

Investing in Private Equity Funds: A Survey

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This literature review covers the issues faced by private equity fund investors. It explores what has currently been established in the literature and what has yet to be investigated. In particular, it reveals the many important questions to be answered by future research. This literature survey shows that the average investor has obtained poor returns from investments in private equity funds, potentially because of excessive fees. Overall, investors need to gain familiarity with actual risk, past return, and specific features of private equity funds. Increased familiarity will improve the sustainability of this industry that plays such a central role in the economy.

Private equity funds, dubbed “capitalism’s new kings” by *The Economist*,¹ are investment vehicles that make two main types of investments: leveraged buyout (BO) and venture capital (VC).² Even though these two types of investment are quite different and funds focus on either one of them, venture capital funds and leveraged buyout funds are typically studied together. The reason is that private equity firms often invest in both BO and VC, typically via different funds but with overlapping management teams. BO funds and VC funds also share the same organizational structure (same fee structure, illiquidity characteristics, etc.). In addition, a unique feature of private equity firms is that they play a management role in their portfolio companies.

The vast majority of private equity funds are organized as limited partnerships and have a finite life (10 years extensible to 14 years). Their investors are principally institutional investors, such as endowments, pension funds, insurance companies, and banks. These investors, called limited partners (LPs), commit a certain amount of capital to private equity funds, which are run by general partners (GPs). In general, when a GP identifies an investment opportunity (portfolio company), it “calls” money from its LPs up to the amount committed (undiscounted), and it can do so at any point in time until the liquidation of the fund. Such calls are called “drawdowns” or “takedowns.” When an investment is liquidated, the GP distributes the proceeds to its LPs either in kind or in cash. The timing of these cash flows is typically unknown *ex ante*. Compensation from LPs to GPs consists of (1) a management fee and (2) a fraction of profits, called “carried interest.” Both components are defined differently across funds and can be quite difficult to compute.

This industry is now considered an important asset class with over \$1 trillion under management, two-thirds of which are managed by BO funds. Because BO funds use high leverage ratios, their economic impact is even greater than these figures suggest. Furthermore, fundraising is growing fast—from \$5 billion in 1980 to \$400 billion in 2006.³

At first, venture capital studies were part of a fairly independent subfield of management science called entrepreneurial finance. In the late 1980s, following the birth and rapid growth of leveraged buyouts, several “finance” studies focused on BOs. The debate was mainly centered on the question of whether BOs were a

¹27 November 2004.

²Note that real estate and entrepreneurial investments in nonpublic companies are sometimes referred to as private equity. This review is focused on private equity funds, which do mainly VC and BO.

³Also, funds are getting bigger: The Blackstone Group recently raised a \$15.6 billion fund, TPG raised \$15 billion, and Permira raised €11 billion. Recently, a large publicly listed LP vehicle was also raised (KKR PEI on Euronext, \$5 billion).

long-awaited corporate governance action or simply shareholders stealing from existing stakeholders (in particular, bondholders). A few years later, the research coverage of BOs virtually disappeared.

In the 1990s, because venture capital was developing fast, financial economists noticed that entrepreneurial situations were characterized by the same two problems that are the basis for much of corporate finance theory—agency problems and information asymmetries—and that these problems were stronger there and somehow easier to isolate. The relationship between GPs and portfolio companies then offered a perfect laboratory to test predictions of several important theories. A representative work in this area is that of Kaplan and Stromberg (2003), who compared characteristics of venture capital financial contracts with their counterparts in financial contracting theory.⁴

Research thus focused on the relationship between GPs and financed companies while neglecting the LP–GP relationship. One of the contributors to this neglect is the lack of data, but this lack does not explain it all. Since the turn of the century, however, private equity research seems to have turned to the LP side, which is the focus of this review and contains, in my opinion, many interesting questions yet to be answered—with or without data.

Measuring Performance

Once we focus on the LP–GP relationship, the first question on the table is probably that of performance net of all fees. Estimating the performance of private equity funds is important in itself for several direct applications (e.g., portfolio benchmarking), but this question also fits in a large literature on the performance of professional asset managers. Financial economists are interested in private equity performance to gauge both market efficiency and investor sophistication. In this section, I review evidence on the performance obtained by investors as well as the performance obtained by the funds on their investments (gross of fees).

Performance of LPs. The seminal study of Kaplan and Schoar (2005) reported that the performance of the 746 private equity funds in their sample is close to that of the S&P 500 Index, net of fees. Such a figure appears low because both VCs and BOs are expected to have risk properties and liquidity (level) properties that are less attractive than that of the S&P 500. This finding is a first indication that performance is low.

In addition, Phalippou and Gottschalg (2006; hereafter, PG) found that Kaplan and Schoar’s (2005) performance findings are still optimistic. They showed that the selected funds in the Kaplan and Schoar sample are likely better performers than nonselected funds, which makes this average performance superior to the actual average performance of the industry.

The problem is that one cannot measure the performance of nonselected funds—they are not present in the performance dataset of Thomson Venture Economics (TVE), the main data provider. The solution proposed by PG was to use a fraction of a fund’s successful exits as a proxy for performance because this proxy is available for both selected funds and a subset of nonselected funds. The key to this “sample bias correction” is to have a link between the two datasets.

PG also noted that a number of the selected funds report high values for their nonexited investments. These so-called “residual values” are audited accounting figures reported by GPs to LPs on a quarterly basis to value ongoing investments. PG pointed out that the majority of funds reporting residual values, in addition to being beyond their age limit (10 years), are funds that did not show any signs of activity for more than 3 years. These funds have not changed their residual values since the market hype of 2000 and have not distributed any cash, invested anything, nor have they received any fees since at least 2000. In addition, these funds have particularly low performance. PG took that as a strong indication that these residual values reflect so-called “living deads”—worthless investments kept in the accounting books. If the residual values are written off, then

⁴The amount of work in this area is tremendous and is nicely summarized in a survey by Denis (2004).

the performance of private equity funds decreases further. After such adjustments, PG calculated that on average, private equity funds underperform the S&P 500 by more than 3 percent a year.⁵

Despite these adjustments, PG pointed out that their estimate is still optimistic, because additional costs incurred by investors are not deducted because of data access constraints. Certain investors hire funds of funds when investing in private equity and thus pay supplementary fees. In addition, investors face transaction costs when “cashing” stock distributions made by funds.

Interestingly, in order to assess the added value of private equity fund managers, PG calculated the performance gross of fees and found it to be substantial. Assuming a conservative fee structure of 2 percent of committed capital throughout a fund’s life plus a 20 percent carried interest (8 percent hurdle rate and with full catch-up provision), they found an average gross-of-fees alpha of about 4 percent a year.⁶ This typical 2–20 fee structure, which seems innocuous at first sight, results in very high fees in practice—7 percent a year. David Swensen (2000), a large private equity investor, estimated even higher fees—about 12 percent a year.

The finding of high gross-of-fees performance shows that GPs might add value (the final conclusion depends on how much risk they take) and that the typical fee structure has a large impact on performance. These results also indicate that the total rent (i.e., fees) captured by private equity funds is probably excessive and is probably behind the counterintuitive result of low net-of-fees performance.

Kaplan and Schoar (2005) and PG focused on the cash-flow stream from (to) the private equity funds to (from) LPs, which includes fee payments and carried interest and contains both buyout investments and venture capital investments. They thus measured the net performance obtained by LPs that invest in private equity funds. A related area of study is the performance of VC and BO investments gross of fees.

VC Returns Gross of Fees. The most comprehensive studies of the performance of individual venture capital investments are those by Hwang, Quigley, and Woodward (2005) and Cochrane (2005). Cochrane found that log returns of venture capital investments have negative alphas but that arithmetic returns (and alphas) are high. One of the data issues faced by Cochrane was that some financing rounds were missing in his data, which automatically decreased the perceived amount invested in a company and increased performance; this problem was acknowledged by the author and tackled econometrically in a maximum likelihood framework. In addition, Cochrane’s dataset was a subset of that used by Hwang et al.⁷ With their dataset, Hwang et al. found that average performance is substantially lower than that reported by Cochrane, with gross-of-fees performance slightly above that of the S&P 500, which is consistent with the finding of low net-of-fees performance.

BO Returns Gross of Fees. Buyout investments are much larger than venture capital investments. Their overall economic importance is also much greater than that of venture capital. Yet, their performance has received virtually no attention—probably because of data limitations, because the main providers of private equity data tend to specialize in venture capital. The main data source for BO performance is the track records of BO funds, reported

⁵In contrast to PG, Ljungqvist and Richardson (2003a) found high performance for private equity funds. Such a discrepancy may be traced to two facts. First, the sample used by Ljungqvist and Richardson has a disproportionate number of buyout funds, and over the time period they studied, buyout funds performed better than venture capital funds. Their sample funds were also larger, more U.S. focused, and more experienced, which all have been found to be positively related to performance. Second, they report that the LP who supplied their data is a major investor in private equity. It is thus the type of LP that reports to TVE, and PG showed that funds in which such LPs invest tend to perform better. Results in Lerner, Schoar, and Wong (forthcoming) also indicate that performance can vary dramatically across types of LPs. For example, endowments have an average internal rate of return (IRR) above 20 percent, whereas banks have an average IRR of 0 percent. Hence, average performance of one LP might greatly differ from average performance of all funds.

