

# The Risk and Return Characteristics of Private Equity Using Market Prices

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## Abstract

Drawing on a unique and comprehensive data set that includes more than 700 listed private equity companies (LPEs), we analyze the historical risk profile of these investment vehicles from 1994 until 2008. We find that a return index of LPEs has similar risk properties compared to a return index of listed private equity fund of funds. Both of these indices indicate that the private equity (PE) asset class suffers from substantial exposure to stock market risk as well as other measures of macroeconomic activity. In contrast with previous studies, our analysis uses the market price as an objective measure of per share value, and therefore, it does not need to rely on the self-reported internal rate of return or net asset value imputed for assets that are inherently difficult to appraise to calculate the return for the private equity companies. In a cross-sectional analysis we also investigate the influence of organizational structure, size, experience, listing exchange, financing stage, geographic positioning, and industry focus on the fund discount (NAV/Price).

**Keywords:** Listed private equity; risk-return characteristics; funds of funds

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## I. Introduction

The capital commitments to private equity partnerships have grown rapidly from \$20 billion in 1990 to \$496 billion at the market's peak in 2007. The potential economic impact of private equity investments is even greater since many private equity investments are highly leveraged. The conventional wisdom in the investor community is that private equity investments yield superior returns, largely uncorrelated with traditional asset classes such as stocks and bonds. This view is supported by a recent news release by Thomson Financial and the National Venture Capital Association announcing that Thomson Reuters' US Private Equity Performance Index (PEPI)<sup>1</sup> “across all horizons outperformed public market indices, NASDAQ and the S&P 500, through 9/30/2008.” For example, for the 20-year period ending in September 2008, PEPI earned annualized return of 15.4 percent after fees, which is more than twice the return of 7.5 percent earned by S&P 500.

Academic research also shows superior returns for private equity investments. For example, Ljungqvist and Richardson (2003) report that private equity investments outperformed the S&P 500 by six to eight percent. Kaplan and Schoar (2005), Cochrane (2005) and Peng (2003) also find that private equity funds outperform the S&P 500. All these papers use data that suffer from potential selection bias. For example, Kaplan and Schoar (2005) use self-reported data collected by Venture Economics (VE). Venture Economics does not contain any data for funds that choose not to report their performance, and it is quite likely that funds that performed poorly never made it to the VE database. This selection bias aside, the estimated performance of PE funds using VE data depends critically on the valuation of non-exited investments at the end of the sample period. For instance, Kaplan and Schoar use the fund reported accounting values of such non-exited investments and find that the value-weighted performance of PE funds exceeds S&P 500 return by about five percent, but Phalippou and Gottschalg (2009) report that different valuation of non-exited fund show that the PE funds underperformed the market by 3.83 percent.

Ljungqvist and Richardson (2003) attempt to circumvent these biases by using PE investment data provided by “one of the largest institutional investors in private equity in the U.S.” While this database circumvents some of the biases in earlier studies, it is subject to a

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<sup>1</sup> See [http://www.nvca.org/pdf/Q3\\_08\\_VC\\_Performance\\_Release.pdf](http://www.nvca.org/pdf/Q3_08_VC_Performance_Release.pdf). The Private Equity Performance Index is computed based on “quarterly statistics from Thomson Reuters' Private Equity Performance Database analyzing cash flows and returns for more than 1,900 US venture capital and private equity partnerships with a capitalization of \$828 billion. Sources are financial documents and schedules from Limited Partner investors and General Partners.”

more subtle selection bias. The success of this institutional investor in its PE investments likely influenced its decision to provide access to its data. Moreover, this investor likely became one of the largest investors in PE because of its early successes in PE investments either because of its own skills or luck. Without data from a random sample of PE investors, it is difficult to generalize the experience of one successful PE investor to the general class of PE investments.

Cochrane (2005) notes that “overcoming selection bias is the central hurdle in evaluating such investments” and he uses a statistical model to take into account the selection bias. He finds that venture capital investments generated average alpha of 32 percent after bias adjustment. While Cochrane’s analysis provides interesting insights, the reliability of his estimates depend critically on the validity of his statistical assumptions. In contrast, Quigley, Hwang and Woodward (2005) apply a different statistical approach to account for potential selection bias and report that the average alpha for venture capital investments is not different from zero.

This paper examines the risk and return of private equity investments using a comprehensive dataset of publicly traded firms that invest in private equity. Our sample comprises of three categories of firms (i) fund of funds (FoFs) that invest in unlisted private equity funds (ii) publicly traded funds that invest in private equity and (iii) publicly traded firms that give shareholders ownership rights to the general partners who promote unlisted private equity funds. Our comprehensive dataset is free from selection bias. Moreover, we determine the value of investments from market prices and we do not rely on self reported accounting data for valuation. These advantages with our data circumvent the critical shortcomings of the self reported data used in extant studies.

We are also able to determine the risk characteristics of PE investment since we have the market prices available for all of the listed private equity vehicles in our database. The extant literature attempts to infer the risk characteristics of PE investments based on their cash payouts to investors and based on the valuations of these investments when they raise follow up funding. Because it is difficult to determine the market values of all investments made by a PE based on cash payouts or additional financing rounds for some of their investments, additional assumptions are necessary to determine the risk of these investments. The estimates of systematic risk seem to depend significantly on the type of assumptions. For example, the estimates of beta range from about 0.5 in Quigley et al. (2005) to 4.66 in Peng (2001).

This is the first paper to examine the risk and return characteristics of PE using market prices of funds of funds that invest in private equity. Since these funds of funds are claims to various portfolios of unlisted private equity, these entities provide market prices for portfolios of assets that are usually untraded. Three earlier papers examine the risk and return

of venture capital companies using a small number of publicly traded funds that invest in private equity. Martin and Petty (1983) use a sample of 11 venture capital companies that all survived during the 1974 to 1979 period and find that these companies on average earned 26.8 percent per year. Brophy and Guthner (1988) analyze weekly returns for 12 listed venture capital companies that operated over the entire 1981 to 1985 period and find that these companies outperformed the market. Both Martin and Petty, and Brophy and Guthner suffer from selection biases since they require that all firms in their sample survive their entire sample periods.

We construct a data set of more than 700 LPEs during 1994–2008; this sample is representative of the whole private equity industry. Moreover, with this novel and comprehensive sample, we eliminate concerns about survivorship and selection bias. By using daily pricing data for LPEs, which offer an objective measure of their performance, we enable direct comparisons between the risk–return characteristics of private equity and those of other asset classes, such as public equity and debt markets. We also construct a global LPE index that can serve as a benchmark for the universe of unlisted private equity investments. This contribution has several direct applications, including portfolio benchmarking and strategic asset allocation. To investigate the hedging opportunities of LPEs, we examine whether they still generate positive returns when macroeconomic activity declines. We also test whether previous research findings about unlisted funds—including the impact of a fund’s size, experience, financing stage, geographic positioning, and industry focus—hold for our sample of LPEs.

