships to maximize Yale's access to their future funds (see Lerner and Leamon (2011)).

While practitioners commonly discuss the way in which private equity partnerships limit capital in their funds, there are no estimates documenting the way limited access works in practice. Since it is in the interest of GPs to appear relatively exclusive, it is possible that

[2] Gompers and Lerner (1999) document that carried interest profit shares are higher for older and larger GPs. However, the majority of private equity funds have carried interest of 20% and management fees between 1.5% and 2.5%.

statements from practitioners are exaggerated. An additional contribution of our work is to provide evidence on the existence of limited access, the sectors and time periods in which it appears to have been present, and the implications of limited access for returns.

3. Sample of LP Investments in Private Equity Funds

3.1. Sample construction

To study Limited Partners' private equity investments, we construct a list of LPs and their investments using data obtained from two sources: *VentureXpert* and *Capital IQ*. While neither source contains a complete list of all LPs in a given fund, each does contain an extensive list of LPs.[3] *VentureXpert* provides LPs' investments and commitment data dating back to 1969. *Capital IQ* has detailed information, including investor identity, on more than 18,000 private equity firms. We identify 8,120 investments made by 1,236 LPs from *VentureXpert* and 24,479 investments made by 2,028 LPs from *Capital IQ*.

To be consistent with Lerner et al. (2007) and to minimize potential problems from incomplete coverage, our analysis only considers LPs' private equity investments in the two most common types of funds after 1990: buyout and venture. Fund-level performance data are collected from *Preqin*, which contains performance information for 5,200 individual funds, and which claims to cover 76% of all North American private equity funds ever raised, 63% of European funds, and 46% of funds from Asia and the rest of the world. Because we want to analyze LPs' investment returns, we drop funds without IRR or vintage year information, and also drop funds raised after 2006 to minimize any potential bias coming from unrealized investments of funds. If a private equity firm raised multiple funds of the same type in a given

[3] Unfortunately, the data on the dollar amount of each LP's investment is not available for the majority of the investments.

year, we aggregate all funds in that year and compute a size-weighted IRR. This process leads to a sample containing 14,380 investments from 1,852 unique LPs in 1,250 unique buyout and venture funds between 1991 and 2006. Of the 14,380 LP investments, 10,219 are unique to *Capital IQ* and 818 are unique to *VentureXpert*; 3,343 are included in both databases.

We divide the full sample into two eight-year periods, the Lerner et al. (2007) sample period, 1991-1998, and the subsequent seven years,1999-2006, because we are interested in knowing how the relationship between GPs and LPs changed over time. The 1991-1998 subperiod contains 3,685 investments by 996 unique LPs in 412 unique funds. The 1999-2006 subperiod contains 10,695 investments made by 1,533 LPs in 838 funds.

We divide LPs into eight categories: *Public pension funds, Corporate pension funds, Endowments, Advisors, Insurance companies, Banks/Finance companies, Investment firms, and Others*. *Public pension funds* and *Corporate pension funds* are pension funds provided by the public and private sector, respectively. *Endowments* are private and public university endowments as well as foundations. *Advisors* are investment advisors and consulting firms. *Insurance companies* include any firm with a primary business in insurance. *Banks/Finance companies* include all banks and bank-affiliated investment arms. *Investment firms* include private equity firms, investment companies, and hedge fund sponsors. LPs not included in the previous seven classes are classified as *Others*.

Table 1 presents summary statistics on the characteristics of each class of Limited Partner in our sample. Public pension funds make the most investments per LP, with each LP making 32.44 investments, followed by endowments (16.56 investments per LP) and investment firms (16.29 investments per LP). All classes of LP have more investments in the second half of the sample

period than in the first half; this increase reflects the high growth of the private equity industry as well as more comprehensive data coverage over time.

In addition to differing in the quantity of investments made, classes of LPs also differ in the proportion of investments in the first fund raised by a private equity firm. Over the full sample period, endowments have the lowest percentage of their investments in a GP's first fund, while insurance companies and banks invest most often in those funds. This pattern is driven by LPs' investments in both venture and buyout funds in the first half of the sample period. From 1999 to 2006, there is little difference between endowments' investments in GPs' first funds and those of other investors.

3.2. Performance of Different LP Classes of Investors

Table 2 documents characteristics of the private equity funds by class of investor. Funds in which endowments invest have the highest average IRR over the entire sample period; over the full (1991-2006) period, their funds' IRR is 13.38%, and the highest for any other class is 11.09% (Insurance Companies). However, when we break down the IRR by subperiods, there are sharp differences in performance over time. Consistent with Lerner et al. (2007), endowments' investments in private equity did remarkably well in the 1991-1998 period, with an average IRR of 35.74%, which is substantially higher than the next highest class, Investment firms (IRR of 25.78%), and the average fund in the sample (23.67%). In contrast, in the latter 1999-2006 period, endowments actually have the *worst* performance of any class of investors, with a 5.83% IRR, compared to a 6.26% IRR for the next lowest class of investors (Corporate Pension Funds), and 7.9% for the average fund in the sample.

When we split up the investments between venture and buyout, there are stark differences in performance, both across investor types and over time. Endowments earned a spectacular 63.82% return on their venture capital investments during the 1991-1998 period. However, endowments' venture capital returns between 1999 and 2006, like those for most investors, were negative. Buyout returns for endowments were typical of most classes of investors, being slightly below average in both periods (11.81% compared to a 12.07% average during 1991-1998 and 10.05% compared to a 10.79% average during 1999-2006).

4. Changes in the Industry

Recent work has shown that private equity fund returns have changed since the 1990s (see Robinson and Sensoy (2011) and Harris et al. (2012)). Venture capital performance, both in absolute terms and relative to public markets, has declined substantially. Buyout performance has been more or less flat in both absolute and relative terms. In addition, the cross-sectional dispersion of fund returns has decreased. These patterns point to a maturing and general commoditization of the industry. Below, we present statistics from our data consistent with these trends observed in prior work.

4.1. Changes in Fund Sizes and Returns

Panel A of Table 3 presents the mean, median, first quartile, and third quartile values of size and returns of funds in our sample. Results are further broken down by fund type. The funds are evenly split between venture and buyout; out of the 1,250 funds, 629 are venture funds and 621 are buyout funds. The number of funds, the number of investors in a fund, and fund size all increase over time, consistent with a rapid growth of the industry. The total number of funds and

fund size both double in the second subperiod, and the average (median) number of investors in a fund increases from 8.94 (6) in the first period to 12.76 (8) in the second period. These patterns hold for both venture and buyout funds. As the industry becomes larger in the second subperiod, and due to the technology bust of the early 2000s, venture fund returns decrease, while buyout returns are similar in the two sub-periods.

A decline in average returns can come from two sources: there could be substantially lower returns for a few funds, or there could be an industry-wide drop. Our results support the latter explanation, since the dispersion of venture capital returns is also lower in the 1999-2006 sub-period. Panel B of Table 3 shows the standard deviation of IRRs of different fund types in the two sub-periods. The full sample shows a drop in standard deviation of returns from 1991-1998 to 1999-2006. This decrease is driven entirely by venture funds. In addition, separating funds by GP experience shows that more mature venture funds experience an even larger drop in return dispersion. Therefore, the combined evidence in Table 3 indicates that the returns of the venture industry have decreased, and that the late period has few exceptionally good performers.

We find that the positive correlation between GP experience and performance drops from the first to the second subperiod as well. Table 4 shows regression results of IRR on fund sequence number. Consistent with Kaplan and Schoar (2005), we find a positive relationship between fund sequence and returns in the 1991-1998 subperiod, suggesting that returns increase with GP experience. Moreover, first-time funds have lower returns. As in Kaplan and Schoar (2005), these results are driven by venture funds. However, between 1999 and 2006, venture capital fund performance is no longer related to GP experience. Buyout GP experience is statistically significantly positively related to fund performance in this later period, but the coefficient is

economically small and in fact smaller than the statistically insignificant coefficient in the earlier period.

4.2 Implications

The changes in returns, capital flows, and investor participation in the private equity industry are likely to have altered the manner in which private equity firms operate, and their relationships with LPs. In particular, to the extent that rationed access to top-performing venture groups was a key reason for the outperformance of endowment portfolios in the 1990s, the results presented above suggest this is unlikely to have continued. Fewer, if any, recent venture funds have experienced the enormous success of those raised in the early to mid 1990s. Later sequence funds no longer outperform, calling into question the value of access to these funds. At a deeper level, if access reflects rents distributed to LPs by successful GPs, we should observe a decline in the importance of access. We explore the potential changes in the following sections.

5. Limited Partner Returns and Reinvestment Decisions

5.1. Returns to different types of LPs over time

We estimate multivariate equations predicting the returns on a particular LP investment. We first estimate the equation using just indicator variables for the type of investor, as well as fund type indicator variables and vintage year fixed effects. Because the same fund enters the equation multiple times whenever there is more than one investor who holds the fund in our sample, we cluster by fund when calculating standard errors.[4]

[4] Here and in every other table in which we report standard errors clustered by fund, results are similar if we instead cluster by vintage year, by LP, or double cluster by fund and vintage year or by LP and vintage year.

We report estimates of this base equation for the full sample in Column 1 of Panel A of Table 5. The coefficient on endowments is a statistically significant 2.6, which implies that endowments' private equity investments outperformed the omitted group (public pension funds) by 2.6 percentage points of IRR on average over the entire sample period. No other LP type performs significantly (at the 5% level) differently than the omitted group. To guage the statistical and economic significance of endowment performance compared to the performance of all other LPs, the bottom of the table reports results where the investor type indicator variables are collapsed to two types of investor: endowments and non-endowments. The results indicate that the funds in which endowments invest outperform those of non-endowments by a highly significant 3.10 percentage points of IRR over the full sample period.

In Column 2, we repeat these analyses adding additional controls. We add the log of LP experience (measured by the number of private equity investments in the sample prior to the time of the investment), the log of the fund's size, and fixed effects for the LP's country of origin to the equation. The results comparing endowments to non-endowments are virtually identical to those in Column 1. The significantly positive coefficient the log of LP Experience implies that more "experience" investing in private equity funds is associated with better performance. This result can be interpreted in two ways: First, experience by itself could lead Limited Partners to have better information and skill so that they make better investment decisions, and second, having invested in the early funds of successful GPs could allow the Limited Partners improved access to the subsequent funds of these GPs.