⁶Nowadays, fees are lower for many funds. PG’s sample contained funds raised between 1980 and 1993, and at the time, fees were higher for most funds than assumed in PG’s analysis.

⁷In their article, Hwang et al. (2005) said that they constructed the Sand Hill Index by substantially complementing the VentureOne Corporation dataset used by Cochrane (2005). In a private conversation, they reported that this mainly consisted of finding missing financing rounds. This correction affects performance substantially. From 1989 to 2005, this index outperformed the U.S. stock market by 3.8 percent a year. This figure is close to what PG reported as the gross-of-fees performance.

in private placement offering memoranda (PPMs) that are sent to LPs to raise money for new funds.⁸ This group of transactions obviously contains extraordinary survivorship bias because only buyout groups meeting reasonable degrees of success package their history into documents designed to solicit institutional backing, which causes the sample to contain an overwhelming amount of successful investments compared with the universe. In addition, another source of bias stems from consideration of only completed transactions, because more-successful deals exit via an IPO or an M&A whereas less-successful ones might stay in buyout portfolios for years.⁹

Swensen (2000) examined data on 542 buyout deals initiated and concluded between 1987 and 1998. His data source was the PPMs received by Yale Investments Office. He reported a “pooled” rate of return of 48 percent a year and noted that over the same period, making similarly sized and similarly timed investments in the S&P 500 produced a 17 percent annual return. Swensen had access to the leverage amount used in these deals, and he applied the same leverage to the S&P 500 as was used for the BOs and observed that the newly levered S&P 500 would have generated an 86 percent return, beating BO performance by nearly 40 percent a year! Swensen further pointed out that adjusting for fees worsened the relationship between returns for leveraged marketable securities and private equities. His “back-of-the-envelope” calculations estimated total fees to be as high as 12 percent a year, reducing net returns to investors to approximately 36 percent. Swensen also pointed out that he was able to select the better-performing funds because Yale participated in 118 of these 542 transactions and generated gross returns of 63 percent; the levered-equivalent benchmark was 41 percent and paid an estimated 15 percent a year in fees.

Oliver Gottschalg and I have also collected a large number of such PPMs. In total, we have performance details for 5,708 buyout investments. If I select a sample similar to Swensen’s (fully liquidated deals raised between 1987 and 1998 that lasted for at least 6 months), I count 2,342 funds. Average return is 52 percent, which is close to that found by Swensen (I value-weight each investment IRR [internal rate of return] by capital invested in U.S. dollars). However, if I simply duration-value-weight each investment,¹⁰ the average goes down to 30 percent! This finding is before fees and before accounting for leverage as done in Swensen. The conclusion is clear: Even on a sample that is clearly biased toward winners, if the average performance is properly aggregated and the sample sufficiently large, then average performance is low!

Further Research on Performance. Determining the relative performance of private equity funds gross of fees and net of fees is important. The answers reviewed above converge to low relative performance after fees and high relative performance before fees. The estimates are, however, expected to vary over time as more money and more funds were raised between 1994 and 2000 than between 1980 and 1993 (the latter being PG’s sample). PG, however, indicated that these new funds have performance similar to that of the old funds at the same stages, but one needs to wait until fund liquidation to conclude definitively. It will also be interesting to see if there is any upward trend in performance because the industry is young and might be learning. Finally, a number of fees and transaction costs were not accounted for in PG’s study, and it would be interesting to know their magnitude.

Risk

The estimates of performance are an important first step in locating the relative performance of private equity funds, pointing out the key choices in evaluating overall performance, and assessing the magnitude of the sample selection bias. These estimates have, however, important limitations for practical applications because neither IRR nor PI can be used as an input for expected returns in a portfolio allocation exercise. In addition, without a measure of risk, a performance figure is always difficult to interpret. We now turn to the core question of how to measure the risk faced by private equity fund investors. Currently, the literature offers estimates of the risk of publicly traded vehicles whose business relates to private equity (e.g., Bilo, Christophers, Degosciu, and Zimmermann

⁸PPMs are the prospectuses sent by private equity firms for fundraising. They contain the track records of previously raised funds and the contract details.

⁹PG found that for private equity funds there is indeed a strong negative correlation between investment duration and performance.

¹⁰See the Mispricing section for the rationale behind weighting each investment by both duration and size. The large decrease is because of a -33 percent correlation between (log) duration and (log) IRR for this sample of BOs.

2005), estimates of the risk of private equity funds based on individual investments (e.g., Ljungqvist and Richardson 2003a), estimates of the risk of venture capital investments gross of fees (e.g., Cochrane 2005), and estimates of the risk of private equity funds (e.g., Jones and Rhodes-Kropf 2003).

Publicly Traded Private Equity Vehicles. A first way to estimate risk is to identify listed vehicles that invest in private equity transactions or funds. This approach is proposed by Bilo et al. (2005) and is behind the creation of a private equity index called LPX, which lists 287 vehicles. Most of them are U.K. closed-end funds (unit trusts) and the rest are corporations, publicly traded partnerships, or other structures. However, the exact criterion for inclusion is vague, because firms that invest in publicly listed companies in connection with privately negotiated financing or that attempt to exercise significant influence on the subject of the investment are apparently included. Most of these vehicles are small, and the largest ones, the French Eurazeo and Wendel Group (about \$6 billion each), have investments that differ substantially from the type made by private equity funds (venture capital and leveraged buyouts). However, certain large, publicly listed funds can shed light on the risk profile of private equity investing. For example, 3i Group (\$10 billion market capitalization, traded on the London Stock Exchange since 1994) and Allied Capital (\$5 billion, traded on the NYSE since 1993) are interesting cases. A capital asset pricing model (CAPM) using a local index indicates that the beta of 3i is 1.4 and the beta of Allied Capital is 0.6 (my calculations). Bilo et al. (2005) formed an index with all the selected vehicles and reported a CAPM beta of 1.2 and a negative alpha (−1.2 percent a year).

Private Equity Funds Based on Individual Investments. Another approach involves matching the companies in which funds invest with publicly traded companies. To obtain an estimate of a fund's beta using the first approach, one can proceed as follows (see Ljungqvist and Richardson 2003a, and PG). First, the beta of each investment is assumed to be either the same as the average beta of the publicly traded stocks in the same industry (Ljungqvist and Richardson) or equal to the leverage-adjusted average beta of the publicly traded stocks in the same industry (PG).¹¹ Then, the (distribution-value-weighted) average is taken across all the investments of each fund to obtain a fund beta. LR found an average beta of 1.08, and PG found an average fund beta of 1.3.

VC Investments Gross of Fees. The main study on the risk of VC investments gross of fees is that of Cochrane (2005), which made a number of assumptions (e.g., lognormality of returns) and used an innovative approach to approximate the alpha and beta of venture capital investments. Cochrane acknowledged throughout his article the limits of his dataset and, given these limits, proposed what is probably the state-of-the-art measurement of risk and return of venture capital investments.¹² It is important to keep in mind that what Cochrane measured is the risk faced by the GP, not the risk faced by LPs. Although related, they differ: The fee structure of the funds is nonlinear and even venture capital-focused funds do not invest solely in venture capital. Hence, not all cash flows were included in the analysis.

Estimating Private Equity Fund Risk. Using cash flow data (including fees) at the private equity fund level enables assessment of the risk faced by LPs. Jones and Rhodes-Kropf (2003) offered the first study that estimated risk for a large number of private equity funds. Jones and Rhodes-Kropf implicitly assumed that the accounting values reported quarterly by private equity funds are an unbiased, although sluggish, estimate of the market value. They obtained alphas and betas of portfolios of funds by regressing the assumed market values on both contemporaneous and lagged risk factors, which is a standard approach in empirical finance. Such an approach, however, faces two main limitations. First, accounting values are typically perceived as both inaccurate and biased. Second, even if accounting values were unbiased and sluggish proxies for the market values, Driessen, Lin, and

¹¹PG, however, separated buyout and venture capital in that for VC, they used the average beta of the lowest size quintile of publicly traded stocks in the same industry.

¹²The main concern with Cochrane's (2005) dataset is that if a round of financing is missing then the amount invested will be perceived as a capital gain. Therefore, Cochrane eliminated outliers. Despite this adjustment, the data are quite imprecise, making it difficult to offer a robust estimate.

Phalippou (2007) showed both theoretically and via Monte Carlo simulation that adding lagged risk factors helps dramatically but still does not correctly evaluate the risk of private equity funds. Large and systematic errors are generated for the estimates of risk and abnormal performance of funds, irrespective of the number of lags added.¹³

Driessen, Lin, and Phalippou (2007) propose a method of moments that overcomes the limitations mentioned above and, in addition, offer a comprehensive picture of the risk profile of private equity funds. In particular, they investigate whether risk is time varying (as for hedge funds) and compare the risk profiles of different types of funds (e.g., buyout focused versus venture capital focused). They find a high beta, especially for venture capital funds.