The LPE fund index closely related to the funds of funds index for the underlying unlisted private equity funds. We note that the NVCA value-weighted index for private equity appears to be a smoothed version of the LPE fund index, and thus, this index can serve as a better benchmark for the private equity industry as a whole. For the LPE fund index, we estimate a beta close to 0.92 with the MSCI World index. Thus, private equity returns appear to be quite risky.

European LPEs underperform their U.S. counterparts, though the differences are small. With regard to the investment stage, buyout funds dominate venture capital, though again by only a small amount. The concave relationship between size and performance in our findings implies that larger listed private equity companies perform better but at a declining rate. Overall then, our empirical findings suggest that the private equity market is a risky asset class that is widely exposed to shocks in the public equity and debt markets.

The remainder of this paper is organized as follows: In Section II, we review traditional approaches to private equity investments and introduce the emerging asset class of LPEs. Section III contains a description of our data set and final sample. In Section IV, we present our empirical results, and we conclude in Section V.

## **II. Private Equity Investments**

Private equity refers to investments in unlisted companies that are privately owned, usually through venture capital financing, development capital, or buyouts. Such investing typically occurs through a limited partnership structure in which the private equity firm serves as the general partner (GP). Limited partners (LPs) instead consist largely of institutional or wealthy individual investors who provide capital. At the inception of the investment, LPs must contractually commit their “blind” investment in the partnership. The GP then can draw down and invest committed capital when required. The GP has a specified time period in which to invest the committed capital, usually around five years, and LPs have no input into the investment decisions. However, the GP agrees to return the capital to the LPs at a specified time, usually ten years after the initial investment.

Ideally, after the GPs hold the company for three to five years, it develops sufficiently to become attractive to other investors, so it gets floated on a stock market or sold to a larger company or another private equity firm. Private equity firms typically charge LPs annual management fees, ranging from 1 to 2 percent of their committed investments. When private equity firms sell the investments for a profit, the LPs reap most but not all of the returns, and the GP cannot take any profit until it first repays the LPs the capital that they invested, offset by any losses from bad investments. If any proceeds remain after the hurdle rate, typically 8 to 9 percent of the total invested capital, is cleared, they may be split; conventionally, the LPs receive 80 percent and the GPs receive 20 percent of these net overall fund profits.

However, such investments in private equity through a traditional LP approach can create various problems. First, the likely portfolio diversification of the partnership is limited by the GP’s capabilities and the available management styles and strategies. The intense workload generally prevents funds from investing in more than a handful of companies. Second, the minimum investment tends to be more than \$5 million, which prevents average individual investors from participating in private equity markets. Even for wealthy individual investors, the amount of capital needed to construct a sufficiently diversified portfolio of private equity funds is substantial. Moreover, GPs charge relatively high management fees and, if the fund performs well, take a sizeable proportion of the realized returns. Third, private equity funds may be marketed only to institutions and very wealthy individual investors. Whereas public markets offer securities to the highest bidders, Lerner and Schoar (2004) have documented that GPs may allocate funds to investors on the basis of other attributes, such as their potential ability to withstand a liquidity shock. Fourth, the LP

commits capital at inception, and the investment period, during which the GP draws down and invests capital, may run for half the life of the fund. Yet in many cases, the so-called harvest period, when profits are realized and cash redistributed, begins before all the capital has been invested. Fifth and finally, investors have difficulty measuring their returns on unlisted private equity funds, because market prices typically are old or simply not available. Unlike a publicly traded firm, no ready market price exists for the portfolio of a private equity fund's assets. Moreover, by definition, the underlying assets in the fund are not traded. Thus, unlike mutual funds, the current prices of the individual fund assets are not available to delineate the fund's portfolio.

Many private equity companies have come to market in an attempt to gain access to capital and meet investors' demands for more transparency and liquidity. The resulting listed private equity (LPE) vehicles provide access to an asset class that traditionally has been restricted to institutional investors and high net worth individuals in the form of fixed-life limited partnership funds with high minimum subscriptions. In contrast, shares of LPEs are listed on major stock exchanges and can be bought and sold, just as shares in any listed company can be. Furthermore, LPEs offer a wide range of private equity investments, because each vehicle entails different investment strategies and criteria.

In turn, LPEs provide various advantages compared with traditional direct fund investments. First, private equity in this listed form is no longer as illiquid because they are quoted on public stock exchanges. The investor benefits from the relative liquidity of the shares while participating in an illiquid private equity portfolio that frequently offers superior returns. The marketability and availability of market prices have a clear and practical use. Private equity is best suited for long-term holding, but shareholders gain the ability to buy and sell shares in the LPE vehicle at a known price, which increases or reduces their exposure immediately and at their preference. Second, LPEs must comply with strict reporting requirements and corporate governance rules, and therefore, they are much more transparent than their unlisted counterparts. Regular reports of net asset value, the benefits of daily mark-to-market pricing, and interim and final financial accounts provide valuable insights about the portfolio. In addition, LPEs have an obligation to make the market aware of any price-sensitive events, beyond their regular reporting requirements. Third, without a minimum investment requirement, LPEs are accessible to smaller investors. Finally, they also suffer no restrictions similar to the sales prohibition for traditional private equity.

### **III. Data**

The data for this study come from several different sources. Specifically, the data related to LPEs shares and all financial market indices are from Thomson Financial Datastream, which

also provides the currency conversion tool for any company data that report currencies other than U.S. dollars. Kenneth French's Web site provides the time series for the Fama-French (1993) risk factors, the riskless rate, and the momentum factor (Carhart 1997). For the data about macroeconomic variables in the United States, we turn to FRED, the Web site maintained by the Federal Reserve Bank of Saint Louis. All LPE classifiers come from VentureXpert, though if an observation is not available on VentureXpert, we determine the classifiers from the LPE's annual reports.

#### ***A. Sample Selection***

No publicly available data list all quoted private equity companies, nor is such a list available from commercial databases that offer data on the private equity industry. Therefore, we begin by collecting potential LPEs from various sources, including commercial data providers (Thomson VentureXpert, Thomson SDC Platinum, Dow Jones Galante, Dow Jones Private Equity Analyst) as well as Bloomberg and Reuters, as well as stock exchanges, investment banks, analysts, institutional investors, and reports by the NVCA and other venture capital associations. We take the resultant sample of 12,500 potential LPEs and match them with data from Thomson Financial Datastream. Companies not covered by Datastream likely are not quoted on an exchange, so we exclude them from our sample and identify 1,800 publicly traded companies that potentially are active in the field of private equity.