Columns 3 and 4, we re-estimate the equations in Columns 1 and 2, focusing only on investments in funds with vintage years between 1991-1998, the period of Lerner et al.'s (2007) sample. In Columns 5 and 6, we do the same focusing only on investments in funds with vintage

years between 1999-2006. Scanning across the columns reveals two main facts. The outperformance of endowments is entirely concentrated in the 1991-1998 period, and disappears in the later 1999-2006 period. In fact, no LP type systematically outperforms in the later period. Similarly, the importance of LP experience to returns in the overall period is driven entirely by the 1991-1998 subperiod as well. One explanation for this result is that LPs in general become more experienced over time, differences in experience matter less.

Panels B and C of Table 5 repeat the analysis for venture and buyout LP investments separately. The main takeaway is that the results discussed above for all investments are driven by venture investments. In the buyout industry, endowments do not outperform in either the earlier or the more recent time period.

We next investigate why endowments outperformed in funds raised between 1991-1998, and why this outperformance has not continued among funds raised in 1999-2006.

5.2. LPs' reinvestment decisions

A possible source of superior endowment performance is through better investment selection. Endowments receive information about GPs while investing in their funds; potentially they could use this information to make more informed investment decisions, particularly when deciding whether to invest in new funds from partnerships with which they have invested in the past. Accordingly, Lerner et al. (2007) suggest that one way to measure an investor's skill is to examine the quality of their reinvestment decisions. LPs are normally given the option of investing the subsequent funds of the partnerships in which they invest. Therefore, it is unlikely that there is differential access affecting funds' reinvestment decisions.

When faced with a reinvestment decision, an LP has observed the quality of the GP's decision-making while managing the initial fund. Since we can observe the returns of both the funds in which LPs chose to reinvest, as well as the returns of the funds in which the LP chose not to reinvest ("abandoned" funds), we can gauge the quality of the LP's decision-making by comparing the returns on these two groups of funds. Lerner et al. (2007) show that in their 1991-1998 sample, funds in which endowments reinvest do substantially better than the ones they abandon, while other types of investors are not nearly as good as picking investments as endowments are.

We present evidence on reinvestment decisions in Table 6. Panel A presents results for the full sample of investments, Panel B for venture capital funds and Panel C buyout funds. Each Panel is broken down by investments over the entire time period, and for investments in the 1991-1998 and 1999-2006 subperiods. We divide each class of LPs' investments by those for which the LP invested in the follow-on fund, and those for which the LP chose not to invest in the follow-on fund. If a fund has no follow-on fund, it is dropped from the sample.

Panel A of Table 6 compares reinvested and abandoned funds for venture and buyout funds taken together. In the full sample as well as in each sub-period, for each type of investor (except "Others"), follow-on funds in which LPs choose to reinvest perform better than those in which they choose not to reinvest. In some but far from all cases, the IRR of the current funds for which the LP reinvested is statistically significantly higher than the funds for which they did not reinvest. These results suggest that as a whole, LPs use information in the returns of the original funds, as well as the private information they receive as investors in the fund (e.g. through periodic reports from the GPs), to make reinvestment decisions that have substantially higher returns than a "random reinvestment" rule would have had.

Panel A of Table 6 also shows that endowments appear relatively better than other types of LPs at reinvestment decisions in the 1991-1998 period, consistent with Lerner et al. (2007). Endowments' reinvested funds outperformed funds in which they chose not to reinvest (an average IRR of 37.8% for reinvested funds compared to 24.6% for funds they chose not to reinvest), and the difference is larger than for most other LP types. Yet, with an average IRR of 24.6%, even those funds in which endowments chose not to reinvest outperformed the funds in which other types of LPs reinvested on average. The Panel also shows that during the more recent 1999-2006 period, endowments' reinvested funds still outperform those in which they did not reinvest, but by a much smaller margin. Other types of LPs see similar differences in returns to reinvested and not reinvested funds. In short, in the later period, the reinvestment decisions of endowments are not economically or statistically unusual relative to other institutional investors.

These results by themselves are consistent with superior investment skill among endowments in the 1991-1998 period. However, the results in Panels B and C of Table 6, which break the results down by venture and buyout LP investments, cast some doubt on the view that endowments had superior selection skill even in the 1991-1998 period. Panel B shows that venture funds in which endowments reinvest in the 1991-1998 period perform exceptionally well, with a 62.6% average IRR. However, the funds in which they choose not to reinvest perform almost as well, with a 59.2% average IRR. Moreover, Panel B also shows that an IRR of 59.2% is a higher average performance than that of any of the venture capital funds in which other types of LP could reinvest, whether or not these other LP types choose to reinvest.

Rather than reflecting investment skill, these results on endowments' reinvestment decisions suggest that endowments in the early 1990s were in the position of choosing between investments in the very best venture groups, and did so only slightly better than randomly. The

evidence suggests that regardless of their skill at reinvestment decisions, simply having been invested with these top venture partnerships led to endowments' superior returns relative to other classes in the 1991-1998 period. The venture groups managing the funds for which endowments earned these very high returns are all well-known firms with reputations for limiting access (Kleiner-Perkins, Sequoia, Benchmark, etc.). Presumably, if other types of investors could have invested with these partnerships, many of them would have done so.

Panel C of Table 6 shows that endowments similarly appear to make better reinvestment decisions in their buyout investments than do other types of LPs in the 1991-1998 period. This is primarily due to abandoning funds that turn out to do poorly; endowments do not perform better on their reinvested funds than do other types of LPs, consistent with our evidence in Table 4 that endowments do not systematically outperform other LPs in their buyout investments.

Panels B and C of Table 6 echo the message of Panel A: Whatever superior reinvestment decisions endowments may have made relative to other investors in the 1991-1998 period, there is no evidence that this continues to the 1999-2006 period.

6. The Importance of Access to Limited Partner Returns

The evidence presented on LPs' returns and reinvestment decisions is consistent with endowments' success being driven by their early investments with exceptional General Partners, which provides them access to the partnerships' later funds. In this section, we provide tests of the importance of access in driving LPs' returns. Because access is not observable, our tests involve comparing funds that are likely to have limited access to those in which it is likely that all investors can invest if they choose.

6.1 First-Time vs. More Mature Funds

One way to distinguish between access-based and skill-based explanations for differences in returns is to consider first-time funds separately. Compared to funds from experienced partnerships, first-time funds tend to perform worse (at least in the 1991-1998 period), and they are generally considered extremely difficult to raise (see Lerner, Hardymon, and Leamon (2011)). Therefore, it is unlikely that allocations to a first-time fund are rationed. The skill-based explanation then suggests that endowments and more experienced investors should outperform other investors when investing in first time, as well as higher sequence funds. Alternatively, it is possible that endowments' superior performance could occur if they were able to invest in funds from more experienced partnerships, which performed better than first-time funds.

We first estimate the likelihood that a particular LP invests in a first-time fund. Limited partners tend to be averse to investing in first time funds, so a higher proportion of investments in more established funds is likely to reflect better access. We estimate equations that predict whether a particular investment is in a first-time fund as a function of LP type, LP experience, fund size and type, vintage year, and country of LP origin. Because this dependent variable is dichotomous, we estimate the equation by Probit models.

We report estimates of this equation on the entire sample and subsamples split by both time period and type of fund in Table 7. The top part of the Table reports results for all LP types separately, while the bottom of the table reports otherwise identical specifications in which the LP type indicators are collapsed to a single indicator for endowments vs. non-endowments (analogous to Table 5). For brevity, we omit the coefficients on the control variables when reporting these latter specifications.

The main message of Table 7 is that endowments are statistically and economically less likely to invest in first-time funds than are non-endowments, especially in the 1991-1998 period. In the 1999-2006 period, this remains true only for buyout funds. Taking both fund types together, the magnitude of the difference between endowments and non-endowments decreases by about two-thirds over time. In the 1991-1998 period, endowments are 14.5% less likely to invest in first-time funds, but only 5.2% less likely in the 1999-2006 period. Table 7 also shows that experienced LPs (regardless of type) are less likely to invest in first-time funds, with the gap again shrinking dramatically over time.

Overall, these results suggest that to the extent endowments and experienced LPs enjoyed an advantage in access to more experienced partnerships (and hence less need to invest in first-time funds) in the 1991-1998 period, this advantage has attenuated substantially over time.

To test whether endowments, though less likely to invest in first-time funds, make better investment decisions when they do compared to other types of investors, we compare the returns of different classes of investors for funds of different sequence numbers. Table 8 presents estimates of equations that predict the returns of a particular fund, broken down by both time period and whether the fund was a first-time fund. In the 1991-1998 period, endowments outperform other classes of investors substantially in their investments in later-sequence funds, with a 10 percentage-point difference compared to the omitted class (public pension funds). In contrast for first-time funds, the difference between endowments and other classes of investors is smaller (about 4 percentage points) and not statistically significantly different from zero.

These results suggest that the superior returns to endowments were driven by their investments in experienced funds during the 1991-1998 period. Of course, superior performance in experienced funds can in principle be driven both by access to the top funds and by skill at

selecting good funds. We cannot rule out, therefore, that endowments' superior performance in experienced funds over 1991-1998 was due in part (or even in large part) to selection skill, even though they display no such skill in selecting among first-time funds. Even if so, however, Table 8 also shows that there is not a difference in endowments' performance compared to other LPs in any funds (first-time or experienced) in the 1999-2006 period. Overall, these results are consistent with the view that the access to the experienced venture capital partnerships that did so well during the 1990s' technology boom was the primary driver of endowments' superior performance in the 1990s.

6.2 Returns to investments in funds that are likely to be restricting access

We now turn to an alternative test of access in which we account for a broader implication of limiting access. Limited access to funds occurs when private equity partnerships choose to limit the amount of capital they raise for a particular fund, and to ration capital to LPs of their choosing, rather than to raise fees to the point where they can just raise the amount of capital they desire for the fund. As a consequence, some investors are left out of the fund.