Research on risk is still in its early stages. There is much to be done, such as assessing how features like nontradability or credit line affect risk estimates. Studying publicly traded instruments could also be fruitful, especially with publicly traded LPs.

Explanations for Performance Level

The performance of private equity funds is lower than the performance of the S&P 500 by as much as 3.8 percent a year, and the risk properties of the S&P 500 seem more attractive. Even if one disregards the estimates found by PG, the figures provided by Kaplan and Schoar (2005), Thomson Venture Economics,¹⁴ CalPERS (California Public Employees' Retirement System; see www.calpers.ca.gov),¹⁵ and Swensen (2000) show that private equity funds do not outperform public equivalent investments significantly. An interesting area for further research is to understand why investors allocate large amounts to this asset class, given such low past performance. There is little research on this topic; I discuss in this section four sets of "non-mutually-exclusive" explanations as directions for future research: (1) learning, (2) mispricing, (3) positive externalities, and (4) conspiracy.

Learning. Managing private equity investments requires skill because GPs are active board members and make many strategic decisions. Thus, it is reasonable to expect learning to play an important role in performance. Consistent with this assertion, Kaplan and Schoar (2005) found that experienced funds offer significantly higher performance. It is possible that by participating in inexperienced (and hence poorly performing) funds, LPs tacitly obtain the right to participate in future, more profitable funds. This right is valuable, because funds by successful and established GPs tend to be oversubscribed and prior investors receive privileged access. For this hypothesis to hold, however, a few assumptions need to be made, and it implies that the performance we observe is not a good estimate because it fails to account for this "option" value.

Investing in private equity also requires skill. Limited partners need to screen funds based on indicators of expected performance (e.g., past performance and quality of the management team). Lerner, Schoar, and Wong (forthcoming) argued that large differences in skills exist across LPs, and these differences significantly affect performance. Because the private equity industry is relatively young, it is possible that the performance that we observe is low because it includes the learning costs for LPs. These costs may be recouped in the future.

It is worth stressing the results found by Lerner, Schoar, and Wong (forthcoming) at this stage. They provided evidence that some LPs have fund-picking abilities and, probably as a result of this, have higher performance.¹⁶ Because these abilities may increase over time, future performance might differ from past performance, and poor past performance might be the cost to pay for acquiring this ability.

¹³As argued by Woodward (2005), adding lagged risk factors improves risk estimates dramatically. Such an approach has a long tradition in many fields dealing with a similar problem (e.g., real estate). Interested readers may refer to Woodward and the literature therein mentioned.

¹⁴Performance estimates from TVE are similar to those of Kaplan and Schoar (2005) because they are computed under the same assumptions and with a similar sample.

¹⁵CalPERS posted online the performance of the 263 funds in which it has invested. For the 73 funds (in this CalPERS dataset) started between 1990 and 1997, the average (investment-weighted) IRR is 13 percent as of mid-2006. This estimate treats residual values as correct (they represent a high 20 percent of value invested), and as pointed out in this literature review, average IRRs are upward biased. Hence, CalPERS' performance appears relatively low.

¹⁶Fund picking in the current context means that an LP gets the reinvestment decision right. That is, when firm XYZ raises a new fund XYZ-F2, observations show this fund will have high performance if endowments that invested in the previous fund (XYZ-F1) decide to invest in XYZ-F2. It is the opposite for banks. Hence, it seems that endowments have fund-picking abilities where banks do not.

These learning-based explanations should, however, be tempered by the finding that recently raised funds have expected performance similar to that of previously raised funds and that there is no general upward trend in the time series of fund performance. Nonetheless, performance disclosure has been rare in the past and might become more frequent in the future. It is thus possible that learning will be faster and future performance better than that observed over the last 25 years.

Mispricing. The documented performance is so low that one may think that certain investors have mispriced this asset class. Interestingly, Lerner, Schoar, and Wong (forthcoming) investigated whether different types of LPs obtain different average performance when investing in private equity. They found wide heterogeneity that they mainly attributed to differences in skill. Therefore, one explanation for the finding of low performance is that certain institutional investors have misvalued this asset class because of lack of skill.

We also note that this asset class is relatively new and payoffs are highly skewed. Investors might then attribute too much weight to the performance of a few successful investments, such as Microsoft Corporation, Yahoo!, and Google. Along these lines, note that entrepreneurial investment in nonpublic companies, whose performance distribution resembles that of private equity funds, is also found to have relatively low performance (Moskowitz and Vissing-Jorgensen 2002).

Another possibility is that investors have a biased view of performance because only performance gross of fees is reported in prospectuses used to raise funds and other resources (e.g., CalPERS' online report). As reported above, performance gross of fees is high. Not all investors have realized that they should subtract about 12 percent from the average IRR that they observe in the prospectuses (see Swensen 2000).

Along the same lines, note that it is basically impossible for investors to benchmark the past performance of funds with information reported in prospectuses. Indeed, these documents (as well as CalPERS' online report) contain only multiples and IRRs gross of fees. Such performance figures are of very little value. For example, for the first fund on the CalPERS list, "1818 Fund II," raised in 1993, the IRR is said to be 12.2 percent and the total amount distributed has been 1.7 times the amount invested.¹⁷ It is impossible to know if this figure is good or not because we do not know when the fund invested the money and when it divested. In conversations with LPs, a recurrent argument is that they are satisfied with past performance because they "doubled" their money, that is, obtained a multiple of 2. PG found that funds offer a multiple of 1.8 net of fees and likely above 2 gross of fees. Such a multiple might indeed appear to be high. However, how long it took to obtain such a multiple must be considered, and because investors face a continuous stream of inflows and outflows, this information is not trivial to determine. PG found an average fund duration of 75 months, or 6.25 years. The stock market portfolio has returned on average 1 percent a month from 1980 to 2003, which means that over 6.25 years, an investor would have more than doubled her/his money ($\times 2.1$), which is substantially higher than $\times 1.8$.¹⁸

Furthermore, the aggregation of IRRs is highly misleading. To illustrate, assume that good performance (say, 100 percent IRR) occurs over 2 years on average, bad performance (say, -20 percent) occurs over 10 years on average, and that good and bad performance have equal probability. Average performance is 60 percent, which differs from what investors have experienced.¹⁹

PG reported that the correlation between fund performance and duration is highly negative. Funds with longer duration perform worse; hence, the average IRR is biased upward. One way to correct for this bias is to weight each IRR by the product of the present value (PV) of investment and duration [$\text{Duration} \times \text{PV}(\text{Invested})$] to obtain a sort of IRR per annum and per dollar invested. PG reported that doing so decreases the average IRR from 14.64 percent to 12.22 percent, a substantial 2.42 percentage point spread. In certain vintage years, the

¹⁷Note that despite being 13 years old, this fund still reports substantial residual value (equal to 27 percent of value invested), which is likely to have a large impact on the 12.2 percent IRR.

¹⁸The reader should bear in mind that this computation is simply to illustrate one of the limits of using multiples and is not conclusive about relative performance. A better measure of relative performance is the profitability index.

¹⁹To solve this problem, IRRs are often computed on aggregated cash flows. Such a practice is an improvement but does not solve the problem completely (see PG).

decrease is even more dramatic (from 22.86 percent to 13.88 percent for the 1985 vintage). For individual investments, the effect is even stronger. The average performance of BOs decreases from 52 percent to 30 percent when weighting by duration, and it is mainly to investment-level performance that investors have access.

It is an open and interesting question to know if institutional investors are tricked by performance reports. It is surprising at first sight that they would be, but all fund-raising prospectuses display only performance measures that are both misleading and of little use to assess relative performance. Conversations with LPs often confirm that they judge funds only on multiples and IRRs and that a multiple of 2 is believed to be good.

Side Benefits. A potential explanation for the low performance of private equity funds is that the objective of limited partners may not be to maximize returns. Ljungqvist and Richardson (2003a) recounted that the LP who provided them with data invests in private equity funds in order to establish a commercial relationship with GPs: “The Limited Partner’s twin investment objectives [are] not only to obtain the highest risk-adjusted return but also to increase the likelihood that the funds will purchase the services our Limited Partner’s corporate parent has to offer” (p. 8). These side benefits include advisory work and underwriting securities (both debt and equity). A recent study by Hellmann, Lindsey, and Puri (2005) corroborated this view. It argued that banks are strategic investors in the venture capital market because they use their venture capital investments to build relationships for their lending activities.

In addition, certain LPs invest in private equity to stimulate the local economy. This behavior is witnessed among pension fund managers in both the United States and Europe. Moreover, agencies such as the International Finance Corporation and the European Bank for Reconstruction and Development are large contributors to venture capital funds. Similarly, the European Union has invested substantial amounts in as many as 190 private equity funds via the European Investment Fund, which is “committed to the development of a knowledge-based society, centered on innovation, growth and employment, the promotion of entrepreneurial spirit, regional development and the cohesion of the Union” (see www.eif.org).