Because we define LPEs more narrowly as instruments in which the underlying business is private equity investing but the vehicles are quoted on an exchange, we exclude companies without private equity characteristics (e.g., investment holding companies that focus on becoming operators), those that offer various financial services (e.g., investment and merchant banks), and funds that invest significantly in listed securities or fixed income other than private equity. We also exclude open-ended funds, such as unit trusts and mutual funds. Hence, to be eligible for inclusion in our sample then, a company must meet a specific definition: The company is listed on a public stock exchange, its core business is investing in private equity (more than 50 percent of all assets are classified as private equity investments), and it actively pursues an exit strategy. Through our efforts, we identified 833 LPEs.

In a final step, we deleted all LPEs that lacked full pricing information, though unlike Bilo et al. (2005), we do not require the LPEs to stay in existence for the entire sample period. The final sample of 710 LPEs includes 80 delisted and 4 suspended companies, and this data set has the key advantage of being free of self-reporting and survivorship biases (see Brown, Goetzmann, and Ibbotson 1999). These 710 LPEs appear on various exchanges around the world and represent a broad range of financing stages and investment strategies, including geographical and industry sector exposure.

## ***B. Liquidity Criteria***

As are many alternatives, illiquidity is a practical constraint. Illiquid stocks exhibit autocorrelation in prices, which makes it difficult to study their price behavior. The volatility of an illiquid price series will be biased upward by infrequent, sharp revaluations, whereas systematic risk measures likely will be biased downward. Therefore, it is necessary to impose liquidity criteria to ensure that the sample accurately reflects price movements in the listed private equity market.

We require LPEs in our final sample to fulfill four criteria and thus reflect general price dynamics in the private equity industry. We evaluate the following criteria as annual averages over the full year of daily data prior to the rebalancing month:

1. A minimum of 150 price observations available.
2. The average market capitalization of the LPE is more than \$20 million.
3. The average annual bid–ask spread does not exceed 4 percent of the average price at which the securities trade in the market.
4. The minimum trading volume, relative to the companies' market capitalization, is more than .08 percent.

Only 391 LPE companies in our sample meet these liquidity constraints. A substantial number of the 710 vehicles are thinly traded. We also recognize that data about trading volume and bid ask prices are scarce prior to 1994, so we investigate the performance and risk–return characteristics of LPEs for 1994–2008, for which we have 379 LPEs, 35 of which (9.2 percent) have been delisted. Our LPE index thus provides tradable exposure to leading LPE vehicles that meet key size, liquidity, and trading activity requirements.

## ***C. LPE Classification***

We classify the 379 LPEs in our final sample by some of their observable characteristics to determine which key factors drive their performance. Specifically, we differentiate our sample according to seven features: organizational structure, country of listing, size, experience, investment stage focus, industry focus, and geographical focus.

The first organizational structure category consists of LPE firms such as Blackstone or 3i that invest directly in private companies, act mostly as GPs, have an active controlling stake in the target companies, and are actively involved with the business strategy. The second category consists of LPE funds such as JZ Capital Partners raised specifically for investment in private companies. These funds have their own listing on exchanges and invest directly in underlying end-investments, mostly through limited partnerships. In this context, funds refer to closed-end funds, not funds as pools of capital raised and managed by private

equity partnerships. The third group consists of LPE funds of funds such as KKR Private Equity Investors that generally do not hold controlling stakes in the underlying vehicles and invest as LPs.

Listed funds of funds give retail investors access to the otherwise unreachable unlisted asset class and do not own a controlling stake in the underlying funds. In other words they are comparable to an institutional investor's private equity portfolio. Similar to an institutional investor these funds of funds invest as a limited partner. Table 1 provides a description of the funds of funds universe during our sample period. An value-weighted index based on this sample of 26 listed funds of funds is a diversified portfolio of underlying unlisted private equity investments.

*<Insert Table 1 here>*

We also group LPEs by exchange (US, Europe, London, and Rest of World), market capitalization (20m–100m USD, 100m–500m, 500m–1,000m, 1,000m–2,500m, and above 2,500m), investment stage focus (early-stage, expansion, balanced, buyout, and other private equity investment), industry focus (biotechnology, consumer, diversified, financials, industrials, technology, and telecommunication), geographical focus (North America, Europe and the UK, and Rest of World), and experience proxied by time since IPO (less than 1 year, 1–3 years, 3–5 years, 5–10 years, 10–15 years, and more than 15 years). Table 2 displays the total number, value, and number of active and delisted LPEs per characteristic.

*<Insert Table 2 here>*

According to Panel A in Table 2, LPE firms constitute a large majority of the sample. They are also relatively larger in size, whereas LPE funds are the smallest in terms of market capitalization. In Panel B, we show that the sample is dominated by LPEs listed on the European (124) and London (114) stock exchanges, whereas the U.S. stock exchange is underrepresented. However, the average size of LPEs listed on the U.S. exchange is much larger than those listed elsewhere, and those listed in London are relatively smaller. The U.S. listed private equity market appears less well-developed than the European one; it hosts a large number of closed-end funds, special vehicles such as business development companies, fewer private equity firms, and not a single fund of funds. The size classes in Table 2, Panel C, are based on average market values over the entire sample period and show that most funds achieve market capitalization of USD20–500 million. This sample is dominated by a relatively small number of mega funds; that is, the 34 LPEs with USD1,000–2,500 million

represent roughly 22 percent of the sample in market value. The 26 funds of funds that are larger than USD 2,500 million represent more than 50 percent of the sample in market value.

In Panel D, we reveal that our sample is fairly well balanced across the five investment stages. The buyouts and other private equity stages include relatively larger LPEs than the three venture capital categories. The sample also includes quite a few LPEs with a diversified industry focus, according to Panel E. Many LPEs also appear in the technology category, though they are smaller than those focused on biotechnology and financials. As Panel F shows, the geographical focus of the LPEs in our sample is biased toward the European market, and the total market value focused on Europe is even larger. Finally, the experience classifiers in Panel G indicate the time between the listing dates and 31 December 2008. The number of LPEs per category are reasonably balanced, but measured in terms of market value, the sample is clearly dominated by the 93 LPEs with more than 15 years' experience, which represent roughly 49 percent of total market capitalization.

#### **IV. Discussion of Results**

##### ***A. Construction of the LPE Index***

We construct the first global LPE total return index that tracks the performance of the broad class of LPE vehicles over the period January 1994 to December 2008, using total return series obtained from Datastream, with the dividends reinvested. We build various value-weighted indices for which the weights depend on the relative market capitalization. These total return indices are based on our sample of 379 LPEs that meet the four liquidity criteria at the moment of monthly rebalancing, so the exact number of index constituents varies.