Theoretically, a fund will have limited access when its size does not grow sufficiently to justify the demand for its products. Empirically, we cannot estimate demand separately from supply but we can estimate the extent to which funds are likely to have limited access by measuring which ones grew less than what is predicted from an econometric model of fund growth. We rely on a model similar to ones in the literature to calculate expected growth rates of private equity funds (see Chung et al. (2012)).

We estimate the following model:

$$Ln\left(\frac{Follow\text{-}on\ fund\ size}{Preceding\ fund\ size}+1\right)=\alpha+\beta\times Preceding\ fund\ IRR+Vintage\ FEs+\ \varepsilon \quad (1)$$

The major factors affecting future fund size are the returns of the current fund and also macroeconomic factors related to the state of the overall economy and the private equity industry. Therefore we include the IRR of the partnership's prior fund in the equation, and include vintage year fixed effects to control for macroeconomic factors. We estimate this equation separately for buyout and venture capital funds.

Since Equation (1) predicts the expected size of the fund, its residuals represent departures from expected size. Therefore, any firm that has a negative residual has a negative "abnormal growth". We estimate equations that predict whether a particular LP's investment is in a fund with negative abnormal growth, using as a sample all investments with sequence number higher than 1 so that we can calculate abnormal growth for that fund. The idea is that funds that have negative abnormal growth are more likely to have limited access to their funds, so that the estimated equation will provide insight into which types of investors are more likely to invest in a fund with limited access.

Table 9 presents estimates of these equations, for the all types of funds in Columns 1-3, for venture funds in Columns 4-6, and for buyout funds in Columns 7-9. The estimates indicate that endowments are more likely than other LP types to invest in venture funds with negative abnormal growth in the 1991-1998 period, but not in the 1999-2006 period.[5] There is no difference in the propensity of different LP types to invest in negative-abnormal-growth buyout funds. This finding is consistent with the results reported above suggesting that endowments' access to the extremely successful venture capital funds in the 1991-1998 period is the primary driver of their superior performance.

[5] We also find that endowments are more likely to invest in funds in the lowest quartile of abnormal growth than other LP types.

While funds that have negative abnormal growth are likely to have limited access for investors, it is unclear whether such limited access actually leads to better future performance. In principle, the reason to limit capital in a fund is to be able to undertake fewer but higher quality investments and to allow the fund's GPs to have sufficient time and energy to be able to manage them well. This argument predicts that funds that accept less capital than they otherwise could have raised, could have superior performance than otherwise identical funds that did not limit their size. However, it is also possible that investment quality is unaffected by fund growth rates; for this reason, we consider the issue empirically.

To test this hypothesis, we examine whether abnormal growth of a fund is related to its performance.[6] Table 10 contains estimates of equations predicting fund returns as a function of abnormal growth. Panel A includes the residuals from our estimates of Equation (1) into the equation directly and Panel B includes a dummy variable that equals 1 if there is negative abnormal growth. The unit of observation in this sample is the fund, not the LP stake as in most prior tables, and we include all funds for which we could calculate an abnormal growth.

The estimated equations in Table 10 indicate that there is clear association between abnormal growth and fund returns. The residual on growth is negatively related to subsequent returns, while the dummy variable indicating whether there is negative abnormal growth has a positive impact. By far the largest effect is for venture funds during the 1991-1998 period. The coefficient of -27.5 on abnormal growth in the equation for venture funds in this period (Column 5) is negative and substantially larger in magnitude than the corresponding coefficient in the comparable equation for any other subsample. Similarly, the coefficient of 43.8 on the dummy variable that indicates if there is negative abnormal growth is substantially larger for the venture funds in the 1991-1998 period than for any other subsample. Economically it implies that,

[6] See Chung (2012) for a related test.

measured by IRR, venture funds that had negative abnormal growth outperformed otherwise similar venture funds during this period by 35 percentage points.

This finding suggests that negative abnormal growth, which likely reflects limited access to a fund, is associated with unusually good performance, especially in venture capital funds during the 1991-1998 period. It is consistent with the argument that there were extremely high returns to having access to the top venture funds during this period, and that the exceptional performance of endowments at this time can be explained by their access to these funds.

6.3 Implications

Discussions of investing in private equity often revolve around the notion of a long-term relationship between private equity fund managers and their investors. By establishing a long-term relationship, the investors gain access to GPs' future funds. Well-known investors have had the investment strategy of investing with high quality partnerships, and investing in *all* of their funds so as to assure access in the future. Practitioners often claim that such access to the best funds allows investors in private equity to achieve higher returns than would otherwise be possible.

Our results from endowments' investments in first-time funds and growth-constrained funds are consistent with access being an important factor in private equity investing in the 1991-1998 period. However, the maturing of the industry has been accompanied by declines in returns and the dispersion of returns, especially in venture capital. In addition, all LPs have gained experience from investing. In light of these changes, our findings for the 1999-2006 period suggest that the importance of access has also declined over time, consistent with the notion that

the industry has changed from a niche, poorly understood industry, into a standardized and important part of most institutional portfolios.

7. Conclusion

Since the modification of the "Prudent Man" rule in 1978 that allowed institutional investors to allocate part of their portfolios to alternative assets, the private equity industry has changed substantially. In 1980, the largest fund raised was the Golder-Thoma $60 million dollar fund that invested in many different kinds of deals, including both venture capital and buyouts. At the time, institutional investors were somewhat skeptical of the industry, GPs, LPs and portfolio firms were experimenting with different contractual structures, and indeed "private equity" itself was not an accepted term. By the time of the 2008 Financial Crisis, individual funds of over $20 billion were being raised, funds became specialized in particular types of investments so that "renewable energy" or "infrastructure" funds were commonplace, contracts have become standardized, and private equity has become an accepted part of the financial world in which most major business schools teach courses, and is even a topic for debate in presidential campaigns.

It is natural that such maturing of an industry can lead to changes in the fundamental relationships between participants. In the private equity industry, the major participants are the Limited Partners, the General Partners, and the portfolio companies. In this paper we explore the relationship between Limited Partners and General Partners by focusing on access to funds, and the way in which it has changed over recent years. An overarching hypothesis is that the fundamental changes brought on by the maturing of the private equity industry have changed the nature of relationship between Limited Partners and General Partners in private equity.

We examine this hypothesis empirically with special attention to the unusually good performance earned by endowments documented by Lerner et al. (2007). To do so, we gather a sample of 1,852 LPs' stakes in 1,250 buyout and venture funds between 1991 and 2006, which is substantially larger than any previous sample of LP stakes. We start by showing changes in returns brought on by the maturing of the industry. Consistent with prior work, we find an industry-wide decline in returns and a decline in the relationship between GP experience and return. These results are driven by changes in venture funds.

We also confirm the Lerner et al. (2007) finding that endowments outperform other investor classes during the 1991-1998 period. We argue that this unusually good performance was likely due to endowments' access to the best funds during this period, rather than superior skill at picking funds, for three reasons.

First, the superior performance demonstrated during 1991-1998 did not continue subsequently; during the 1999-2006 period endowments' performance in their private equity investments was very similar to that of other investor classes. The unusual performance was limited to venture funds that benefited from the technology boom of the 1990s, the performance of endowments' investments in buyout funds was similar to that of other asset classes. Presumably, superior skill would have manifested itself in other kinds of funds as well.

Second, endowments' reinvestment decisions are not consistently better than that of other investors, especially over time. In the venture sector during the 1991-1998 bull market, even if endowments had made random reinvestment decisions, or had only reinvested in the fund families for which they chose not to invest, they still would have earned close to a 60% IRR on those investments and outperformed other classes of investors.

Third, even in the 1991-1998 period, endowments did not outperform other investor classes in their investments of first-time funds, for which access is unlikely to be limited and so represent a pure test of selection skill. Moreover, direct tests of access using abnormal growth of fund assets to measure limited access reveal that endowments were more likely to invest in venture funds with limited access during the 1991-1998 period, and also that these funds (venture funds with limited access during the 1991-1998 period) had unusually good performance.

It is clear that there have been major changes in private equity industry in recent years. We argue that this maturing has had implications for the relationship between GPs and LPs. Presumably the huge inflows of capital and commoditization of the industry has lowered the rents to GPs. If limited access reflected the sharing of these rents, then as these rents decreased over time, we should expect that the importance of limited access would decrease as well.

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Figure 1. Venture and Buyout Fundraising over Time

The figure shows the amount of venture and buyout funds raised from 1990 to 2008, derived from data listed in Preqin. Bars represent fundraising by year. The blue portion represents buyout fundraising in millions of dollars. The red portion represents venture fundraising in millions of dollars.