Finally, corporations also sometimes invest in private equity funds as LPs. They probably have some strategic objectives. An example is Siemens Venture Capital, which has some direct investments in companies but also invests in about 25 venture capital funds.²⁰

We cannot estimate whether LPs are satisfied *ex post* with the total outcome (investment performance and additional benefits). Neither do we know how much these side benefits explain the current puzzle. Nonetheless, ample casual evidence shows that investors expect high returns from private equity funds. The question of the size of the externality and its anticipated value is an interesting area for further research.

Conspiracy Theory. The use of stale residual values (which underestimate beta and overestimate alpha mechanically) and the showing of both average IRRs (which are misleadingly high) and multiples (which are rather uninformative) lead to a reported alpha that is exaggerated but credible for an unknowledgeable person. In such a situation, it is possible that some market participants take advantage in the following way. The person in charge of managing the private equity portfolio of an investment company (the LP) is glad to receive from the GP a misleadingly high alpha. This misleading figure enables him/her to receive a commensurably exaggerated salary. The GP is obviously glad, too, because it can receive higher fees than otherwise. For certain investment companies, the whole company may even be fine with such a practice because it enables the company to display good records. One could imagine such a scenario, for example, for some “black sheep” among endowments or pension funds, the main investors in private equity, because they are not the ultimate claimants. Trustees are the ones who should intervene, but for some reason, they seem silent. This worrying “conspiracy theory” could explain why large amounts of money can flow in the industry despite poor average past performance. If such a theory is verified on a large scale and/or practices do not change, the sustainability of this industry will, unfortunately, be threatened.

²⁰Siemens’ portfolio is available on its website at www.siemensventurecapital.com/portfolio/fund.html.

Drivers of Performance

This section studies the determinants of performance. If performance is low on average, the question is: Can I select the good funds and avoid the bad ones? This section brings some first answers.

Performance Net of Fees. Kaplan and Schoar (2005) found that the performance net of fees depends positively on fund size, fund sequence (i.e., experience/tenure), having a VC objective, past performance, and public market returns during the investment phase of a fund's life. Jones and Rhodes-Kropf (2003) found that both their measure of and proxy for idiosyncratic risk are associated with higher net returns. Ljungqvist and Richardson (2003a, 2003b) found that level of investment opportunity is positively related to performance whereas competition for deal flow among GPs is negatively related to performance.

The finding by Kaplan and Schoar (2005) of performance persistence is probably the outcome that has received most attention. Understanding the drivers of such persistence, and how investors attempt to benefit from it, appears to be a particularly interesting area for future research. There are several runner-up hypotheses. Jones and Rhodes-Kropf (2003) proposed that early winners get large and rich and thus are less averse to a given amount of idiosyncratic risk. They argued that such risk is priced and that the early winners can price more aggressively and win the best deals.

Performance Gross of Fees. Several studies have used the VentureXpert dataset from TVE and used exit success as a proxy for performance.²¹ They found that the main drivers of the success rate of GPs with their portfolio companies are quality of the private equity industry network (Hochberg, Ljungqvist, and Lu, forthcoming 2007), experience (Sorensen, forthcoming 2007), specialization (Gompers, Kovner, Lerner, and Scharfstein 2006), and having a scientific training (Zarutskie 2006). Zarutskie also found that for early stage funds, having past industry experience as an entrepreneur is important but having prior venture capital investing experience is not. Using gross IRRs as a performance measure, Cumming and Walz (2004) found that fund size and syndication are positively related to performance but not fund sequence (a proxy for experience). Using the return between the first financing round and the last one (prior to exit), Hege, Palomino, and Schwiendbacher (2004) reported that venture capital returns in Europe are much lower than in the United States.

Various studies have also looked at the influence of the legal environment on performance. Lerner and Schoar (2005) reported that private equity funds (VC and BO) active in common law countries have higher performance than private equity funds active in civil law and socialist countries (as measured by either IRR or multiples; gross of fees). Cumming and Walz (2004) found that more monitoring, more advice, more legal protection, and the use of convertible securities are associated with higher performance.

Performance and Competitive Environment. The question of how both the demand for private equity money by companies and the supply of private equity money by investors affect performance is a question that is as complex as it is interesting. The complexity lies both in measuring each component and in disentangling them. In addition, the peculiar organizational structure of the industry increases the difficulties. For example, the supply of capital is determined by how much investors commit but also by the behavior of the GPs, who can choose the speed at which it uses its commitments. If a link is found between the degree of competition and performance, it is still difficult to disentangle the two main potential explanations. One explanation is investor sentiment (when investors are too optimistic, they invest too much, pay too high a price, and receive low performance). The other explanation is investor foresight (when future opportunities improve, investors increase allocations and receive lower performance).

The first study receiving wide attention on this question was by Gompers and Lerner (2000). They found that between 1987 and 1995, when inflows of capital committed to venture funds were high, the valuation of these funds' new investments was high as well. Whether or not this translates into poor performance, however, is unclear. Gompers and Lerner reported that investments made during times of high inflows do *not* translate into higher

²¹The use of exit success as a proxy was validated empirically by Hochberg, Ljungqvist, and Lu (2007) and PG.

exit success rates. The answer is, therefore, somewhat ambiguous, as pointed out by the authors. In addition, the authors stressed that it would be ideal to have the rate of return on each investment to conclude whether on not high inflows predict lower future performance. Cumming and Walz (2004) used return data for (mainly) venture capital investments and found that, after controlling for sample selection issues, the relation between inflows and performance is positive, not negative. This finding means that investors can forecast future performance; that is, they can time the private equity fund market. These are gross-of-fees results, however, and fees might be time varying in such a fashion that GPs might partially capture the timing benefits.

Gompers, Kovner, Lerner, and Scharfstein (2005) found that the venture capital firms with the most experience in a given industry are more prone to increase their investments when the market heats up and that the success rate for deals done in a hot market is lower than it is for deals done in a cold market, although the difference is negligible.

A different finding was reported by Ljungqvist and Richardson (2003b), who provided extensive theoretical discussion and empirical analysis of the market environment's influence on performance. They argued that the supply of capital is likely to be sticky in the short run, which is why time-varying competitive conditions should affect returns. They used the number of companies funded in an industry as a measure of investment opportunities and the amount that they received as a measure of "money-chasing deals."²² They used the total amount committed to other private equity funds in a given year as the "fire power" of the competitors. The latter two variables were used as proxy for the supply, and the number of companies funded was used as proxy for the demand. They found that higher demand increases performance (measured in many different ways) whereas higher supply decreases it, thus providing evidence for money-chasing deals.

Note also that the measure of money-chasing deals differs between Ljungqvist and Richardson (2003b) and Gompers and Lerner (2000). In addition, the capital committed to the industry at one point in time differs from the real amount of money-chasing deals at that point in time because all the capital committed that has not yet been called is typically sizable.

Capital Formation. What drives the amount invested in private equity funds? Kaplan and Schoar (2005) found that the relation between past performance and fund size is positive and concave. Current fund size is also positively related to past fund size and experience.

Gompers et al. (2005) reported that the amount of venture capital invested in a given industry in a given year depends on lagged public market valuations. There are two main explanations for their finding. The "behavioral" explanation is that investors get overoptimistic about a given sector at some point in time and want to invest a lot in it. In the VC industry, LPs likely have little power to force investments in a given industry unless the fad lasts for a long time. However, the GPs may be subject to the same fad and may overinvest in a given industry or feel the need to herd. The "rational" explanation is that when the prospects of an industry are good, more money should go to this industry to decrease the cost of capital. Gompers et al. (2005) found that the venture capital firms with the most experience in a given industry are more prone to increase their investments when the market heats up. In addition, the success rate for deals made in a hot market is lower than it is for those made in a cold market, but the difference is small. They interpreted their results as supporting the rational story, although such a story would imply lower returns for investments made in good times. In addition, if the rational story is correct, then we have a reverse money-chasing-deal phenomenon: More money flowing in the industry means higher future returns, which contradicts the conjecture of Gompers and Lerner (2000) but is consistent with some of the reported evidence.

Optimal Organizational Structure

The contract between investors and their financial intermediaries in private equity partnerships is very different from that in any other financial context. This section reviews what we know and what we wonder about existing contracts.

²²The term "money-chasing deal" refers to the fact that inflows in the industry "chase" a given number of investments. Hence, high inflows inflate prices and vice versa.

The Big Question. The main features of the private equity industry are that funds raise equity at the time they are formed and additional capital when investments are made (e.g., debt for BOs and syndicated equity for VCs). Funds have a quasi-finite life; although the legal length is generally 10 years, extensions are frequently granted on a yearly basis after the 10th year by mutual agreement (between limited partners and general partners). A private equity firm raises a new fund every 2 to 5 years, and funds are uniformly set to liquidate after 10 years. There is a high cost of raising a new partnership (e.g., cost of the “road show”), and when one is created, money is raised in several stages, called closings.