Yet LPE is only part of the entire private equity industry. The natural question arises whether our LPE index is representative for the industry as a whole. The NVCA publishes a private equity performance index that tracks the unlisted private equity industry, based on the latest quarterly statistics from Thomson Reuters' Private Equity Performance Database. It includes cash flows and returns for more than 1,900 U.S. venture capital and private equity partnerships and determines index returns net of management fees, partnership expenses, and the fund manager's carried interest. Figure 1 compares our value-weighted LPE total return index and the NVCA capital-weighted average return index for 1994–2008.

*<Insert Figure 1 here>*

Our LPE index slightly leads the NVCA index and the latter series appears to be a smoothed version of the index based on market prices.

## **B. Performance of Listed Private Equity**

To study the performance and risk characteristics of private equity, we estimate two models:

$$R_{it} - RF_t = \alpha_i + \beta_{1i}(R_{mt} - RF_t) + \varepsilon_{it}, \text{ and} \quad (1)$$

$$R_{it} - RF_t = \alpha_i + \beta_{1i}(R_{mt} - RF_t) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}MOM_t + \varepsilon_{it}. \quad (2)$$

In Table 3, we list the regression results for our indices of funds of funds and other listed private equity vehicles over the period 1994–2008.

*<Insert Table 3 here>*

The first two columns of Table 3 contain the performance parameter estimates for the excess return of the value-weighted listed funds of funds index. In column 1, the factor loading for the MSCI World index is 0.92 and the intercept is less than three basis points. In addition, more than 38% of the variance of the fund of funds index is explained by the return for the broadest index of public equity. In column 2 we replace the MSCI World index with the S&P 500 index. The factor loading and explanatory power associated with the S&P 500 index are somewhat lower due to the international nature of the underlying investments. However, there is still no evidence of significant average abnormal returns. In columns 3 and 4 of this table, we use analogous specifications for the value-weighted index of listed private equity funds. We find similar results regarding the lack of performance benefits for the index of listed private equity. More importantly, the factor loading of the market portfolio for the funds of funds index, where the underlying assets are unlisted private equity funds, and the listed private equity index are quite similar, 0.92 and 0.96 respectively. Thus, the similarity of the factor loading for systematic risk for these two indices suggests that the index of listed private equity fund is a useful proxy for the performance of unlisted private equity. In columns 5 and 6 we analyze the performance of a combined index of listed private equity funds (LPs) and listed private equity firms (GPs). The factor loading for systematic risk is somewhat higher for this combined index, and therefore, the listed private equity firms hold a leveraged claim to the underlying investments of the listed private equity funds.

*<Insert Table 4 here>*

In Table 4 we reexamine the risk profile of these indices using the 4-factor model. For the index of funds of funds (columns 1 and 2) we find that the factors loading on SMB is

positive and statistically significant. Essentially, the return to this private equity index behaves more like the return for small stocks than large stocks. The factor loadings for HML and MOM are positive but not statistically significant. The coefficient estimates for the index of listed private equity funds in columns 3 and 4 are quite similar in magnitude to the coefficient estimates for the funds of funds index. Once again, the index of listed private equity funds has similar risk characteristics compared to the portfolio of funds in the funds invested in unlisted private equity.

### C. *LPE Performance and the Economic Environment*

Ljungqvist and Richardson (2003) find strong correlations between the year in which a fund makes its first investment (vintage year) and its future performance. During an economic upswing, increased liquidity increases company valuation, but the opposite also is true. Gompers et al. (2005) note that the point in time at which a private equity fund makes its initial investment offers a strong indicator of its future success. Yet Kaplan and Schoar (2005) argue that market entry is procyclical, such that funds starting in boom times perform worse. Phalippou and Gottschalg (2008) also analyze whether stock market cycles and industry-specific business cycles might covary with the performance of private equity funds. Their proxy for the CAPM beta of unlisted funds implies that private equity performance is procyclical with both business cycles and public stock markets.

Koopman, Kräussl, Lucas, and Monteiro (2009) relate the credit cycle to three blocks of economic variables: the business cycle, bank lending conditions, and financial market indicators. However, they show that these variables appear to explain only some of the credit cycle. To investigate how LPE performance may depend on credit cycle dynamics—that is, the extent to which the private equity industry depends on volatility in the debt markets—we estimate the following model:

$$R_{it} - RF_t = \alpha_i + \beta_{1i}(R_{mt} - RF_t) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}MOM_t + \beta_{5i}Lidity_t + \beta_{5i}Dummy1_i \quad (4) \\ + \beta_{5i}Dummy2_i + \beta_{5i}Dummy3_i + \beta_{5i}Dummy4_i + \beta_{5i}Dummy5_i + \varepsilon_{it}$$

We replace the dummy variables with two macroeconomic variables. Similar to Koopman et al. (2009) we proxy the business cycle with GDP growth and the bank lending conditions with the credit spread (i.e., difference between interest rates for BAA and AAA corporate bonds).

Although our previous empirical findings suggest the opposite, we hypothesize that the private equity industry may be less affected by the current credit crisis, because capital

commitments to funds are longer term. Thus, these companies should have access to capital even during turbulent times in financial markets. Table 5 presents for each sample (all private equity, venture capital, and buyouts) the estimates for both the market model (1) and the factor model (2), including the macro economic variables.

*<Insert Tables 5a, 5b here>*

The results generally meet our expectations: GDP growth has a significantly positive effect on the performance of the entire listed private equity industry; an increase in the number of loans outstanding positively influences performance, though the economic effect is rather small. Money supply growth strongly and positively influences performance. Increases in the quality spread suggest tighter credit markets and a significantly negative coefficient. Our prior finding that private equity exhibits a large downside risk receives support from the significantly negative coefficient, which represents volatility in the public equity market.

However, a notable exception to the support for our expectations appears in the buyout segment. We anticipated finding stronger correlations between this segment and the credit cycle than between the credit cycle and venture capital, but most of the coefficients are insignificant for the buyout sub-sample.

#### ***D. Cross-Sectional Performance of Listed Private Equity***

Broadly, private equity consists of two categories: venture capital and buyout funds. The former provides capital to mostly young companies that are developing innovative technologies and may enjoy strong growth in the future but cannot raise sufficient financing in the debt or public equity markets. These transactions suffer great uncertainty and high risk but offer potentially high returns. Fama and French (1992) show that the stock market returns on these small companies differ significantly from those of larger, public companies.