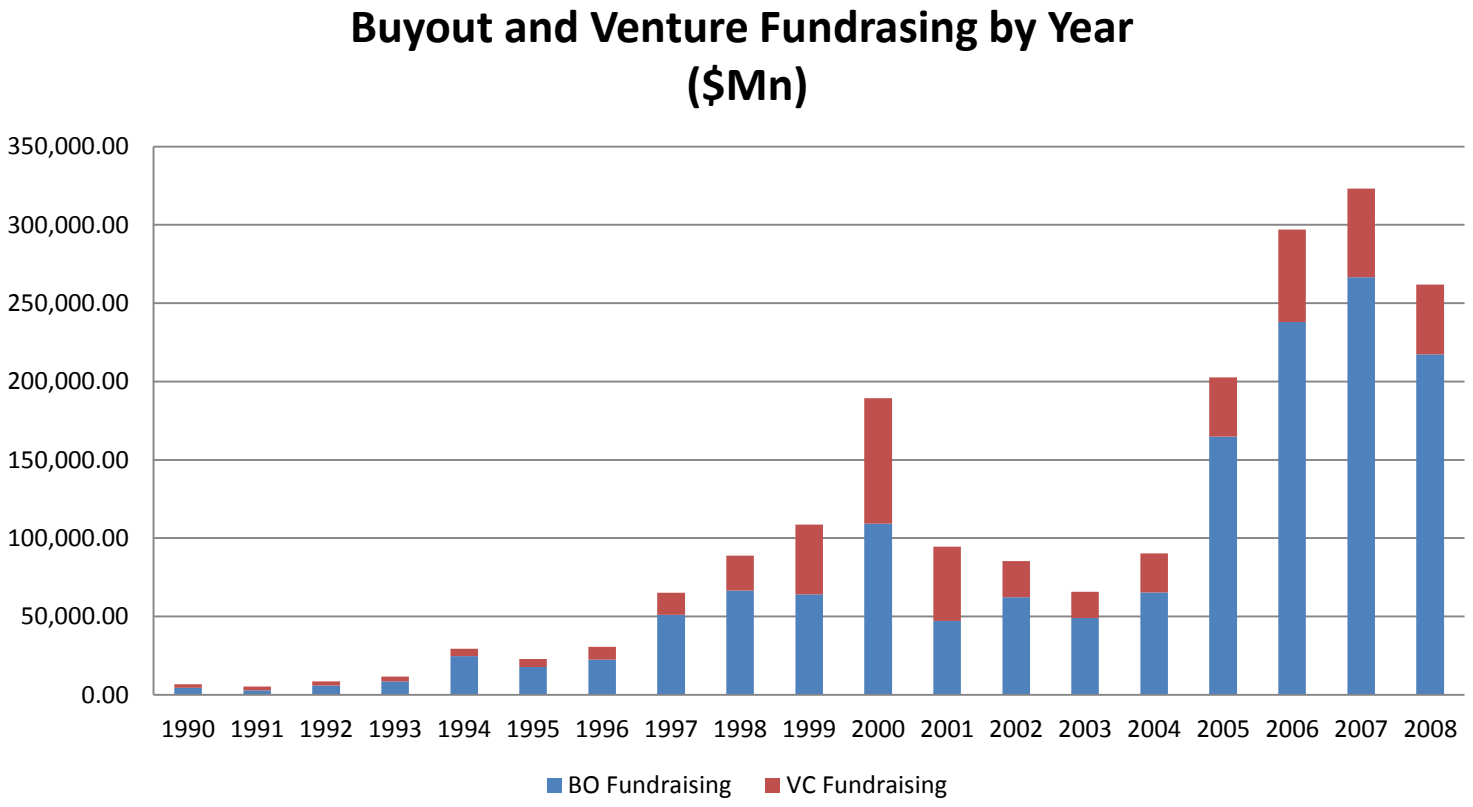

Table 1. LP Characteristics

This table shows characteristics of the sample of 1,852 LPs and their 14,380 investments in 1,250 buyout and venture capital funds raised between 1991 and 2006. Statistics are shown for the full sample period as well as the 1991-1998 and 1999-2006 subperiods. *Total # of LPs* is the total number of LPs that make at least one investment in a given fund type in a given period. Means are reported for all other variables. *LP Experience* is the total number of investments made by an LP prior to the current investment. *Investments in Fund 1* is the percentage of an LPs' investments in a given fund type in a given period that are investments in the first fund raised by a private equity firm.

Panel A: LP Characteristics

	All Funds (Full Sample)				All Funds (1991-1998)				All Funds (1999-2006)			
	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)
Public pension fund	137	32.44	28.76	20	90	9.09	7.65	38	131	18.44	35.9	14
Corporate pension fund	89	16	13.96	23	67	5.37	4.33	44	79	8.63	19.04	11
Endowments	210	16.56	14.45	17	137	4.58	4.45	28	178	8.72	18.49	12
Advisors	144	13.64	11.62	24	66	3.29	4.07	38	123	5.56	14.01	18
Insurance companies	153	13.3	11.24	28	78	2.99	3.57	47	129	4.5	14.32	18
Banks/Finance companies	381	11.48	9.42	30	173	3.08	3.39	46	334	4.93	11.37	23
Investment firms	387	16.29	13.62	24	188	3.09	2.77	42	338	7.57	16.07	20
Other investors	351	7.46	5.81	26	197	1.6	1.53	36	221	2.59	8.16	16
Overall	1,852	18.33	15.79	23	996	3.7	4.4	39	1533	6.98	19.72	17

	Venture Funds (Full Sample)				Venture Funds (1991-1998)				Venture Funds (1999-2006)			
	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)
Public pension fund	99	13.69	28.97	20	60	6.43	7.97	39	91	13.55	36.54	14
Corporate pension fund	66	7.45	12.92	23	41	4.11	4.57	41	61	6.19	16.93	12
Endowments	162	8.5	13.24	17	92	3.58	4.38	28	149	5.91	16.68	12
Advisors	90	8.92	12.75	24	30	3.4	5.31	34	78	4.56	15	19
Insurance companies	81	7.27	10.35	27	32	3.23	4.04	44	73	4.36	12.82	18
Banks/Finance companies	222	5.02	8.34	30	75	3.24	3.05	45	207	4.3	9.56	25
Investment firms	262	8.45	11.9	25	94	3.15	2.98	42	240	6.49	13.61	21
Other investors	202	2.44	3.47	27	78	1.74	1.05	35	154	2.29	4.31	19
Overall	1,184	8.41	14.2	23	502	3.64	4.52	39	1053	5.89	17.15	17

	Buyout Funds (Full Sample)				Buyout Funds (1991-1998)				Buyout Funds (1999-2006)			
	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)	Total # of LPs	Avg # of investments Per LP	LP Experience	Investments in Fund 1 (%)
Public pension fund	121	21.07	28.66	20	78	6.39	7.5	38	117	12.35	35.61	14
Corporate pension fund	74	11.48	14.67	23	57	3.85	4.18	46	61	6.14	20.57	10
Endowments	155	9.69	15.53	16	107	3.47	4.52	29	133	6.27	20.15	11
Advisors	100	8.82	10.99	25	49	3.21	3.42	41	88	4.82	13.45	18
Insurance companies	114	8.6	11.72	28	62	2.74	3.33	48	93	4.04	15.13	18
Banks/Finance companies	279	8.65	10.04	29	136	2.79	3.52	46	235	4.35	12.55	21
Investment firms	254	10.94	15.05	24	137	2.7	2.63	42	221	6.8	18.24	19
Other investors	210	7.68	7.65	26	139	1.55	1.75	36	110	2.55	12.13	13
Overall	1,307	12.55	16.84	23	765	3.25	4.34	40	1058	6.05	21.5	16

Table 2. Fund Characteristics

This table shows fund characteristics at the LP level. *Fund Sequence* is the order in which a fund was raised by a private equity firm. *Fund Size* is the fund's total committed capital. *Fund IRR* is the fund's internal rate of return. Reported statistics are the average across all LP investments by a given LP type in a given fund type in a given period. *Endowments vs. non-endowments* shows the difference in mean values between endowments and all non-endowment LP investors. Significance levels are determined by regressing each dependent variable on the endowment dummy, with standard errors clustered by fund.. ***, **, and * indicate significance level at the 1%, 5%, and 10%, respectively.

	All Funds (Full Sample)			All Funds (1991-1998)			All Funds (1999-2006)		
	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)
Public pension fund	3.71	9.71	3,233	2.42	21.4	922.71	4.14	9.25	2,528.33
Corporate pension fund	3.25	9.89	1,042	2.01	20.13	785.99	3.91	6.26	1,763.11
Endowments	3.94	13.38	2,181	2.83	35.74	671.95	4.39	5.83	1,662.09
Advisors	3.21	10.95	901	2.24	24.74	951.94	3.51	8.74	1,842.80
Insurance companies	3.11	11.09	813	2.1	21.16	645.70	3.51	9.44	1,479.54
Banks/Finance companies	2.93	9.04	2,180	2.05	16.22	822.36	3.21	8.88	1,314.65
Investment firms	3.33	8.88	3,140	2.25	25.78	738.71	3.57	7.32	1,573.47
Other investors	3.06	10.49	890	2.12	19.4	924.32	3.58	7.22	1,545.19
Overall	3.4	10.2	1,534	2.31	23.67	807.49	3.78	7.9	1,784.80
Endowments vs. non-endowments	0.63***	3.74***	-185.85**	0.62***	14.55***	-163.38**	0.72***	-1.43*	-144.25

	Venture Funds (Full Sample)			Venture Funds (1991-1998)			Venture Funds (1999-2006)		
	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)
Public pension fund	3.63	8.56	526	2.58	38.72	226.32	4.01	-1.8	589.83
Corporate pension fund	3.41	9.56	512	2.18	37.1	214.35	4	-3.48	602.11
Endowments	3.54	16.49	525	2.83	63.82	240.99	3.81	-1.89	615.97
Advisors	3.16	9.67	478	2.36	47.56	200.20	3.4	-1.41	536.25
Insurance companies	3.2	7.15	386	2.55	32.13	222.68	3.46	-2.19	447.27
Banks/Finance companies	2.79	4.1	391	2.17	29.91	165.52	2.93	-1.4	437.46
Investment firms	3.27	5.96	490	2.3	46.88	181.44	3.45	-1.29	522.38
Other investors	2.9	8.36	387	2.2	33.13	190.92	3.14	0.27	463.19
Overall	3.29	8.78	478	2.45	44.09	209.38	3.54	-1.58	535.59
Endowments vs. non-endowments	0.30**	9.40***	57.98**	0.48**	25.18***	40.35**	0.32***	-0.15	91.32***

	Buyout Funds (Full Sample)			Buyout Funds (1991-1998)			Buyout Funds (1999-2006)		
	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)	Fund Sequence	Fund IRR (%)	Fund Size ($Mn)
Public pension fund	3.74	10.24	2,870	2.34	12.73	1,271.54	4.2	9.42	3,395.09
Corporate pension fund	3.15	10.12	2,055	1.91	9.57	1,141.33	3.84	10.43	2,568.50
Endowments	4.31	10.57	2,145	2.83	11.81	1,039.34	4.93	10.05	2,608.86
Advisors	3.23	11.66	2,271	2.18	12.69	1,348.99	3.57	11.33	2,571.50
Insurance companies	3.05	13.2	1,700	1.87	15.42	866.89	3.54	12.3	2,038.45
Banks/Finance companies	3	11.88	1,655	2	10.91	1,077.23	3.39	12.25	1,876.96
Investment firms	3.38	11.32	2,195	2.22	11.92	1,104.92	3.68	11.16	2,475.57
Other investors	3.2	12.17	2,063	2.09	12.94	1,268.85	4.04	11.58	2,665.50
Overall	3.48	11.14	2,231	2.23	12.07	1,147.27	3.94	10.79	2,633.88
Endowments vs. non-endowments	0.95***	-0.64	-98.90	0.70**	-0.31	-126.12	1.13***	-0.84	-28.69

Table 3. Changes in Fund Characteristics and Performance over Time

The table shows summary statistics of the characteristics and performance of funds in our sample. The full sample period is divided to 1991-1998 and 1999-2006 subperiods, and funds are divided to venture and buyout funds. Panel A reports the number of observations, mean, median, first quartile (Q1), and third quartile (Q3) values of fund size, returns, and vintage year. Panel B shows the dispersion of fund returns, measured by the cross-sectional standard deviation of fund IRR (in percent). The sample is further divided to *Fund 1*, the first fund raised by a private equity firm, and *Fund > 1*, subsequent funds.