In the past, investors were charged management fees on capital committed; now they tend to be charged on the amount invested. The base for management fee calculation is also different in the first and in the second halves of a fund’s life. A “carried interest” is also charged as a function of a fund’s profit. It used to be payable on each investment separately but is now more often charged on the sum of all investments. In the mid-1980s, many funds started to charge the carry on each investment starting at the first one (the PV of fees increased a lot then). In the late 1980s, inflows weakened, and carried interest began to be computed (as before) on the sum of investments.

Selling stakes in the partnership is sometimes simply forbidden, and when it is not, the stakes can be sold only at deep discounts and only with the authorization of the GP. Past performance is top secret. Some funds have fund-raising prospectuses that cannot be photocopied; some funds refuse money from any LP that might publicly declare the fund’s performance.

The contracts are generally around 100 pages long and contain tons of very specific covenants. LPs have very limited rights and incentives to influence or direct funds’ activities. Nonetheless, LPs require wide-ranging information to monitor the performance of the fund and meet with their general partners on a regular basis to discuss the progress of the portfolio.

Most of these features fall in the much-studied field of optimal contracting. The private equity context being very different from other contexts, financial economists might learn about applications of contract theory by studying the GP–LP relationship and/or might be able to help practitioners design more efficient contracts between LPs and GPs. The time dynamic is also interesting; the fee structure has evolved over time. In addition, private equity funds started in the 1940s as publicly traded closed-end funds. The first limited partnerships appeared in 1958, and this organizational form became ubiquitous in the early 1980s. Why this evolution?

Nontransparency. Until recently, no information on fund performance was publicly available. In 2002, after a lawsuit, CalPERS (and other pension funds in the United States) posted its performance online. However, CalPERS posted an IRR without indicating how it was computed and, importantly, without any benchmark. This was close to no disclosure at all. A second lawsuit (again against CalPERS) required CalPERS to report the fee payments. The information disclosed as a result gives an aggregate level per fund and does not say much, although the fee payments do seem quite high for most funds.

This state of the world is surprising to financial economists, because in general, hiding information is not optimal. GPs have to pay for secrecy by offering superior performance in equilibrium, and the benefits for the GPs are not obvious. One can imagine that an unskilled GP wants to hide, but why would the good GPs? Why are the good GPs not posting their track records on their websites? It is difficult to imagine that this disclosure would harm their future competitiveness. These questions are as intriguing as they are unsolved.

An interesting hypothesis stems out of the observation that good private equity firms do get their “star” status via the press coverage of their so-called “home runs” (high-performance investments). Indeed, everyone knows which private equity firm is behind Google, Yahoo!, Warner Music Group, and so on. Hence, maybe the good-performing firms are better off having only their home runs publicly known rather than having their entire portfolio performance publicly known.

Another hypothesis (and a potentially complementary one) is the explanation typically given by the star firms. The star firms argue that if they publicize their performance, they will get even more money, and they do not want that because it is painful (and time consuming) to reject money. This explanation then triggers a second

puzzle: Why firms do not advertise past performance and increase their fees? Recently, several (perceived) top firms have increased their carry to 30 percent (from 20 percent) but this increase is not enough to eliminate the oversubscription. Having a carry above 30 percent is not impossible, and some star hedge funds actually have a 50 percent carry! So what is it we are still missing? The explanation that I have gotten from star firms is that if they charge high fees and they have bad luck, the investors will get so upset that they will not invest again. This argument is shaky mainly because it applies only to management fees and not really to the carry. This idea is nonetheless an interesting thought never explored (as far as I know): If a financial intermediary set its rent (i.e., fees) equal to expected alpha, then in many cases (say 50 percent), investors would have a negative alpha, which might, in turn, hurt the intermediary's reputation or upset some oversensitive investors.²³

To conclude, this nontransparency is a puzzle. I see no coherent explanation, except that of the conspiracy theory (discussed previously), that equally applies to this question.

Nontradability. The stakes of LPs in a given fund are not readily transferable. This feature might be related to the desire to not give any information about funds. Indeed, to sell a stake, an LP would have to tell prospective investors about the current performance and investments of a fund. Obviously, a feasible and supposedly cheap option is to sell the stake to the investors that are already in the fund. There have been some such rare cases, and the practice has been that other LPs buy the stake “at cost.” It is surprising to financial economists, but this rule seems to be customary.

When asked, GPs typically say that they want to avoid stakes ending up in the hands of unsophisticated investors without a long-term commitment to the asset class (Lerner and Schoar 2004). We should also note that the Investment Company Act of 1940 imposes costly disclosure requirements on the GPs if a stake is put to sale. In addition, if the stakes were freely traded, the fund would be taxed at the GP level as well as the LP level, which would be especially detrimental because many investors in private equity funds are tax-exempt entities. However, it is generally believed that the level of control over transfer constraints imposed in most partnership agreements is far in excess of what would be required to comply with securities and tax laws (see Lerner and Schoar 2004), but this is an open research question. In particular, one could try to quantify this trade-off.

The problem of nontransferability of stakes hit a high in 2001 when most banks decided to reduce their exposures to private equity and could not readily do so. Famous examples include that of JP Morgan and Deutsche Bank. In 2000, JP Morgan sold \$1 billion on the secondary market with a large discount and sold an extra \$0.5 billion via securitization in 2001–2002.²⁴

Securitization consists of issuing collateralized fund obligations (CFOs). The investor receives cash by issuing a bond with a private equity stake as collateral. These bonds are rated by major rating agencies like any other bond, except that the modeling of the underlying cash flow is probably more difficult than for a traditional corporate bond. The distributions from the fund should pay for part or all of the coupons. Obviously, there is ample room for timing mismatch: Coupons and fund distributions differ in size and timing. In practice, a credit facility is often in place or liabilities are made deferrable. The current trend seems to be toward the development of the secondary market for stakes, although the CFO market has seemed to stagnate.

Stakes are transferable in practice, therefore, but it is not widespread, and GPs appear to do their best to prevent the transferability of partnership stakes. A potential explanation is that GPs want to avoid a kind of information-based bank run. Another explanation put forth by Lerner and Schoar (2004) is that GPs want to avoid asking outside investors for money because they would have to pay a “lemon” premium. (The market does

²³Economists have also looked at models of disclosure and found cases in which it is optimal to not disclose information. It is not clear whether any of these models apply in the current context. Nonetheless, it is possible that a manager with a good signal now would decide not to disclose it in order to avoid having to disclose bad signals in the future. Indeed, if a good-performing firm discloses its track record now, then if there is bad news in the future, it will have to disclose it, and if it does not, the market will infer the worst. This line of thought is potentially fruitful, but one needs to assess the plausibility of the assumptions in the current context.

²⁴Deutsche Bank first tried to find someone to buy \$130 million of private equity stakes, but the discount offered by the market was so large that Deutsche Bank gave up on the idea and, instead, used securitization.

not know whether the need for money is because current investors are not recommitting enough as a result of a liquidity shock or because the fund is a lemon.) To avoid this discount in future fund raising, GPs decide to have investors that are as liquid as possible, even if the GPs have to pay a cost associated with nontradability.

Lerner and Schoar (2004) investigated 250 private equity partnership agreements and found that, consistent with their model, the restrictions on limited partners' ability to transfer funds are less common in later funds (where information problems are presumably less severe) and in partnerships whose investment focus is in industries with shorter investment cycles (such industries are prone to lower information asymmetry). Also, funds specializing in biotechnology investments have more transfer constraints, whereas those focused on software and the Internet have fewer constraints (biotech is an industry believed to have more asymmetric information problems, according to Lerner and Schoar).

Covenants. Gompers and Lerner (1996) explored the use of covenants and restrictions in 140 GP-LP contracts. Importantly, these contracts were for venture capital funds only. They identified several classes of covenants and showed that two complementary factors are important determinants of contractual restrictiveness: agency problems and the supply and demand conditions in the market. The covenant classes are (1) limits on the amount that can be invested in any one company, (2) limits on the use of debt, (3) restrictions on coinvestments with other funds raised by the same firm, (4) rules about reinvestment of profits, (5) limits on the ability of GPs to invest personal money directly in portfolio companies, (6) restrictions on the sale of partnership interests by GPs, (7) restrictions on future fund-raising abilities (e.g., the firm cannot raise a new fund until 50 percent of the capital of this fund is invested), (8) restrictions on GPs' outside activities,²⁵ (9) rules for future inclusion of general partners, and (10) limits on investments in other assets (publicly traded securities, VC funds, BO funds, foreign securities, etc.). An interesting question to investigate would be the extent to which covenants are traded off with fees and their economic role.

Credit Line. Capital is committed at the beginning of the fund's life and is called at random times, mainly in the first five years. If an LP does not make a called payment, it is excluded from the fund and pays a penalty. Such an arrangement raises many questions: (1) Is this the best mechanism? (2) Does it produce any perverse incentive for GPs? (3) How costly is such a structure to an LP; that is, what is the value of this credit line? (4) Why do penalties vary greatly across funds and why are they in place? (5) What is the best response for an LP in a dynamic environment when such a structure is in place?