The second category includes management and leveraged buyouts, combining various forms of private equity such as balanced stage, mezzanine stage, turnaround, and distressed debt financing. Private equity capital finances changes in capital structure and ownership, aids in restructuring efforts, and mitigates periods of financial distress. Therefore, it mostly involves public-to-private transactions of mature companies in markets with low growth rates and stable cash flows. Because the risks involved are limited, they should yield lower returns, and buyout transactions in turn frequently involve high amounts of leverage to increase the returns to owners. However, this leverage also increases risk, because fulfillment of the debt obligation lies with the companies, which exposes them to default risk.

Empirical evidence regarding the performance of venture capital versus buyout funds is rather mixed. Ljungqvist and Richardson (2003) conclude that buyout funds outperform venture capital funds, by an average of 21.8 percent versus 14.1 percent. They also find an average beta estimate of 1.12 for venture capital funds and a slightly lower beta of 1.09 for the buyout funds. However, Kaplan and Schoar (2005) show that buyout funds slightly underperform the S&P 500, whereas venture capital funds generate superior returns. Gompers and Lerner (2000) argue that overall macroeconomic conditions and the degree of competition in the venture capital industry affect the valuation of individual deals. Small private firms are more sensitive to business cycles, and price behavior may depend on changes in gross domestic product (GDP) growth rates. They reason that credit markets may drive valuations in the private equity industry, because bank loans may substitute for venture capital. When bank loans are more expensive or less available, entrepreneurs may be willing to pay a higher cost of equity capital to attract venture financing.

Tables 6a and 6b present our results for the different segments of venture capital and buyout funds for the CAPM model, for the 4 factor model and for our macroeconomic condition variables, both for the S&P 500 and for the MSCI World index (for robustness).

*<Insert Tables 6a, 6b here>*

We also undertake a cross-sectional analysis to determine the relation between the performance of a private equity company and its characteristics. From our sample of 379 liquid LPE, we first analyze which organizational structure—LPE firms, funds, or funds of funds—performs best during 1994–2008. The stock exchange on which the LPE gets quoted might also impact performance, because the U.S. capital market is much more developed than its European counterpart, so LPEs listed on North American exchanges should generate higher returns.

Kaplan and Schoar (2005) find a concave relationship between a fund's size and its performance; before a certain point, larger funds perform better than smaller ones, but this relationship turns negative for very large funds. Funds trying to grow beyond a certain point may perform worse if they cannot attract the required human capital or find sufficiently attractive deals. Following their line of reasoning, we hypothesize that up to a certain point larger LPE market capitalization leads to stronger performance. Kaplan and Schoar (2005) also show that fund performance relates positively to its sequence number, which may actually reflect the GP's experience and reputation. Older partnerships have access to more established networks and industry contacts that provide proprietary deal flow, help them avoid costly auction bids, and offer greater deal profitability. We expect that the age of a LPE

company captures these effects, such that more mature companies achieve stronger performance than more recently listed companies.

Both Ljungqvist and Richardson (2003) and Kaplan and Schoar (2005) find performance differences between venture capital funds and buyout funds. Venture capital investments inherently carry more business risks, whereas buyouts suffer more financial risks. Because investment risk depends on the life cycle stage of the companies in a portfolio, we investigate whether this life cycle stage (i.e., early-stage, expansion, balanced, buyouts, or other private equity financing) substantially influences LPE performance.

Private equity companies may limit their investments to a specific industry, but because their performance depends on the performance of the portfolio firms, concentrated investments may expose a private equity company to industry-specific risk. Companies in some industries (e.g., biotechnology) also need more time to produce observable results (cf. software, ICT). These industry-specific issues should affect the volatility of the stock price of a LPE company, especially those concentrated in a particular sector.

Another type of concentration may occur when LPEs limit their investments to a specific geographic area. Phalippou and Gottschalg (2009) find that investments in private equity funds located outside the United States yield significantly lower returns, and various studies note the relevance of legal regulations and financial environments for private equity financing. Moreover, Hochberg, Ljungqvist, and Lu (2007) indicate that an established network of venture capitalists can play a crucial role. Therefore, we hypothesize that LPEs that specialize in deal financing in North America generate higher returns than do other LPE investments.

To investigate how a private equity company's performance and its characteristics correlate, we regress the price returns on dummy variables, according to the type of classifier. The resultant model shows:

$$R_{it} - RF_t = \alpha_i + \beta_{1i}(R_{mt} - RF_t) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}MOM_t + \beta_{5i}Lidity_t + \beta_{5i}Dummy1_i \quad (3)$$

$$+ \beta_{5i}Dummy2_i + \beta_{5i}Dummy3_i + \beta_{5i}Dummy4_i + \beta_{5i}Dummy5_i + \varepsilon_{it}$$

We include time-fixed effects to control for the large heterogeneity in private equity returns over time and correct for heteroscedasticity (White method) and then estimate seven regression models using ordinary least squares. Table 5 shows the estimates of our cross-sectional regression.

*<Insert Table 7 here>*

The results in Table 5 show the cross-sectional relations, which offer no proof of differences in performance due to the different organizational structures. The coefficients for both firms and funds are small and insignificant.

In line with Phalippou and Gottschalg (2009), we find that European LPEs underperform their U.S. counterparts, though the differences are small and seemingly irrelevant. It does not seem to matter whether a LPE appears on a U.S. stock exchange or London's. The evidence pertaining to the investment stage confirms that buyout funds dominate venture capital, though by only a small amount. Table 5 also shows that LPEs that focus on the industrial and biotechnology sectors perform better than their counterparts, as do LPEs with a diversified focus. This evidence makes it difficult to argue that focused funds perform better than diversified funds by building stronger industry networks and skills. In contrast with previous findings, our results offer weak evidence that LPEs focusing on Europe and the rest of world (Asia, Australia) perform better than LPEs focusing on U.S. financing companies.

The size regression includes two continuous variables: the stock prices of a private equity company regressed on the logarithm of its market value and on the logarithm of its market value squared. Similar to Kaplan and Schoar (2005), we find a concave relationship between size and performance: Larger companies perform better but at a declining rate. The impact of experience model has six continuous dummy variables, which represent the number of months since the LPEs' listing, so as LPEs age over the course of the sample period, they change age categories. The category experience results are inconclusive, because the estimated coefficients are all insignificant. However, all coefficients are positive and increasing since the date the company was listed, which suggests that more experienced (older) LPEs perform better than less experienced (younger) LPEs.

## **V. Conclusions**

Unlike previous studies designed to estimate the performance of private equity investments, we investigate the market prices of listed private equity companies, not book values. Because we have access to the objective measures of market prices, we no longer need to rely on self-reported data to determine the return values. Listed private equity provides several advantages over unlisted private equity. Most important, it suffers less from stale pricing, is more transparent, and provides increased liquidity. Although the LPE market plays an important role in the financial landscape, we know little about its performance and risk characteristics.