Panel A: Fund-level characteristics

	All Funds (Full Sample)					All Funds (1991-1998)					All Funds (1999-2006)				
	Obs	Mean	Median	Q1	Q3	Obs	Mean	Median	Q1	Q3	Obs	Mean	Median	Q1	Q3
# of LPs investing in fund	1,250	11.5	7	3	15	412	8.94	6	3	12	838	12.76	8	3	16
Vintage year	1,250	2000	2000	1998	2003	412	1996	1996	1994	1997	838	2002	2002	2000	2005
IRR (%)	1,250	11.23	6.30	-4.90	19.10	412	25.61	12.75	2.15	30.70	838	6.14	4.4	-5.2	15
Fund size ($Mn)	1,250	702.53	287.99	125.00	682.64	412	404.99	169.50	75.50	399.85	838	848.82	354.00	163.00	770.00
Preceding fund IRR (%)	751	20.31	12.70	1.40	27.00	206	33.87	24.15	11.10	39.00	545	15.19	9.20	-1.70	22.00
Preceding fund size ($Mn)	751	589.89	235.00	100.00	560.00	206	298.73	135.00	61.48	268.00	545	699.95	300.00	130.00	702.52

	Venture Funds (Full Sample)					Venture Funds (1991-1998)					Venture Funds (1999-2006)				
	Obs	Mean	Median	Q1	Q3	Obs	Mean	Median	Q1	Q3	Obs	Mean	Median	Q1	Q3
# of LPs investing in fund	629	9	10	3	12	201	7	4	2	9	428	10	7	3	14
Vintage year	629	2000	2000	1998	2003	201	1996	1996	1994	1997	428	2001.91	2001	2000	2004
IRR (%)	629	11.66	1.3	-6.85	12.65	201	36.96	13.5	1.4	48.8	428	-1.76	-2.5	-8.7	5.5
Fund size ($Mn)	629	280.3	164	80	320	201	129.06	100	51	170	428	351.33	227.5	111.35	450
Preceding fund IRR (%)	381	21.1	6.8	-4.4	25	102	42.52	26.18	10.9	47.65	279	13.27	0.7	-7.4	12.4
Preceding fund size ($Mn)	381	250	150	66	285	102	107.26	81	50	150	279	302.19	190.9	86	400

	Buyout Funds (Full Sample)					Buyout Funds (1991-1998)					Buyout Funds (1999-2006)				
	Obs	Mean	Median	Q1	Q3	Obs	Mean	Median	Q1	Q3	Obs	Mean	Median	Q1	Q3
# of LPs investing in fund	621	14	15	4	19	211	11	8	3	15	410	15	10	4	22
Vintage year	621	2000	2000	1997	2004	211	1996	1996	1994	1998	410	2002.65	2003	2000	2005
IRR (%)	621	14.79	12.7	4.1	24	211	14.8	12.5	3.1	22.7	410	14.79	12.7	4.2	24.9
Fund size ($Mn)	621	1130.2	500	250	1188.88	211	667.84	350	165	806.4	410	1368.15	658.78	300	1500
Preceding fund IRR (%)	370	19.51	18	9	27.4	104	25.38	22.55	12	34.3	266	17.21	15.45	7.9	25
Preceding fund size ($Mn)	370	939.89	400	196.71	1000	104	486.52	243	100	525.17	266	1,117.15	500	252	1419.08

Panel B. Dispersion of returns

	All Funds		Venture Funds		Buyout Funds	
	(1)	(2)	(3)	(4)	(5)	(6)
	1991-1998	1999-2006	1991-1998	1999-2006	1991-1998	1999-2006
Fund 1	47.33	20.58	65.31	15.38	18.03	22.63
Fund > 1	57.54	17.69	74.99	11.63	20.79	20.43
Overall	52.02	18.84	70.11	13.16	19.34	21.3

Table 4. The Relationship between GP Experience and Fund Returns

The table relates fund performance (IRR) to the experience of the GP, measured by the (log) sequence number of the fund. *Fund 1 dummy* equals one if the fund is a first fund raised by a private equity firm, zero otherwise. All other variables are defined in previous tables. Vintage year fixed effects are included in all specifications. Results are reported for all funds, as well as separately for venture and buyout funds. For specifications involving all funds, a fund type fixed effect is also included (not reported). Coefficient estimates and robust standard errors clustered by vintage year are reported. ***, **, and * indicate significance level at the 1%, 5%, and 10%, respectively.

Dependent variable: Fund IRR (%)

	All Funds (Full Sample)			All Funds (1991-1998)			All Funds (1999-2006)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log fund sequence	3.308**	4.452***		11.313***	11.311***		0.527	1.773**	
	(1.567)	(1.537)		(1.893)	(2.715)		(0.991)	(0.904)	
Log fund size		-1.535*	-1.105		0.004	0.820		-1.596***	-1.414***
		(0.796)	(0.822)		(2.284)	(2.460)		(0.510)	(0.503)
Fund 1 dummy			-4.144**			-7.654**			-1.912
			(1.667)			(3.855)			(1.252)
Fund type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,250	1,250	1,250	412	412	412	838	838	838
Adjusted R2	0.118	0.119	0.117	0.069	0.066	0.058	0.238	0.244	0.243

	Venture Funds (Full Sample)			Venture Funds (1991-1998)			Venture Funds (1999-2006)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log fund sequence	6.315**	6.554**		24.006***	22.329***		0.395	1.306	
	(3.204)	(3.225)		(5.192)	(8.648)		(1.137)	(1.121)	
Log fund size		-0.356	0.178		2.441	4.520		-1.369**	-1.185**
		(1.912)	(1.911)		(7.436)	(6.754)		(0.596)	(0.591)
Fund 1 dummy			-6.725**			-18.22***			-0.846
			(3.248)			(6.580)			(1.321)
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	629	629	629	201	201	201	428	428	428
Adjusted R2	0.199	0.198	0.196	0.050	0.046	0.036	0.035	0.043	0.041

	Buyout Funds (Full Sample)			Buyout Funds (1991-1998)			Buyout Funds (1999-2006)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log fund sequence	1.327	2.749**		2.919	3.926		0.759	2.315**	
	(1.286)	(1.112)		(3.424)	(3.353)		(1.299)	(0.953)	
Log fund size		-1.746***	-1.474**		-1.654***	-1.263**		-1.754*	-1.608
		(0.661)	(0.683)		(0.433)	(0.528)		(1.063)	(1.038)
Fund 1 dummy			-2.650			-1.077			-3.465*
			(1.814)			(3.799)			(1.942)
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	621	621	621	211	211	211	410	410	410
Adjusted R2	0.204	0.211	0.209	0.146	0.151	0.140	0.222	0.227	0.229

Table 5. Investment Performance by LP Type and Period

The table shows regression results of LPs' investment performance for the full sample period and two subsample periods from 1991-1998 and 199-2006. The dependent variable in all columns is fund IRR. Eight indicator variables are used to identify investments made by different LP types. Each indicator variable takes on the value of one for observations consisting of investments in funds by the corresponding investor type, and zero otherwise. *Public pension funds* is the omitted reference group in all regressions. *Log LP experience* is the log of the total number of LPs' investments prior to the current fund. *Log fund size* is the natural logarithm of the fund's size in millions of dollars. All specifications include vintage year fixed effects. Columns (2), (4), and (6) include LP country fixed effects. Panel A reports results for all funds, and includes a fund type (buyout or venture) fixed effect. Panels B and C report results separately for venture and buyout funds, respectively. *Endowments vs. non-endowments* reports separate regression results with just the endowment indicator variable and the control variables. All other non-endowment LPs serve as the reference group. Only the coefficient on the endowment indicator is reported. Coefficient estimates and standard errors clustered by fund are reported. ***, **, and * indicate significance level at the 1%, 5%, and 10%, respectively.