The first four questions are self-explanatory and have not been tackled in the literature.²⁶ The fifth question is an interesting dynamic optimal portfolio problem. The number and perceived quality of funds raised at any point in time varies. If an investor decides to invest in one of them, the capital will be invested over the next five years at a certain expected pace and distributed at another expected pace. The question is then: What are the optimal commitment and fund selection strategies? A restricted version of this problem often formulated by practitioners is, What shall I do if I want to have a fraction of my portfolio—say between 4 percent and 6 percent—invested in private equity at any point in time? Other related but smaller questions include: Is it better to get all the capital, place it in the S&P (possibly levered) or other financial assets and draw from it? Should investors overcommit because the present value of investments is less than capital to be committed?

A solution to the problem of achieving and maintaining a desired exposure to private equity was proposed by De Zwart, Frieser, and Van Dijk (2006). Their commitment strategy takes into account characteristics of the existing private equity portfolio to determine the level of new commitments. Optimal commitments depend on contemporaneous distributions, uncalled capital from past commitments, and exposure objectives. This strategy is found to have a more constant exposure than the commonly used 30 percent overcommitment strategy.

²⁵This covenant is interesting in light of recent work in corporate governance asking whether busy boards are less effective.

²⁶A partial exception is Axelson, Stromberg, and Weisbach (2006), who tackle the first question.

The other side of the relationship is interesting too: What type of incentive does such an arrangement provide the GPs? GPs might have an incentive to raise as much capital as possible and call only what will lead to high performance (to maximize carry). Hence, they have an incentive to obtain more commitments than they can handle. This incentive toward overcommitment is costly for LPs for at least three reasons: (1) It increases the cost of their credit line; (2) it increases the uncertainty of net returns (the billed fee being more uncertain *ex ante* because how much the GP is overcommitted is unknown); (3) if fees are charged based on capital committed, then the billed fee is automatically increased.²⁷

The Fee Structure. The fee structure contains two main components: management fees and a carry. The details are quite complex and extensive and can have a large effect on the final bill—particularly those details related to the calculation and payment timing of the carry. The fee agreements are available in fund-raising prospectuses, and several studies have used such data sources to study the level of fees and its determinants.

Gompers and Lerner (1999) proposed a learning model to explain cross-sectional and time-series variation in compensation (of GPs by LPs) and provided an empirical analysis based on a sample of 419 venture capital fund fee contracts. They found that 81 percent of the funds had a carry between 20 percent and 21 percent. They also found that older and larger firms had a more performance-sensitive contract, based on simulated fund residual values.

Metrick and Yasuda (2006) had a sample of 203 recent partnership agreements, for both buyout funds and venture capital funds. They reported that 92 percent of the funds had a 20 percent carry and 83 percent had it with a hurdle rate. Out of the funds with a hurdle rate, 74 percent set it at 8 percent and 92 percent used a catch-up provision. Finally, the carry basis was capital committed for 83 percent of the funds. Using simulations and an option-pricing framework, Metrick and Yasuda estimated the expected cost for LPs of several fee arrangements. They concluded that slight adjustments in the fee contracts led to significant changes in total cost for LPs. They also found that more experienced funds collected higher fees per managing partner by raising larger funds but not by charging a higher price per dollar managed.

Note that management fees are standard at first examination; they are set around 2 percent, which is the rate for mutual funds and less than that of most hedge funds. However, fees are typically charged on the amount committed at inception (sometimes only the first five years, sometimes for the entire fund's life), which results in high fees; Ljungqvist and Richardson (2003a) reported that 16 percent of committed capital is invested at the end of the first year and that after five years, only 80 percent of capital committed is invested. The fee payment at the end of the first year is thus as high as 12.5 percent of the amount invested, for example. This policy is also intriguing because GPs have an incentive to ask for as much capital as possible to collect high management fees but can avoid low performance because of too much money under management by simply not investing the excess capital (sometimes the carry contains a hurdle rate based on *capital committed*, which limits this incentive, or covenants are in place to require full investment of committed capital).

It is also interesting to note that, sometimes, different LPs in the same fund are charged different fees and that in older and larger partnerships, management fees are not set in advance, but instead, an expense budget for the GP is negotiated every year with the LPs. Finally, an important cost for LPs is whether the distributions are made in share or in cash, but as far as I know, this provision is never made in the contracts observed by researchers.

Explaining the heterogeneity of fee structure both cross-sectionally and over time is an interesting and nontrivial task. Some questions are still open for further research. For example, it would be interesting to see whether the fee structure becomes more heterogeneous over time as the industry learns about the abilities of different funds. In addition, the way carried interest is paid (typically after each divestment and with a refund if the fund does not post a profit in the end) is like granting a no-interest loan to GPs. More generally, time value of money is never taken into account (as far as we know) in the fee computations. Such an omission can distort GP incentives.

²⁷Note that sometimes the carry is based on capital committed, which reduces the incentive to overcommit for the GPs.

Quantifying the impact of the fees and seeing whether investors are fully aware of both the magnitude of fees and the impact of each subtle difference in carry computations is also of interest. Another fact to be explained is why there is an apparent collusion on fees (e.g., the common 2–20 fee structure) but not collusion in effect because the conditions buried in the footnotes differ across funds and change the value of the fees dramatically. A related question is to what extent covenants are substitutes for fees. For example, a fund in high demand could relax certain covenants (in its favor) instead of increasing fees. It would also be interesting to see how the value of fees change as a function of the track record posted in the memorandum. Finally, the big question of interest to financial economists is whether the current compensation system aligns the interests of the GPs with those of the LPs.²⁸ Can GPs successfully manipulate capital calls and distributions to obtain higher compensation (e.g., by starting with their best ideas or exiting too early)? If so, how could a better alignment be achieved?

Sluggish Intermediate Valuations.²⁹ Funds differ a great deal in the way they measure the value of nonexited investments.³⁰ Industry bodies have often differed in advising private equity funds on the appropriate way to value investments. However, within Europe, there has been an initiative to agree on valuation guidelines and there now exists an agreed approach to valuation. This approach has been endorsed by all the main national industry associations in Europe and many outside Europe (with the notable exception, as of this writing, of the National Venture Capital Association in the United States). Cumming and Walz (2004) stressed that valuation standards vary across countries and found that less stringent accounting rules and weak legal systems entail systematic overvaluation.

The accuracy of residual values differs for venture capital and buyouts. In venture capital, GPs report company values at the price of the most recent round (i.e., at cost until a second round). Because venture deals are nearly always syndicated, one can see from one partner to another that this approach is consistent. The deals differ only in how they handle failing companies. Some write them down as soon as the probability of failure is high enough; others wait until the very last moment.³¹ So, for venture capital investments, prices are often stale, but when they move, they move toward a reasonable value.

For buyouts, typically there are no transactions from the initial acquisition to exit. Nonetheless, GPs try to value the company between these two transactions. Most of them keep the investment at cost in the accounting book. Others use such ad-hoc approaches as seven times earnings (earnings before interest, taxes, depreciation, and amortization, or EBITDA). Others use stock market comparables, some once a year, some every quarter.

PG also noted that poorly performing funds might be reluctant to write off their residual values in hopes of masking part of their underperformance and preserving the possibility of raising subsequent funds. They found supporting evidence for this conjecture. Funds with apparently more-aggressive residual values (funds that report relatively high residual values despite a prolonged period of inactivity in terms of distributions and investments) have lower fund performance, irrespective of the assumptions regarding the market value of the residual values, and vice versa.

PG also remarked that there are more opportunities to write up residual values in up markets (because of new financing rounds). Again, evidence supports this conjecture. Of all funds that increased their residual values in 1999–2000, less than 20 percent subsequently decreased it at all between 2001 and 2003. These results are indicative and show that there are several interesting questions regarding the selective reporting of residual values by private equity funds. In particular, the relationship between overvaluation and future fundraising appears to be an interesting question.

²⁸A first answer to this question is given by Axelson et al. (2006).

²⁹Part of this subsection is based on correspondence with Susan Woodward, to whom I am thankful for these insightful and comprehensive pieces of information.

³⁰GPs diverge in their valuations, and thus it happens that an LP who invests in the same company via two different funds can receive two different valuations (see Blaydon and Horvath 2002).

³¹This difference was observed by Susan Woodward, who has access to a large amount of such data.

Tackling the Big Question. As seen above, Lerner and Schoar (2004) was one of the first studies to explain one of the aspects of the organizational structure of a fund (nontransferability). Jones and Rhodes-Kropf (2003) also tackled this area; they presented a principal-agent model that explains why GPs are compensated by a type of “at-the-money” call option instead of an “out-of-the-money” option. Kandel, Leshchinskii, and Yuklea (2006) investigated the “10-year-life” feature. They provided both a theoretical framework and empirical evidence for the main inefficiency stemming from such a structure: continuation of bad projects and termination of good projects. Their findings made it clear that this arrangement has perverse consequences and, in addition, that the rationale for it is quite obscure.