This article attempts to fill this gap by constructing a novel, comprehensive data set with a large sample of globally listed private equity companies. Using our final sample of 379 LPEs over 1994–2008, we investigate internal and external drivers of performance and risk. Our sample represents all listings on international exchanges for which pricing data are available and that fulfill stringent liquidity requirements; we thus minimize the thin markets effect on the results. Moreover, our sample is free of survivorship and selection bias. We employ the S&P 500 as a representative measure of the equity market in general.

The private equity market emerges as a risky asset class that is strongly exposed to volatility in the public equity and debt markets. Investors are not sufficiently rewarded for this risk, according to the significantly negative alphas we document.

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**Table 1. Funds of Private Equity Funds Characteristics**

<b>No.</b>	<b>Name</b>	<b>No. of Fund Investments</b>	<b>Stage Exposure</b>	<b>Industry Exposure</b>	<b>Geographic Exposure</b>	<b>Vintage-year Exposure</b>
1	Absolute Private Equity AG	42	Buyouts	Consumers	North America	Unbalanced
2	AIG Private Equity Ltd.	66	Buyouts	Consumers	North America	Balanced
3	Amanda Capital	12	Venture Capital	Consumers	Europe	Unbalanced
4	AP Alternative Assets LP	4	Venture Capital	Industrials	North America	Unbalanced
5	Bramdean Alternatives Ltd.	12	Buyouts	NA	RoW	Unbalanced
6	Castle Private Equity AG	13	Buyouts	Consumers	North America	Balanced
7	Conversus Capital LP	186	Buyouts	Consumers	North America	Balanced
8	Evolve India Holding PLC	2	Venture Capital	Consumers	RoW	Unbalanced
9	F&C Private Equity Trust PLC	20	Buyouts	NA	Europe	Balanced
10	Graphite Enterprise Trust PLC	5	Buyouts	Industrials	Europe	Balanced
11	HarbourVest Global Private Equity Ltd.	552	Buyouts	Consumers	North America	Unbalanced
12	ING Private Equity Access Ltd.	6	Buyouts	Consumers	RoW	NA
13	JP Morgan Private Equity Ltd.	44	Buyouts	Consumers	North America	Balanced
14	KKR Private Equity Investors LP	4	Buyouts	Consumers	North America	Balanced
15	Lehman Brothers Private Equity Partners Ltd.	37	Buyouts	Industrials	North America	Unbalanced
16	Macquarie Private Capital Group	41	Buyouts	Consumers	RoW	Unbalanced
17	New Star Private Equity Trust PLC	19	Buyouts	Consumers	Europe	Unbalanced
18	NAXS Nordic Access Buyout Fund AB	5	Buyouts	NA	Europe	NA
19	Pantheon International Participations PLC	93	Venture Capital	Consumers	North America	Unbalanced
20	Princess Private Equity Holding Ltd.	115	Buyouts	NA	North America	Balanced
21	Private Equity Holding AG	41	Venture Capital	Technology	Europe	Unbalanced
22	Private Equity Investor PLC	18	Venture Capital	NA	North America	Unbalanced
23	Scandinavian Private Equity A/S	4	Buyouts	NA	Europe	NA
24	shaPE Capital AG	16	Venture Capital	NA	Europe	Balanced
25	Standard Life European Private Equity PLC	25	Buyouts	Consumers	Europe	Unbalanced
26	SVG Capital PLC	24	Buyouts	Consumers	Europe	Unbalanced

**Table 2. Sample Statistics, 1994 – 2008**

<b>Panel A: Category</b>							
	<b>Total</b>	<b>%</b>	<b>% USD</b>	<b>Active</b>	<b>%</b>	<b>Dead</b>	<b>%</b>
Firm	235	62.0%	82.1%	211	55.7%	24	6.3%
Fund	118	31.1%	13.6%	108	28.5%	10	2.6%
FoF	26	6.9%	4.3%	25	6.6%	1	0.3%
Total	379	100.0%	100.0%	344	90.8%	35	9.2%
<b>Panel B: Exchange</b>							
US	55	14.5%	27.3%	54	14.3%	1	0.3%
Europe	124	32.7%	30.0%	111	29.3%	13	3.4%
London	114	30.1%	17.3%	104	27.4%	10	2.6%
RoW	86	22.7%	25.4%	75	19.8%	11	2.9%
Total	379	100.0%	100.0%	344	90.8%	35	9.2%
<b>Panel C: Size</b>							
20m - 100m	165	43.5%	3.0%	155	38.3%	20	5.3%
100m - 500m	128	33.8%	13.1%	120	31.7%	8	2.1%
500m – 1,000m	26	6.9%	7.2%	24	6.3%	2	0.5%
1,000m – 2,500	34	9.0%	21.3%	31	8.2%	3	0.8%
>2,500m	26	6.9%	55.5%	24	6.3%	2	0.5%
Total	379	100.0%	100.0%	344	90.8%	35	9.2%
<b>Panel D: Stage Focus</b>							
Early-Stage	57	15.0%	16.5%	53	14.0%	4	1.1%
Expansion	38	10.0%	7.6%	34	9.0%	4	1.1%
Balanced	61	16.1%	15.0%	56	14.8%	5	1.3%
Buyout	29	7.7%	9.8%	24	6.3%	5	1.3%
Other PE	43	11.4%	14.7%	38	10.0%	5	1.3%
NA	151	39.8%	36.4%	139	36.7%	12	3.2%
Total	379	100.0%	100.0%	344	90.8%	35	9.2%
<b>Panel E: Industry Focus</b>							
Biotechnology	26	6.9%	11.3%	23	6.1%	3	0.8%
Consumer	19	5.0%	5.0%	16	4.2%	3	0.8%
Diversified	78	20.6%	29.7%	71	18.7%	7	1.9%
Financials	5	1.3%	6.3%	5	1.3%	0	0.0%
Industrials	20	5.3%	3.1%	19	5.0%	1	0.3%
Technology	54	14.3%	8.9%	49	12.9%	5	1.3%
Telecommunication	23	6.1%	3.8%	20	5.3%	3	0.8%
NA	154	40.6%	31.9%	141	37.2%	13	3.4%
Total	379	100.0%	100.0%	344	90.8%	35	9.2%
<b>Panel F: Geographical Focus</b>							
North America	38	10.0%	7.7%	34	9.0%	4	1.1%
Europe	119	31.4%	45.0%	109	28.8%	10	2.6%
RoW	63	16.6%	13.6%	54	14.3%	9	2.4%
NA	159	42.0%	33.7%	147	38.8%	12	3.2%
Total	379	100.0%	100.0%	344	90.8%	35	9.2%
<b>Panel G: Experience</b>							
<1	1	0.3%	0.3%	1	0.3%	0	0.0%
1 to 3	76	20.1%	14.0%	75	19.8%	1	0.3%
3 to 5	46	12.1%	7.9%	43	11.4%	3	0.8%
5 to 10	85	22.4%	9.7%	78	20.6%	7	1.9%
10 to 15	78	20.6%	19.0%	65	17.2%	13	3.4%
>15	93	24.5%	49.2%	82	21.6%	11	2.9%
Total	379	100.0%	100.0%	344	90.8%	35	9.2%