Dependent variable: Fund IRR(%)

Panel A: All funds

	Full sample		1991-1998		1999-2006	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowments	2.606**	3.017***	9.243***	10.823***	0.125	-0.010
	(1.122)	(1.149)	(2.863)	(3.123)	(0.653)	(0.661)
Corporate pension funds	-2.092*	-1.591	-3.228	-1.303	-0.807	-0.877
	(1.071)	(1.027)	(2.605)	(2.441)	(0.584)	(0.615)
Advisors	1.109	1.609	3.520	6.012*	0.589	0.245
	(0.899)	(0.998)	(2.800)	(3.482)	(0.721)	(0.670)
Insurance companies	-0.417	0.350	-1.574	1.679	0.474	0.063
	(1.043)	(1.008)	(2.762)	(2.935)	(0.819)	(0.746)
Banks/Finance companies	-1.634*	-0.789	-3.553	1.153	0.699	-0.065
	(0.913)	(0.779)	(2.370)	(2.434)	(0.747)	(0.610)
Investment firms	0.228	0.719	3.049	7.025**	0.791	0.011
	(0.717)	(0.874)	(2.449)	(3.510)	(0.545)	(0.556)
Others	-1.741	-0.425	-1.359	2.131	0.691	0.657
	(1.196)	(1.012)	(2.496)	(2.497)	(0.950)	(0.844)
Log LP experience		1.177***		3.437**		0.290
		(0.386)		(1.549)		(0.220)
Log fund size		-0.068		2.516		-0.207
		(0.694)		(1.743)		(0.646)
Fund type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
LP country fixed effects	No	Yes	No	Yes	No	Yes
Number of observations	14,380	14,084	3,685	3,609	10,695	10,475
Adjusted R2	0.157	0.160	0.154	0.159	0.350	0.361
Endowments vs. non-endowments	3.096***	3.053***	9.654***	8.954***	-0.337	0.012
	(1.119)	(1.070)	(2.875)	(2.722)	(0.561)	(0.535)

Panel B: Venture funds

	Full sample		1991-1998		1999-2006	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowments	7.179***	7.842***	25.675***	30.172***	0.200	0.311
	(1.831)	(1.936)	(5.902)	(6.706)	(0.795)	(0.778)
Corporate pension funds	-1.726	-0.689	-1.093	3.464	-1.49*	-1.269
	(1.985)	(1.904)	(6.182)	(5.660)	(0.808)	(0.836)
Advisors	2.560	3.968*	10.799	17.098**	-0.188	-0.204
	(1.884)	(2.251)	(7.809)	(8.557)	(0.799)	(0.790)
Insurance companies	-1.673	0.489	-4.018	2.761	-0.695	-0.192
	(1.890)	(1.929)	(6.304)	(6.029)	(0.901)	(0.896)
Banks/Finance companies	-1.199	1.315	-7.952	7.940	-0.193	-0.007
	(1.602)	(1.695)	(7.166)	(7.362)	(0.733)	(0.673)
Investment firms	2.266*	4.189**	10.404*	23.819***	-0.125	-0.199
	(1.275)	(1.747)	(5.632)	(7.907)	(0.628)	(0.631)
Others	0.598	3.203*	-2.024	11.844*	1.317	1.742
	(1.915)	(1.736)	(6.429)	(6.086)	(1.324)	(1.100)
Log LP experience		1.513**		9.477**		0.385
		(0.638)		(3.895)		(0.258)
Log fund size		2.552**		8.259		1.152*
		(1.162)		(5.044)		(0.687)
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
LP country fixed effects	No	Yes	No	Yes	No	Yes
Number of observations	5,713	5,606	1,335	1,312	4,378	4,294
Adjusted R2	0.302	0.308	0.089	0.113	0.055	0.106
Endowments vs. non-endowments	6.724***	6.125***	24.352***	21.637***	0.343	0.390
	(1.734)	(1.669)	(5.801)	(5.535)	(0.688)	(0.646)

Panel C: Buyout funds

	Full sample		1991-1998		1999-2006	
	(1)	(2)	(3)	(4)	(5)	(6)
Endowments	-0.232	-0.288	-1.060	-1.200	0.067	0.072
	(0.779)	(0.750)	(1.629)	(1.575)	(0.871)	(0.843)
Corporate pension funds	-1.535**	-1.613**	-3.130**	-3.210**	-0.765	-0.799
	(0.665)	(0.674)	(1.267)	(1.313)	(0.744)	(0.737)
Advisors	1.135	0.572	1.448	0.394	1.027	0.547
	(0.849)	(0.769)	(1.586)	(1.622)	(1.000)	(0.881)
Insurance companies	1.174	0.574	2.067	1.685	0.767	0.066
	(1.006)	(0.982)	(2.276)	(2.443)	(1.075)	(0.972)
Banks/Finance companies	-0.108	-0.550	-1.436	-1.132	0.372	-0.310
	(0.859)	(0.692)	(1.263)	(1.262)	(1.081)	(0.814)
Investment firms	0.637	-0.082	0.196	-1.162	0.789	0.307
	(0.598)	(0.614)	(1.107)	(1.328)	(0.705)	(0.681)
Others	0.058	-0.325	-0.761	-0.913	0.446	-0.204
	(1.106)	(1.036)	(1.910)	(1.998)	(1.350)	(1.124)
Log LP experience		-0.035		-0.204		0.031
		(0.250)		(0.590)		(0.267)
Log fund size		0.079		0.380		-0.031
		(0.669)		(1.122)		(0.803)
Vintage year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
LP country fixed effects	No	Yes	No	Yes	No	Yes
Number of observations	8,667	8,478	2,350	2,297	6,317	6,181
Adjusted R2	0.343	0.356	0.201	0.202	0.390	0.410
Endowments vs. non-endowments	-0.407	-0.089	-0.662	-0.500	-0.302	0.099
	(0.691)	(0.658)	(1.482)	(1.403)	(0.763)	(0.724)

Table 6. Returns on Reinvested and Abandoned Funds

The table reports the average returns and size of LPs' reinvested funds as well as abandoned funds. A fund is considered *Reinvested* if if the LP invests in the follow-on fund raised by the same private equity firm (if a follow-on fund is raised) and *Abandoned* if the LP does not invest in the follow-on. Column *(1) N* reports the number of reinvested/abandoned funds by LP type. Columns *(2) Current Fund IRR* and *(3) Follow-on Fund IRR* report the IRR of the current fund (the fund that LP has invested) and Follow-on Fund (which the LP either reinvests or abandons), respectively. Column *(4) Follow-on Fund Size* is the total committed capital (from all investors) in the follow-on fund. Panels A, B, and C show the average returns and size of the all fund, venture funds, and buyout funds that LPs reinvested/abandoned, respectively. *Diff* is the difference between reinvested funds and abandoned funds. T-tests are performed to determine whether the differences are significant. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: All funds

		Full Sample (1991-2006)				1991-1998				1999-2006			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Reinvestment Decision	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)
Endowments	Reinvested	1200	25.8	19.64	1226.22	466	42.35	37.78	643.2	734	16.58	8.12	1596.37
	Abandoned	402	17.76	9.35	1486.35	105	36.93	24.6	972.06	297	11.92	3.96	1668.17
	Diff		8.04***	10.29***	-260.13**		5.42	13.18*	-328.86**		4.66*	4.16***	-71.8
Public pension funds	Reinvested	1804	22.78	17.34	1882.15	667	32.7	24.46	999.6	1137	17.91	13.17	2399.89
	Abandoned	417	15.23	9.06	2115.4	107	26.83	20.12	686.25	310	11.99	5.25	2608.69
	Diff		7.55***	8.28***	-233.25		5.87*	4.34	313.35***		5.92***	7. 92***	-208.8
Corporate pension funds	Reinvested	591	26.07	15.76	1328.98	274	35.44	23.18	751.08	317	20.35	9.35	1828.49
	Abandoned	136	11.28	8	1316.48	50	25.48	14.55	1256.78	86	4.62	4.19	1351.19
	Diff		14.79***	7.76***	12.5		9.96*	8.63	-505.7**		15.73***	5.16***	477.3*
Advisors	Reinvested	442	27.5	18.93	1476.35	147	39.3	31.53	856.43	295	22.8	12.65	1785.26
	Abandoned	159	16.65	7.65	1955.75	48	27.06	12.45	1463.95	111	12.93	5.58	2168.42
	Diff		10.85***	11.28***	-479.4*		12.24**	19.08***	-607.52**		9.87**	7.07***	-383.16
Insurance companies	Reinvested	412	26.35	18.74	1030.41	167	35.26	25.4	567.02	245	21.72	14.2	1346.27
	Abandoned	134	19.32	8.3	1498.49	45	31.25	11.7	980.1	89	14.79	6.58	1760.6
	Diff		7.03**	10.44***	-468.08**		4.01	13.7***	-413.08**		6.93*	7.62***	-414.33
Banks/finance companies	Reinvested	1011	23.53	15.48	1179.69	338	32.93	21.7	728.15	673	19.73	12.36	1406.46
	Abandoned	423	18.12	8.67	1251.06	145	26.82	13.72	1161.57	278	14.51	6.04	1297.73
	Diff		5.41**	6.81***	-71.37		6.11	7.98**	-433.42***		5.22*	6.32***	108.73
Investment firms	Reinvested	1560	22.57	16	1373.58	446	38.83	30.17	721.37	1114	17.33	10.33	1634.7
	Abandoned	556	18.77	8.15	1408.57	115	38.57	23.18	797.47	441	14.81	4.23	1567.93
	Diff		3.8*	7.85***	-34.99		0.26	6.99	-76.1		2.52	6.1***	66.77
Others	Reinvested	341	23.13	13.6	1433.48	125	30.71	19.11	873.96	216	19.25	10.41	1757.28
	Abandoned	316	20.76	13.16	1183.64	192	32.27	19.54	874.77	124	9.15	3.28	1661.89
	Diff		2.37	0.44	249.84		-1.56	-0.43	-0.81		10.1***	7.13***	95.39
Overall	Reinvested	7361	24.1	17.05	1433.72	2630	36.3	27.5	787.05	4731	18.51	11.24	1793.22
	Abandoned	2543	17.58	9.17	1516.65	807	31.26	18.58	967.54	1736	12.64	4.79	1771.91
	Diff		6.52***	7.88***	-82.93		5.04***	8.92***	-180.49***		5.87***	6.45***	21.31