When considering the 10-year life span of most funds, a few caveats may be useful. First, if funds were infinite and used the current performance measures (IRR, multiples), computing performance with nonliquidating funds would be quite a challenge. Second, 10 years could just be a historical heritage, and firms may not want to deviate from this “equilibrium” because investors could get suspicious. Third, as noted previously, even star funds (or funds with less information asymmetry between LPs and GPs) have, in theory, the same life span. Note, however, that in practice, good funds have a shorter life than bad funds. It might be useful to think of 10 years as an upper limit that triggers a thorough review of nonliquidated investments rather than as a fixed life span. Fourth, despite having very different underlying investments, both VCs and BOs have the same time limit. Fifth, whenever there is no potential conflict of interests between GPs and LPs, funds have an infinite life and are called evergreen. (Such funds are fully owned by a corporation, bank, insurance company, etc.)

Axelson, Stromberg, and Weisbach (2006) tackled the challenging question of explaining the core aspects of the financial structure of private equity firms as an equilibrium outcome. Their theoretical model explained why the industry is characterized by nontradability, a capital commitment rule, carried interests that are paid on the sum of investments, and the use of third-party contributions. Their model also showed that contracting inefficiencies exacerbate the natural investment cycle and thus offer an explanation for the “booms and busts” that the industry seems to have. Finally, their results implied that investments made during bad times will outperform (see Gompers et al. 2006 and this review’s discussion of money-chasing deals for related empirical evidence).

Another question is whether the existing organizational structure produces perverse incentives. The first article to tackle this question was that of Gompers (1996), which found that (1) younger VC firms raise money for a new fund sooner after an IPO, (2) the size of the next fund depends on the number of past IPOs (more so for young VC firms than for old VC firms), and (3) companies are taken to IPO at an earlier age when they are backed by a young VC firm.

Gompers (1996) argued that the reason young firms take companies public earlier than older firms is to establish a reputation and raise a new fund more quickly. Such a conjecture, however, requires a few assumptions. If young firms would not rush their investments, they would also establish a reputation and raise a new fund. I believe that what is implicitly assumed is that GPs have a subjective discount rate that depends on wealth. It is indeed possible that a GP running a smaller fund has less wealth and is thus more willing to receive a big payoff sooner than an even bigger payoff later (compared with GPs running a large fund).

In any case, empirical results such as those found by Gompers (1996) are symptomatic of some conflict of interests that are likely to be costly to LPs. It would be interesting to see to what extent LPs anticipate this and negotiate lower fees (or impose more covenants) when investing in younger VC funds.³² Gompers suggested that reducing fixed fees and increasing carried interest might better align the incentives of GPs and LPs. Another explanation for Gompers’ findings is that funds can artificially increase their IRRs by exiting early. If the cash flow-performance relationship is steeper for small funds, as documented for mutual funds, then small funds can rush their good investments to the market to increase IRR and attract high inflows of capital.

³²A number of LPs do not invest in first-time funds as a principle; this might be why.

Conclusion

One of the most knowledgeable and successful investors in private equity funds is David Swensen. He states about this industry: “Strangely, historical results generally fail to reflect the hoped-for enhanced returns, while risk levels appear to fall below expectations. Unfortunately, poor returns from private investing probably reflect reality, while the low risk evident in data describing past returns from private investing constitutes a statistical artifact” (2000, p. 226). Research evidence surveyed in this review appears to support both of his claims.

Poor performance may come as a surprise to the novice but not to many people in the industry. Indeed, many GPs and some LPs (e.g., Swensen) state that only top-quartile private equity funds are worth investing in. The question is, then, for LPs to identify them so that the other funds go out of business and average performance looks fair. But there is more to poor performance than a selection issue. It seems that fees are higher than what most investors realize, and critics of the industry have said that private equity funds are “a remuneration package dressed up as an investment strategy.”

If investors do not learn fast enough about selecting the right funds and/or designing more investor-friendly contracts, then the industry might collapse. It would be a terrible scenario because both types of private equity funds are essential to the market economy: VC funds as growth catalysts and BO funds as healthy arbitrageurs. It is only with knowledgeable LPs and trustees that this critically important industry can experience a sustainable growth. This literature review is, hopefully, one step in that direction.

References

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"This article examines the influence of public stock market returns on private equity portfolios. The author notes a significant lagged pricing effect between the public equity and private equity markets. The study also reveals that private equity managers apply the rule of conservatism in valuing their portfolios." [Ahmed Sule, CFA, *CFA Digest*, November 2007]

Axelsson, U., P. Stromberg, and M. Weisbach. 2006. "The Financial Structure of Private Equity Funds." Working paper, Swedish Institute for Financial Research and University of Illinois at Urbana-Champaign.

This paper shows that the optimal financing arrangement between funds and investors is consistent with a number of characteristics of the private equity industry. First, the firm should be financed by drawing on a credit line and deal-specific capital. Second, manager compensation should contain a carry based on the sum of all investments. Third, investments should be pooled in a fund and have a cap on their size. Fourth, funds should hold decision rights. Also, their model offers a rationale for having overinvestment (underinvestment) and thus underperformance (overperformance) in good (bad) states of the world.

Bilo, S., H. Christophers, M. Degosciu, and H. Zimmermann. 2005. "Risk, Returns, and Biases of Listed Private Equity Portfolios." Working paper, University of Basel.

This paper offers estimates of the risk and return of publicly traded vehicles whose business is related to private equity.

Blaydon, C., and M. Horvath. 2002. "What's a Company Worth? It Depends on Which GP You Ask." *Venture Capital Journal* (May).

Blaydon and Horvath report that an investor who invests in the same company via two different funds receives two different valuations.

Cochrane, J. 2005. "The Risk and Return of Venture Capital." *Journal of Financial Economics*, vol. 75, no. 1 (January):3–52.

This article offers estimates of the risk of venture capital investments, gross of fees. The author finds that log returns of venture capital investments have negative alphas, but that arithmetic returns and alphas are high.

Conroy, Robert M., and Robert S. Harris. 2007. "How Good Are Private Equity Returns?" *Journal of Applied Corporate Finance*, vol. 19, no. 3 (Summer):96–108. [added April 2008]

"In this article, the authors look at the recent research on private equity returns and use new benchmarks to examine the risk-adjusted returns of investors. They conclude that the attractiveness of private equity as an asset class is overstated." [Brendan F. O'Connell, CFA, *CFA Digest*, February 2008]

Cumming, D., and U. Walz. 2004. "Private Equity Returns and Disclosure around the World." Working paper, Goethe University.

The authors find that fund size and syndication is positively related to performance but not fund sequence. More monitoring, more advice, more legal protection, and the use of convertible securities are associated with higher performance. In addition, the authors find that less-stringent accounting rules and weak legal systems seem to facilitate overvaluation.

Denis, D. 2004. "Entrepreneurial Finance: An Overview of the Issues and Evidence." *Journal of Corporate Finance*, vol. 10, no. 2 (March):301–326.

This article provides an overview of the entrepreneurial finance literature.

De Zwart, G., B. Frieser, and D. Van Dijk. 2006. "A Recommitment Strategy for Long Term Private Equity Investors." Working paper, Erasmus University and Robeco Group.

This paper proposes a solution to the problem of achieving and maintaining a desired exposure to private equity. It takes into account the characteristics of existing private equity portfolios to determine the level of new commitments. The authors state that optimal commitments depend on contemporaneous distributions, uncalled capital from past commitments, and exposure objectives.

Driessen, J., T.C. Lin, and L. Phalippou. 2007. "Measuring the Risk of Private Equity Funds: A New Methodology." Working paper, University of Amsterdam.

This study offers a comprehensive picture of the risk profile of private equity funds. It compares the risk profile of different types of funds, evaluates the relative accuracy of different funds' risk models, and investigates whether risk is time varying and nonlinear.

Gompers, P. 1996. "Grandstanding in the Venture Capital Industry." *Journal of Financial Economics*, vol. 42, no. 1 (September):133–156.

This article tackles the question of whether the existing organizational structure produces perverse incentives. The author argues that young firms take companies public earlier than older firms do in order to establish their reputations and raise a new fund more quickly.

Gompers, P., and J. Lerner. 1996. "The Use of Covenants: An Empirical Analysis of Venture Partnership Agreements." *Journal of Law & Economics*, vol. 39, no. 2 (October):463–498.

The authors analyze 140 partnerships (mainly VC) and assign each fund a series of proxies that measure the probability of opportunistic behavior. In addition, they proxy the demand for VC funding and relate these variables to the amount and type of covenants used in a fund's contract with investors. They define and identify 14 major classes of covenants.

———. 1999. "An Analysis of Compensation in the U.S. Venture Capital Partnership." *Journal of Financial Economics*, vol. 51, no. 1 (January):3–44.

The authors show that although fee structures appear quite uniform across funds, in actuality, there are many subtle differences. They investigate 419 VC funds and find that the fixed component of compensation is higher for those funds that are smaller, younger, and more focused on high-technology and early-stage investments.

———. 2000. "Money Chasing Deals? The Impact of Fund Inflows on Private Equity Valuations." *Journal of Financial Economics*, vol. 55, no. 2 (February):281–325.

The authors find that between 1987 and 1995, inflows of capital committed into venture funds were high and so were the valuations of these funds' new investments. However, investments made during times of high inflows do not translate into higher exit success rates.