**Table 3. Regression Results CAPM**

Notes: All excess returns (3m T-Bills); Newey-West estimates with 6 lags; all indices value-weighted. Standard errors are in parentheses and are adjusted for serial correlation and heteroskedasticity.

**Dependent Variable: Excess Return**

	FOFs MSCI World	FOFs S&P 500	Funds MSCI World	Funds S&P 500	Firms and Funds MSCI World	Firms and Funds S&P 500
Intercept	0.0002 (0.0051)	-0.0005 (0.0058)	-0.0027 (0.0033)	-0.0035 (0.0040)	0.0001 (0.0028)	-0.0007 (0.0038)
Beta	0.9227*** (0.1956)	0.7999*** (0.2128)	0.9633*** (0.1515)	0.8373*** (0.1737)	1.1339*** (0.1093)	0.9678*** (0.1446)
Adjusted $R^2$	0.3881	0.3043	0.4867	0.3836	0.6687	0.5083
No. of Observations	180	180	180	180	180	180

**Table 4. Regression Results 4-Factor Model**

Notes: All excess returns (3m T-Bills); Newey-West estimates with 6 lags; all indices value-weighted. Standard errors are in parentheses and are adjusted for serial correlation and heteroskedasticity.

**Dependent Variable: Excess Return**

	FOFs MSCI World	FOFs S&P 500	Funds MSCI World	Funds S&P 500	Firms and Funds MSCI World	Firms and Funds S&P 500
Intercept	-0.0023 (0.0060)	-0.0038 (0.0068)	-0.0042 (0.0035)	-0.0056 (0.0043)	-0.0024 (0.0030)	-0.0040 (0.0040)
Beta	0.9943*** (0.2272)	0.9244*** (0.2498)	0.9669*** (0.1578)	0.8882*** (0.1860)	1.2097*** (0.1053)	1.0913*** (0.1412)
SMB	0.4354*** (0.1344)	0.5421*** (0.1532)	0.4036*** (0.1357)	0.5059*** (0.1508)	0.4216*** (0.0858)	0.5469*** (0.0929)
HML	0.3529 (0.2192)	0.3912 (0.2470)	0.1146 (0.2256)	0.1460 (0.2427)	0.3582*** (0.0861)	0.3866*** (0.1047)
MOM	0.0609 (0.0786)	0.0876 (0.0895)	0.0451 (0.0653)	0.0682 (0.0646)	0.0653 (0.0611)	0.0887 (0.0750)
Adjusted $R^2$	0.4507	0.3954	0.5476	0.4780	0.7376	0.6139
No. of Observations	180	180	180	180	180	180

**Table 5a. Regression Results Economic Environment – S&P 500**

Notes: All excess returns (3m T-Bills); Newey-West estimates with 6 lags; all indices value-weighted. Standard errors are in parentheses and are adjusted for serial correlation and heteroskedasticity.

**Dependent Variable: Excess Return**

	Funds	Funds	Funds	FOFs	FOFs	FOFs
Intercept	-0.037*** (0.0108)	0.0272** (0.0107)	0.0040 (0.0187)	-0.0499** (0.0212)	0.0617*** (0.0130)	0.0274 (0.0221)
Beta	0.7663*** (0.1372)	0.7360*** (0.1416)	0.7251*** (0.1360)	0.6706*** (0.1286)	0.5948*** (0.1190)	0.5787*** (0.1112)
GDP growth	6.6319*** (2.1930)		3.6110* (1.9746)	12.0746*** (4.5024)		5.3376** (2.6035)
Credit spread		-3.3750*** (1.0233)	-2.4513** (1.1960)		-6.8321*** (1.3392)	-5.4667*** (1.4198)
Adjusted $R^2$	0.4231	0.4329	0.4409	0.4182	0.4800	0.4952
No. of Observations	180	180	180	180	180	180

**Table 5b. Regression Results Economic Environment – MSCI World**

Notes: All excess returns (3m T-Bills); Newey-West estimates with 6 lags; all indices value-weighted. Standard errors are in parentheses and are adjusted for serial correlation and heteroskedasticity.

**Dependent Variable: Excess Return**

	Funds	Funds	Funds	FOFs	FOFs	FOFs
Intercept	-0.0266*** (0.0097)	0.0245*** (0.0090)	0.0050 (0.0171)	-0.0461** (0.0202)	0.0588*** (0.0119)	0.0278 (0.0202)
Beta	0.8982*** (0.1221)	0.8722*** (0.1283)	0.8615*** (0.1233)	0.7961*** (0.1142)	0.7270*** (0.1066)	0.7101*** (0.0972)
GDP growth	5.8090*** (2.0478)		3.0530 (1.9379)	11.2931** (4.3865)		4.8322* (2.5075)
Credit spread		-3.0100*** (0.8423)	-2.2328** (1.0271)		-6.4644*** (1.2089)	-5.2342*** (1.2565)
Adjusted $R^2$	0.5169	0.5260	0.5317	0.4874	0.5458	0.5583
No. of Observations	180	180	180	180	180	180

**Table 6a. Regression Results VC vs. BO Funds – S&P 500**

Notes: All excess returns (3m T-Bills); Newey-West estimates with 6 lags; all indices value-weighted. Standard errors are in parentheses and are adjusted for serial correlation and heteroskedasticity.