Panel B: Venture capital funds

		Full Sample (1991-2006)				1991-1998				1998-2006			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Reinvestment Decision	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)
Endowments	Reinvested	532	32.64	24.55	464.75	220	57.09	62.62	254.57	312	16.15	-2.3	612.96
	Abandoned	223	21.05	8.54	626.92	37	60.56	59.16	191.72	186	14.08	-1.52	713.49
	Diff		11.59***	16.01***	-162.17***		-3.47***	3.46***	62.85***		2.07***	-0.78***	-100.53
Public pension funds	Reinvested	550	28.04	17.13	494.68	218	44.3	43.84	230.39	332	18.62	-0.4	668.23
	Abandoned	169	15.94	8.06	606.49	38	37.65	39.91	135.67	131	10.38	-1.17	743.07
	Diff		12.1***	9.07***	-111.81**		6.65***	3.930***	94.72**		8.24***	0.77***	-74.84
Corporate pension funds	Reinvested	238	33.15	17.25	462.15	106	48.95	42.27	222.79	132	23.04	-2.84	654.36
	Abandoned	62	10.62	6.68	554.2	13	52.23	38.62	196.38	49	3.38	-1.8	649.13
	Diff		22.53***	10.57**	-92.05		-3.28***	3.65***	26.41**		19.66***	-1.04***	5.23
Advisors	Reinvested	152	38.24	22.4	475.73	54	55.19	60.14	203.9	98	29.54	1.6	625.52
	Abandoned	62	14.49	-0.15	565.05	10	23.38	16.49	114.64	52	13.68	-3.34	651.67
	Diff		23.75**	22.55***	-89.32		31.81***	43.65***	89.26**		15.86***	4.94***	-26.15
Insurance companies	Reinvested	150	28.17	17.29	345.62	68	35.41	38.7	191.71	82	22.91	-0.47	473.24
	Abandoned	46	23.62	-0.03	470.81	11	70.06	6.77	275.95	35	15.88	-2.17	532.05
	Diff		4.55	17.32***	-125.19*		-34.65	31.93***	-84.24**		7.03	1.7***	-58.81
Banks/finance companies	Reinvested	341	27.32	11.65	357.02	102	42.2	38.96	172.3	239	21.49	-0.01	435.86
	Abandoned	175	17.74	3.22	537.59	36	47.73	25.4	160.38	139	12.83	-2.52	635.29
	Diff		9.58*	8.43***	-180.57***		-5.53**	13.56***	11.92***		8.66**	2.51***	-199.43
Investment firms	Reinvested	676	24.94	13.51	474.45	181	53.47	51.18	183.79	495	16.47	-0.27	580.73
	Abandoned	300	16.99	4.72	570.72	44	58.89	44.98	145.22	256	12.21	-2.2	643.85
	Diff		7.95**	8.79***	-96.27***		-5.42**	6.2***	38.57		4.26**	1.93***	-63.12
Others	Reinvested	147	25.07	11.08	337.52	48	35.51	30.9	177.05	99	20.08	1.47	415.32
	Abandoned	142	21.57	14.3	460.21	70	42.69	30.19	168.95	72	9.77	-1.14	743.37
	Diff		3.5	-3.22	-122.69**		-7.18	0.71	8.1		10.31*	2.61	-328.05
Overall	Reinvested	2786	29.04	16.99	447.08	997	48.81	48.56	213.87	1789	19.12	-0.61	577.04
	Abandoned	1179	18.04	6.52	563.19	259	49.11	36.5	165.92	920	11.93	-1.92	675.02
	Diff		11***	10.47***	-116.11***		-0.3	12.06***	47.95***		7.19***	1.31***	-97.98***

Panel C: Buyout funds

		Full Sample (1991-2006)				1991-1998				1998-2006			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Reinvestment Decision	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)	N	Current Fund IRR (%)	Follow-on Fund IRR (%)	Follow-on Fund Size ($Mn)
Endowments	Reinvested	668	20.2	15.73	1832.66	246	27.18	15.57	990.76	422	16.89	15.82	2323.44
	Abandoned	179	13.64	10.36	2557.05	68	23.81	5.8	1396.66	111	8.45	13.16	3267.91
	Diff		6.56***	5.37***	-724.39***		3.37***	9.77***	-405.9***		8.44***	2.66***	-944.47**
Public pension funds	Reinvested	1254	20.38	17.43	2490.69	449	26.5	15.05	1373.07	805	17.61	18.77	3114.06
	Abandoned	248	14.72	9.74	3143.65	69	19.93	9.22	989.46	179	13.18	9.94	3974.04
	Diff		5.66***	7.69***	-652.96***		6.57***	5.83***	383.61**		4.43***	8.83***	-859.98**
Corporate pension funds	Reinvested	353	20.79	14.76	1913.42	168	24.84	11.14	1084.41	185	18.41	18.05	2666.25
	Abandoned	74	11.83	9.11	1955.15	37	18.35	6.09	1629.36	37	6.25	12.12	2280.94
	Diff		8.96***	5.65**	-41.73		6.49***	5.05***	-544.95		12.16***	5.93***	385.31
Advisors	Reinvested	290	21.45	17.11	2000.81	93	27.37	14.91	1235.31	197	19.43	18.15	2362.18
	Abandoned	97	17.93	12.63	2844.65	38	27.55	11.38	1819.03	59	12.27	13.44	3505.22
	Diff		3.52	4.48**	-843.84**		-0.18***	3.53***	-583.72***		7.16**	4.71***	-1143.04**
Insurance companies	Reinvested	262	25.26	19.57	1422.47	99	35.13	16.26	824.8	163	21.13	21.57	1785.47
	Abandoned	88	17.28	12.65	2035.69	34	23.49	13.3	1207.91	54	14.12	12.25	2556.88
	Diff		7.98***	6.92***	-613.22*		11.64***	2.96***	-383.11**		7.01***	9.32***	-771.41**
Banks/finance companies	Reinvested	670	21.58	17.43	1598.39	236	28.33	14.23	968.4	434	18.81	19.17	1940.97
	Abandoned	248	18.38	12.51	1754.51	109	21.72	9.86	1492.24	139	16.17	14.59	1960.18
	Diff		3.2**	4.92***	-156.12		6.61**	4.37***	-523.84**		2.64***	4.58***	-19.21
Investment firms	Reinvested	884	20.76	17.91	2061.15	265	28.75	15.82	1088.55	619	18.02	18.8	2477.53
	Abandoned	256	20.94	12.17	2390.43	71	28.19	9.67	1201.68	185	18.58	13.13	2846.66
	Diff		-0.18	5.74***	-329.28		0.56	6.15***	-113.13		-0.56	5.67***	-369.13
Others	Reinvested	194	21.81	15.51	2263.94	77	27.69	11.76	1308.4	117	18.66	17.97	2892.79
	Abandoned	174	20.09	12.22	1774.03	122	27.32	13.43	1279.75	52	8.29	9.39	2933.67
	Diff		1.72	3.29**	489.91*		0.37	-1.67	28.65**		10.37**	8.58***	-40.88
Overall	Reinvested	4575	21.01	17.09	2034.55	1633	27.63	14.64	1136.99	2942	18.15	18.45	2532.76
	Abandoned	1364	17.19	11.46	2340.79	548	24.04	10.11	1346.4	816	13.44	12.36	3008.59
	Diff		3.82***	5.63***	-306.24***	1085	3.59***	4.53***	-209.41***	2126	4.71***	6.09***	-475.83***

Table 7. Probability of Investing in a First-time Fund

Probit models for the probability of an LP type investing in the first fund raised by a private equity firm for all funds, venture capital funds, and buyout funds. The dependent variable equals one if the investment is a first fund raised by a private equity firm, and zero otherwise. Eight indicator variables are again used to identify LP type. All variables are defined in previous tables. Marginal effects and robust standard errors clustered by fund are reported. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	All Funds			Venture Funds			Buyout Funds		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006
Endowments	-0.080***	-0.129***	-0.062***	-0.068***	-0.146***	-0.044	-0.086***	-0.099*	-0.074***
	(0.016)	(0.037)	(0.016)	(0.025)	(0.050)	(0.029)	(0.019)	(0.051)	(0.018)
Corporate pension funds	-0.033**	0.040	-0.062***	-0.055**	0.016	-0.089***	-0.021	0.038	-0.043***
	(0.014)	(0.034)	(0.014)	(0.022)	(0.053)	(0.022)	(0.019)	(0.045)	(0.016)
Advisors	-0.014	-0.008	-0.017	-0.001	-0.014	-0.000	-0.020	0.013	-0.025
	(0.015)	(0.040)	(0.014)	(0.027)	(0.064)	(0.028)	(0.018)	(0.053)	(0.016)
Insurance companies	-0.003	0.062	-0.023	-0.034	-0.039	-0.033	0.017	0.116**	-0.014
	(0.020)	(0.046)	(0.019)	(0.030)	(0.073)	(0.031)	(0.026)	(0.056)	(0.024)
Banks/Finance companies	0.023	0.055	0.009	0.029	0.039	0.023	0.018	0.049	0.004
	(0.017)	(0.037)	(0.017)	(0.027)	(0.064)	(0.028)	(0.022)	(0.048)	(0.021)
Investment firms	0.009	0.023	-0.001	0.004	-0.002	0.002	0.013	0.033	0.002
	(0.015)	(0.034)	(0.015)	(0.022)	(0.053)	(0.024)	(0.019)	(0.045)	(0.018)
Others	-0.072***	-0.061	-0.078***	-0.073***	-0.035	-0.082***	-0.080***	-0.082*	-0.076***
	(0.015)	(0.039)	(0.013)	(0.025)	(0.073)	(0.023)	(0.018)	(0.046)	(0.017)
Log LP experience	-0.057***	-0.093***	-0.045***	-0.055***	-0.093***	-0.046***	-0.058***	-0.097***	-0.043***
	(0.005)	(0.015)	(0.005)	(0.009)	(0.024)	(0.009)	(0.007)	(0.019)	(0.006)
Fund type dummies	Yes	Yes	Yes	-	-	-	-	-	-
Vintage year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LP country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	14,084	3,609	10,475	5,677	1,364	4,333	8,407	2,245	6,142
Pseudo R2	0.138	0.120	0.098	0.119	0.120	0.096	0.178	0.172	0.112
Endowments vs. non-endowments	-0.076***	-0.143***	-0.052***	-0.060***	-0.146***	-0.033	-0.083***	-0.116***	-0.067***
	(0.013)	(0.031)	(0.014)	(0.021)	(0.043)	(0.025)	(0.016)	(0.042)	(0.016)

Table 8. Returns on LPs' Investments in First-Time Funds and Higher Sequence Funds

The table shows how LPs' returns vary with fund sequence. Column *Fund 1* indicates investments in the first fund raised by a PE firm. Column *Fund Sequence > 1* represents investments in funds that are not the first ones raised by a PE firm. All results are clustered by fund. Coefficient estimates and robust standard errors are reported. The dependent variable is the fund IRR. All variables are defined in previous tables. ***, **, and * indicate significance level at the 1%, 5%, and 10%, respectively.