Gompers, P., A. Kovner, J. Lerner, and D. Scharfstein. 2005. "Venture Capital Investment Cycles: The Impact of Public Markets." NBER Working Paper 11385.

Venture capital firms with the most experience in a given industry are prone to increase their investments when the market heats up. The success rate for deals done in a hot market is lower than for deals done in a cold market, although the difference is negligible.

———. 2006. “Specialization and Success: Evidence from Venture Capital.” Working paper, Harvard University. The authors find that the main driver of the success rate of funds with their portfolio companies is specialization.

Hege, U., F. Palomino, and A. Schwienbacher. 2004. “Determinants of Venture Capital Performance: Europe and the United States.” Working paper, HEC Paris and University of Amsterdam.

This paper finds that venture capital investments made in the United States generate higher returns than those made in Europe. The authors find differences in contracting behavior that help to partially explain the observed performance gap, but U.S. venture funds investing in Europe do not outperform their European peers.

Hellmann, T., L. Lindsey, and M. Puri. 2005. “Building Relationships Early: Banks in Venture Capital.” Working paper, Duke University.

This paper argues that banks are strategic investors in the venture capital market because they use their venture capital investments to build relationships for their lending activities.

Hochberg, Y., A. Ljungqvist, and Y. Lu. Forthcoming 2007. “Whom You Know Matters: Venture Capital Networks and Investment Performance.” *Journal of Finance*.

They find that the main driver of funds’ success rates with their portfolio companies is the quality of their networks.

Hwang, M., J. Quigley, and S.E. Woodward. 2005. “An Index for Venture Capital, 1987–2003.” *Contributions to Economic Analysis & Policy*, vol. 4, no. 1:Article 13.

The authors use the same dataset as Cochrane (2005) but with fewer missing financing rounds, and they find that average performance is substantially lower than that reported by Cochrane, with gross-of-fees performance slightly above that of the S&P 500.

Jenkinson, Tim. 2009. “Understanding the Private Equity Phenomenon.” *CFA Institute Conference Proceedings Quarterly*, vol. 26, no. 1 (March):77–83. [added February 2010]

“Private equity’s high degree of leverage in the boom years leading up to the recent bust is a dominant factor in that market’s current precarious state. Valuations have fallen precipitously and are likely to fall farther, with some firms going into default. But many firms will prove robust, and those firms with cash available should be able to find excellent bargains in 2009 and 2010.” (p. 77)

Jones, C., and M. Rhodes-Kropf. 2003. “The Price of Diversifiable Risk in Venture Capital and Private Equity.” Working paper, Columbia University.

The authors find that their proxies for idiosyncratic risk are associated with higher net returns. They also present a principal–agent model that explains why funds are compensated by a type of at-the-money call option.

Kandel, E., D. Leshchinskii, and H. Yuklea. 2006. “VC Funds: Aging Brings Myopia.” Working paper, Hebrew University of Jerusalem.

The authors investigate why funds have a finite life. They provide a theoretical framework and empirical evidence for the main inefficiency stemming from such a structure: continuation of bad projects and termination of good projects.

Kaplan, S.N., and A. Schoar. 2005. “Private Equity Performance: Returns, Persistence, and Capital Flows.” *Journal of Finance*, vol. 60, no. 4 (August):1791–1823.

The authors find that the performance net of fees depends positively on fund size, fund sequence, having a VC objective, past performance, and public market returns during the investment phase of a fund’s life. They also find, however, that private equity funds do not significantly outperform public equivalent investments.

Kaplan, S., and P. Stromberg. 2003. "Financial Contracting Theory Meets the Real World: An Empirical Analysis of Venture Capital Contracts." *Review of Economic Studies*, vol. 70, no. 2 (April):281–315.

The authors compare characteristics of venture capital financial contracts with what financial contracting theory predicts. They study the contractual agreement governing 213 financing rounds done by 14 VC firms. They point out that the distinguishing characteristic of VC financings is that they allow VC firms to separately allocate cash flow rights, board rights, voting rights, liquidation rights, and other control rights.

Lerner, J., and A. Schoar. 2004. "The Illiquidity Puzzle: Theory and Evidence from Private Equity." *Journal of Financial Economics*, vol. 72, no. 1 (April):3–40.

This article investigates 250 private equity partnership agreements, exploring the possible relationship between nontradability and nontransparency. The authors find that restrictions on limited partners' ability to transfer funds are less common in later agreements (where information problems are presumably less severe) and in partnerships whose investment focus is in industries with shorter investment cycles.

———. 2005. "Does Legal Enforcement Affect Financial Transactions? The Contractual Channel in Private Equity." *Quarterly Journal of Economics*, vol. 120, no. 1 (January):223–246.

The authors report that private equity funds (VC and BO) active in common law countries have higher performance than private equity funds active in civil law and socialist countries.

Lerner, J., A. Schoar, and W. Wong. Forthcoming. "Smart Institutions, Foolish Choices? The Limited Partner Performance Puzzle." *Journal of Finance*.

The authors argue that large differences in skill exist across investors and that these differences significantly affect performance, such that average performance of one investor might greatly differ from average performance of all funds. Because the private equity industry is relatively young, it is possible that the performance that we observe is low because it includes the learning costs for investors, which might be recouped in the future.

Ljungqvist, A., and M. Richardson. 2003a. "The Cash Flow, Return, and Risk Characteristics of Private Equity." NBER Working Paper 9454.

The authors document the draw down and capital return schedules for the average private equity fund and provide the main determining factors for these schedules (e.g., existing investment opportunities, competition among private equity funds.) In terms of performance, they document that their sample of private equity funds has high performance relative to the aggregate public equity market and estimate betas greater than 1.

———. 2003b. "The Investment Behavior of Private Equity Fund Managers." Working paper, New York University.

The authors argue that the supply of capital is likely to be sticky in the short run, which explains why time-varying competitive conditions should affect returns. They find that higher demand increases performance, whereas higher supply decreases it, hence finding evidence for money-chasing deals.

Metrick, A., and A. Yasuda. 2006. "Economics of Private Equity Funds." Working paper, Wharton School.

The authors examine 203 recent partnership agreements, for both buyout funds and venture capital funds, and find that slight adjustments in fee contracts lead to significant changes in total cost for investors. They also find that more experienced funds collect higher fees per managing partner by raising larger funds not by charging a higher price per dollar managed.

Moskowitz, T., and A. Vissing-Jorgensen. 2002. "The Returns to Entrepreneurial Investment: A Private Equity Premium Puzzle?" *American Economic Review*, vol. 92, no. 4 (September):745–778.

This article finds that entrepreneurial investments in nonpublic companies whose performance distribution resembles that of private equity funds have relatively poor performance.

Phalippou, L., and O. Gottschalg. 2006. "The Performance of Private Equity Funds." Working paper, University of Amsterdam and HEC Paris.

Using a dataset of 1,579 mature private equity funds, the authors find that the performance estimates found in previous research and used as industry benchmarks are overstated. They show that commonly used samples are biased toward better-performing funds and that accounting values reported by mature funds for nonexited investments are substantial and mostly represent "living dead" investments. After correcting for sample bias and overstated accounting values, average fund performance changes from slight overperformance to substantial underperformance. Assuming a typical fee structure, they find that gross of fees, these funds outperform by about 4 percent a year.

Schmidt, Daniel M. 2006. "Private Equity versus Stocks: Do the Alternative Asset's Risk and Return Characteristics Add Value to the Portfolio?" *Journal of Alternative Investments*, vol. 9, no. 1 (Summer):28–47. [added April 2008]

"Private equity (PE) investments may be less popular than other types of investments because of low transparency, illiquidity, and the difficulty of including these investments in an optimal portfolio. The author explains the risk and return of individual investments in private equity transactions, including mezzanine, venture capital, early-stage, and later-stage investments. This study seeks to develop an approach for the inclusion of PE in optimal portfolio construction." [Keith H. Black, CFA, *CFA Digest*, February 2007]

Sorensen, M. Forthcoming 2007. "How Smart Is Smart Money? A Two-Sided Matching Model of Venture Capital." *Journal of Finance*.

The author finds that the main driver of funds' success rate with their portfolio companies is experience.

Swensen, D.F. 2000. *Pioneering Portfolio Management*. New York: Free Press.

The author examines data on 542 buyout deals initiated and concluded between 1987 and 1998. He points out that returns for similarly leveraged marketable securities are superior to that of buyouts.

Woodward, S. 2005. "Measuring Risk and Performance for Alternative Assets." Working paper, Sand Hill Econometrics.

The author shows that alphas are very sensitive to adding lagged risk factors. Using only contemporaneous risk factors systematically underestimates risk and overestimates alpha.

Zarutskie, R. 2006. "Do Venture Capitalists Affect Investment Performance?" Working paper, Duke University.

Zarutskie finds that the main driver of the success rate of venture capital funds with their portfolio companies is previous scientific training. She also finds that for early-stage funds, having past industry experience as an entrepreneur is important but having prior venture capital investing experience is not.

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