**Dependent Variable: Excess Return**

	VC	BO	VC	BO	VC	BO
Intercept	0.0037 (0.0049)	-0.0002 (0.0050)	-0.0064 (0.0049)	-0.0046 (0.0058)	0.0123 (0.0198)	0.0170 (0.0169)
Beta	0.5865*** (0.1795)	0.7941*** (0.2380)	0.6543*** (0.1890)	0.9785*** (0.2454)	0.4567*** (0.1372)	0.6322*** (0.1486)
SMB			0.6507*** (0.1692)	0.7483*** (0.2177)		
HML			0.1743 (0.1925)	0.6938** (0.3109)		
MOM			0.1049 (0.0790)	0.0355 (0.0739)		
GDP growth					3.1789 (1.9767)	4.3402** (2.0538)
Credit spread					-3.1889*** (1.1908)	-3.8487** (1.6002)
Adjusted $R^2$	0.1748	0.2295	0.3272	0.36772	0.2450	0.3081
No. of Observations	180	180	180	180	180	180

**Table 6b. Regression Results VC vs. BO Funds – MSCI World**

Notes: All excess returns (3m T-Bills); Newey-West estimates with 6 lags; all indices value-weighted. Standard errors are in parentheses and are adjusted for serial correlation and heteroskedasticity.

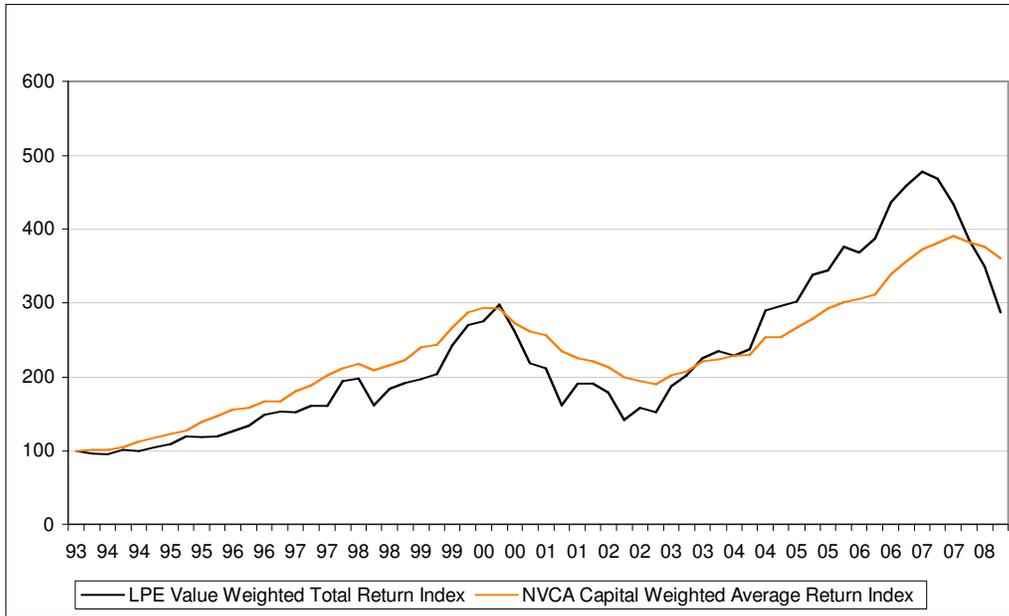
**Dependent Variable: Excess Return**

	VC	BO	VC	BO	VC	BO
Intercept	-0.0032 (0.0044)	0.0005 (0.0041)	-0.0056 (0.0043)	-0.0030 (0.0048)	0.0119 (0.0192)	0.0174 (0.0156)
Beta	0.7342*** (0.1578)	0.9368*** (0.2155)	0.7501*** (0.1725)	1.0575*** (0.2114)	0.6183*** (0.1193)	0.7867*** (0.1384)
SMB			0.5762*** (0.1707)	0.6354*** (0.1918)		
HML			0.1689 (0.1790)	0.6556** (0.2865)		
MOM			0.0966 (0.0692)	0.0083 (0.0827)		
GDP growth					2.6257 (2.0068)	3.7588* (2.0747)
Credit spread					-2.8560*** (1.0692)	-3.5663** (1.4369)
Adjusted $R^2$	0.2626	0.3062	0.3832	0.4181	0.3167	0.3711
No. of Observations	180	180	180	180	180	180

**Table 7. Cross-sectional Regressions Results**

This table reports the results for the analysis of the correlation between performance and observable company characteristics. The dependent variable is the excess return, calculated as the price return minus the 3-month Treasury Bill rate.. The regressions are estimated using OLS. Standard errors are in parentheses and are adjusted for heteroscedasticity (White method). \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level.

Category	Exchange		Stage Focus		Industry Focus		Geographic Focus		Size	Experience	
Intercept	-0.0057 (0.0019)	Intercept -0.0019 (0.0019)	Intercept -0.0113*** (0.0020)	Intercept -0.0103*** (0.0019)	Intercept -0.0103*** (0.0019)	Intercept -0.0103*** (0.0019)	Intercept -0.0105 (0.0019)	Intercept -0.1354*** (0.0138)	<1	0.0162 (0.0189)	
Firm	-0.002 (0.0024)	US 0.0003 (0.0037)	Early Stage 0.0013 (0.0033)	Industrials 0.02*** (0.0037)	Industrials 0.02*** (0.0037)	Industrials 0.02*** (0.0037)	N. America 0.0033 (0.0037)	Size 0.0401*** (0.0046)	1 to 3	0.0142 (0.0196)	
Fund	-0.0007 (0.0025)	Europe -0.0063** (0.0027)	Expansion 0.0072*** (0.0028)	Bio-technology 0.0072** (0.0034)	Bio-technology 0.0072** (0.0034)	Bio-technology 0.0072** (0.0034)	Europe 0.0043* (0.0024)	Size <sup>2</sup> -0.0028*** (0.0004)	3 to 5	0.0172 (0.0191)	
		London -0.0054** (0.0022)	Balanced 0.0066* (0.0034)	Consumer -0.0021 (0.0081)	Consumer -0.0021 (0.0081)	Consumer -0.0021 (0.0081)	RoW 0.0067** (0.0033)		5 to 10	0.0168 (0.0191)	
		RoW -0.0065** (0.0030)	Buyout 0.0119*** (0.0040)	Telecom 0.0027 (0.0043)	Telecom 0.0027 (0.0043)	Telecom 0.0027 (0.0043)			10 to 15	0.0213 (0.0191)	
			Other PE 0.0052* (0.0027)	Technology 0.001 (0.0029)	Technology 0.001 (0.0029)	Technology 0.001 (0.0029)			> 15	0.0251 (0.0190)	
				Diversified 0.0049* (0.0028)	Diversified 0.0049* (0.0028)	Diversified 0.0049* (0.0028)					
Firm F.E	No	No	No	No	No	No	No	No	No	No	
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Adjusted R <sup>2</sup>	0.2114	0.2114	0.2119	0.2122	0.2122	0.2116	0.2212	0.2120			
Obs.	14,772	14,772	14,772	14,772	14,772	14,772	14,772	14,772	14,772	14,772	



**Figure 1. Listed private equity index and NVCA (NAV) index, 1994 -2008**