	Full Sample				1991-1998				1991-1998			
	Fund 1		Fund Sequence > 1		Fund 1		Fund Sequence > 1		Fund 1		Fund Sequence > 1	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Endowments	2.261	1.809	2.333*	2.651**	4.491	3.867	10.092***	9.749***	1.524	0.946	-0.388	-0.296
	(2.200)	(2.069)	(1.193)	(1.189)	(3.770)	(3.385)	(3.500)	(2.877)	(1.773)	(1.724)	(0.719)	(0.682)
Corporate pension funds	-0.820	-0.737	-2.210**	-1.708	-0.466	1.354	-5.448	-1.580	-2.522	-4.099**	-0.763	-0.667
	(2.902)	(2.864)	(1.117)	(1.067)	(4.362)	(3.972)	(3.434)	(2.306)	(1.746)	(1.849)	(0.630)	(0.613)
Advisors	0.849	1.106	1.313	1.889*	-0.593	1.910	6.268	6.677*	2.344	0.101	0.357	0.441
	(1.837)	(2.156)	(1.012)	(1.117)	(3.696)	(3.886)	(3.868)	(3.474)	(1.717)	(1.688)	(0.808)	(0.700)
Insurance companies	0.999	0.525	-0.589	0.118	1.530	3.521	-5.042	-0.155	1.065	-2.750	0.386	0.357
	(2.444)	(2.434)	(1.144)	(1.105)	(4.304)	(3.849)	(3.523)	(2.878)	(2.397)	(2.203)	(0.839)	(0.757)
Banks/Finance companies	0.219	-0.401	-1.986**	-1.080	-0.823	2.323	-6.191**	-2.267	1.992	-1.471	0.043	0.163
	(1.894)	(1.988)	(0.938)	(0.747)	(3.425)	(3.483)	(2.877)	(1.718)	(2.007)	(1.685)	(0.751)	(0.625)
Investment firms	1.905	2.077	-0.049	0.435	1.688	4.217	4.252	4.078	3.161**	0.576	0.102	0.094
	(1.784)	(2.226)	(0.728)	(0.829)	(4.001)	(4.411)	(2.864)	(2.866)	(1.551)	(1.565)	(0.565)	(0.508)
Others	0.929	0.702	-2.144*	-0.576	1.427	1.920	-2.712	2.147	3.290	-1.601	0.402	0.902
	(2.900)	(2.542)	(1.283)	(1.085)	(4.208)	(3.589)	(3.187)	(2.329)	(2.751)	(1.895)	(0.997)	(0.886)
Log fund size		-1.369		-0.591		-1.002		0.864		-0.441		-0.679
		(1.177)		(0.924)		(1.812)		(2.130)		(1.271)		(0.851)
Log LP experience		0.916		1.090***		2.686		2.550*		-0.560		0.494**
		(0.808)		(0.415)		(2.083)		(1.320)		(0.431)		(0.217)
Fund sequence				0.521				1.542				0.204
				(0.337)				(0.969)				(0.285)
Fund type fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vintage year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LP country fixed effect	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Number of observations	3,344	3,283	11,036	10,801	1,442	1,414	2,243	2,195	1,902	1,869	8,793	8,606
Adjusted R2	0.076	0.094	0.210	0.213	0.042	0.079	0.224	0.221	0.248	0.316	0.387	0.397
Endowments vs. non-endowments	1.587	1.414	2.966***	2.945***	4.164	2.436	10.988***	11.406***	-0.322	1.708	-0.438	-0.339
	(2.435)	(2.006)	(1.145)	(1.106)	(4.487)	(3.615)	(3.319)	(3.210)	(1.244)	(1.198)	(0.606)	(0.563)

Table 9. The Probability of LPs Investing in a Fund with Negative Abnormal Growth

The table shows the probability of an LP type investing in a fund that did not grow as much as expected given its past return (negative abnormal growth). Two-stage regressions are used to predict this probability. Stage one predicts abnormal growth by estimating the following model with vintage year fixed effects. The residual term is the abnormal growth measure. Therefore, a negative residual indicates that the fund did not grow as much as predicted given the preceding fund return. Coefficient estimates and robust standard errors are reported in Panel A.

$$Ln\left(\frac{Follow-on\ fund\ size}{Preceding\ fund\ size}+1\right)=\alpha+\beta\times Preceding\ fund\ IRR+Vintage\ FEs+\ \varepsilon \quad (1)$$

In stage two, Probit models are used to predict the probability of an LP type investing in a fund with negative abnormal growth. The dependent variable equals one if the residual term from the stage one regression is negative, and zero otherwise. *Preceding fund investment* is an indicator variable that equals one if the LP invested in the preceding fund, and zero otherwise. All other variables are defined in previous tables. Marginal effects and robust standard errors clustered by fund are reported. ***, **, and * indicate significance level at the 1%, 5%, and 10%, respectively.

Dependent variable: Indicator variable for whether the investment is in a fund with negative abnormal growth

	All Funds			Venture Funds			Buyout Funds		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006
Endowments	0.050*	0.132***	0.024	0.060*	0.164***	0.019	0.009	0.080	-0.014
	(0.027)	(0.044)	(0.033)	(0.034)	(0.043)	(0.043)	(0.039)	(0.061)	(0.047)
Corporate pension funds	-0.013	0.041	-0.032	0.022	0.065	0.007	0.015	0.118**	-0.027
	(0.023)	(0.045)	(0.026)	(0.035)	(0.049)	(0.042)	(0.027)	(0.052)	(0.030)
Advisors	-0.035*	0.006	-0.046*	-0.049	0.047	-0.066	-0.063**	-0.077*	-0.064**
	(0.021)	(0.048)	(0.024)	(0.039)	(0.062)	(0.045)	(0.025)	(0.045)	(0.029)
Insurance companies	-0.084***	-0.087	-0.080**	-0.084*	-0.041	-0.102*	-0.101***	-0.106**	-0.100**
	(0.028)	(0.054)	(0.034)	(0.048)	(0.073)	(0.059)	(0.034)	(0.049)	(0.041)
Banks/Finance companies	-0.055**	-0.061	-0.056**	-0.032	0.016	-0.031	-0.097***	-0.042	-0.113***
	(0.022)	(0.042)	(0.025)	(0.033)	(0.051)	(0.037)	(0.025)	(0.043)	(0.028)
Investment firms	-0.028	0.028	-0.038*	-0.027	0.039	-0.036	-0.051**	-0.008	-0.062**
	(0.018)	(0.037)	(0.021)	(0.029)	(0.046)	(0.033)	(0.022)	(0.043)	(0.025)
Others	0.016	0.032	0.016	-0.022	0.064	-0.041	0.001	0.008	0.017
	(0.030)	(0.049)	(0.036)	(0.047)	(0.059)	(0.059)	(0.035)	(0.052)	(0.042)
Log fund size	-0.111***	-0.033	-0.127***	-0.143***	0.016	-0.178***	-0.118***	-0.071	-0.128***
	(0.026)	(0.056)	(0.030)	(0.044)	(0.071)	(0.050)	(0.030)	(0.054)	(0.035)
Log LP experience	0.001***	0.006**	0.001***	0.001	0.006	0.001	0.001*	0.003	0.001
	(0.000)	(0.003)	(0.000)	(0.001)	(0.005)	(0.001)	(0.000)	(0.003)	(0.000)
Preceding fund investment	0.119***	0.046	0.145***	0.111***	0.088*	0.121***	0.108***	0.031	0.136***
	(0.021)	(0.039)	(0.025)	(0.033)	(0.046)	(0.040)	(0.028)	(0.049)	(0.032)
Fund type fixed effect	Yes	Yes	Yes	-	-	-	-	-	-
Vintage year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LP country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	10,823	2,326	8,497	4,322	906	3,434	6,501	1,420	5,063
Pseudo R2	0.081	0.041	0.100	0.133	0.149	0.134	0.102	0.042	0.103
Endowments vs. non-endowments	0.064**	0.145***	0.037	0.080***	0.139***	0.050	0.049	0.085	0.037
	(0.025)	(0.045)	(0.030)	(0.030)	(0.040)	(0.037)	(0.036)	(0.062)	(0.042)

Table 10. Returns of Funds with Negative Abnormal Growth

The table relates fund returns to the extent of abnormal growth in fund size from the partnership's prior fund The dependent variable in all columns is fund IRR (in percent). The estimation of abnormal growth is defined in Table 9. Panel A reports results using abnormal growth (the residuals from equation (1) in Table 9) as the independent variable. Panel B reports results using an indicator variable for negative abnormal growth as the independent variable. *Negative abnormal growth indicator* equals one if the residual from equation (1) in Table 8 is negative, and zero otherwise. All other variables are defined in previous tables. Coefficient estimates and robust standard errors clustered by vintage year are reported. ***, **, and * indicate significance level at the 1%, 5%, and 10%, respectively.

Panel A: Dependent variable: Fund IRR(%)

	All Funds			Venture Funds			Buyout Funds		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006
Abnormal fund growth	-9.571***	-28.028***	-3.800**	-3.239	-27.478**	-0.355	0.803	0.213	-0.851
	(3.418)	(6.094)	(1.817)	(2.182)	(11.487)	(0.677)	(1.117)	(1.458)	(0.560)
Intercept	34.725***	34.725***	-0.337***	32.163***	32.163***	-8.121***	39.850***	39.744***	9.382***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.729)	(0.000)
Vintage year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	751	206	545	381	102	279	370	104	266
Adjusted R2	0.160	0.048	0.138	0.250	0.176	0.059	0.247	0.260	0.284

Panel B: Dependent variable: Fund IRR (%)

	All Funds			Venture Funds			Buyout Funds		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006	Full Sample	1991-1998	1999-2006
Negative abnormal growth indicator	7.154***	20.851***	1.884	10.537**	43.843***	0.657	0.213	-3.928	2.227
	(2.755)	(2.729)	(1.553)	(4.947)	(16.444)	(1.382)	(1.985)	(4.012)	(2.249)
Intercept	31.148***	24.299***	-1.166*	24.260***	10.241	-8.059***	39.744***	41.814***	9.243***
	(1.377)	(1.365)	(0.683)	(3.710)	(15.463)	(1.788)	(10.874)	(9.742)	(2.614)
Vintage year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	751	206	545	381	102	279	370	104	266
Adjusted R2	0.155	0.037	0.131	0.252	0.064	0.072	0.260	0.189	0.288