

The Performance of Private Equity

Chris Higson

London Business School

Rüdiger Stucke

University of Oxford

Abstract

We present conclusive evidence on the performance of private equity, using a high quality dataset of fund cash flows that covers about 85 percent of capital ever raised by U.S. buyout funds. For almost all vintage years since 1980, U.S. buyout funds have significantly outperformed the S&P 500. Liquidated funds from 1980 to 2000 have delivered excess returns of about 450 basis points per year. Adding partially liquidated funds up to 2005, excess returns rise to over 800 basis points. The cross-sectional variation is considerable with just over 60% of all funds doing better than the S&P, and excess returns being driven by top-decile rather than top-quartile funds. We document an extreme cyclicity in returns with much higher figures for funds set up in the first half of each of the past three decades, and correspondingly lower returns towards the end of each decade. However, we find a significant downward trend in absolute returns over all 29 vintage years. Our results are robust to measuring excess returns via money multiples instead of IRRs, and are essentially unchanged when pricing residual values at observed secondary market discounts.

This version: March 2, 2012

Keywords: Private Equity, Leveraged Buyouts, Performance Measurement

JEL classification: G11, G15, G24, G34

The authors acknowledge the support of the Collier Institute of Private Equity at London Business School. They are grateful to Cambridge Associates for generous access to their database, and to further limited partners for sharing their data.

Address correspondence to both: chigson@london.edu, ruediger.stucke@sbs.ox.ac.uk

1. Introduction

Researchers have faced a tough challenge in measuring the returns from the private equity industry for its investors: there is no active and transparent market for private equity assets; fund managers are not required to disclose the performance or the cash flows of their funds; and information that is available through subscription data providers is summarized or anonymized and, therefore, hard to compare and to validate.

One approach has been to source fund cash flow data directly from a single limited partner. These studies all show private equity significantly outperforming public equity benchmarks. For example, Ljungqvist and Richardson (2003) find excess returns of 5 to 8 percentage points per annum compared to the S&P 500.² Limited partner data is likely to be of high quality since limited partners invest on it and have a strong incentive to maintain its accuracy. However, Lerner, Schoar and Wongsunwai (2007) report significant differences in skill and performance between limited partners, making it difficult to generalize from such studies.

By contrast, the Thomson VentureXpert (TVE) private equity database is broad in coverage and has a long history, so has been a natural destination for researchers looking for representativeness. Using TVE's underlying cash flow dataset as of 2001, Kaplan and Schoar (2005, KS) find that net returns from U.S. buyout funds are slightly below the S&P 500. Using the 2003 dataset, Phalippou and Gottschalg (2009, PG) show a significant underperformance of the entire asset class. These findings have been influential and widely referenced in the past.³ However, recent evidence suggests that a significant proportion of the records in those datasets had missing cash flow data that could result in a systematic downward bias in measured performance (Stucke (2011), Phalippou (2012)).

Aside from the data issues - the problems of single source bias and data accuracy - features of the private equity industry itself made it very hard to draw strong conclusions about performance. The returns from a private equity fund can only be measured with

² Further studies include Gottschalg, Talmor and Vasvari (2010), Robinson and Sensoy (2011).

³ By December 2011, these two studies had been downloaded around 20,000 times from SSRN. Politicians, commentators, labour unions and others who are critical of private equity's robust brand of capitalism were probably slightly surprised to find that buyouts did not even deliver superior returns.

certainty when the fund is fully liquidated, which is usually well beyond the nominal 10-year fund life. But the industry is quite young, so judgments about performance are still largely dependent on vintage years in the 1980s and 1990s. Since private equity performance is also very cyclical, there is a real risk that your conclusion depends on where you are standing.

This paper gives a conclusive answer on how private equity has performed in the past relative to the S&P 500, and resolves the ambiguity in the existing studies of private equity performance. We do this by building a dataset with detailed cash flow data on U.S. buyout funds that is unmatched in size and quality.

Our primary source of data is the fund cash flow database of Cambridge Associates (CA), which has not previously been made available to researchers. The CA data has the integrity of limited partner data, but with broad coverage and a long history, containing around 60% of the universe of U.S. buyout funds by value. However, no single source of data is complete, so that even broad coverage data sources may be vulnerable to the charge of selection bias. The solution is to build a complete dataset. We extend the CA data using buyout funds collected from a number of further limited partners to get a sample that is by far the most comprehensive yet assembled. It contains 1,169 funds with total committed capital of over \$1 trillion. It captures approximately 85% of funds ever raised by the U.S. buyout industry, and this proportion is fairly steady back to 1980.

Our key findings are as follows:

We show that U.S. buyout funds with vintage years from 1980 to 2008 have outperformed the S&P 500 by over 500 basis points per annum (as of June 2010). Leaving out very young funds from 2006 to 2008, excess returns rise to over 800 basis points per annum. There is a continuing debate about the reliability of IRRs as performance measures, so we also conduct the analysis in terms of money multiples. The conclusions are unaffected. Our results are broadly consistent with the results of earlier single-limited partner studies such as Ljungqvist and Richardson (2003), suggesting that those findings were not, in fact, the

product of selection bias. Also, we find no evidence of the ‘success’ bias that some critics argue may be present in data aggregators such as CA.

We document an extreme cyclical pattern in returns to U.S. buyout funds through time. IRRs and TVPIs show a highly pronounced wave pattern, with much higher returns for fund vintage years in the first half of the 1980s, 1990s, and 2000s, and correspondingly lower returns towards the end of each decade. However we find a significant downward trend in absolute returns over all 29 vintage years. There is also a considerable cross sectional variation in the performance of funds. Just over 60% of funds earn a positive IRR spread against the S&P 500, and the average fund did much better than the median, suggesting that excess returns are mainly driven by positive outliers. This naturally raises the question of who those outliers are. We find a (weakly) statistically significant positive relationship between the size of a fund and its performance, both absolutely and relative to the S&P 500. Focusing on funds whose investments were less affected by a subsequent economic downturn, that is vintage years from the first half of each decade, the relationship between size and performance becomes highly significant.

We examine the impact on measured performance of using fund managers’ own valuation estimates for funds that are not yet fully liquidated, which show up as net asset values (NAVs). There is a natural mistrust of the NAV component of returns, but we show that NAV is a second order issue in assessing the historical record. Limiting the sample to ‘effectively liquidated’ funds from 1980 to 2000 slightly reduces excess returns to 450 basis points per annum. More reasonably, if we assume a sale of remaining fund interests into the secondary market at observed discounts this raises returns back to over 500 basis points per annum. Adding funds until 2005, excess returns rise to 700 basis points again.

We investigate the gross performance of our funds. We infer the fees and carried interest from the net cash flows and interim valuation figures by making reasonable assumptions about the terms of the partnership agreements. Gross returns are approximately 60% to 80% higher than net returns to LPs, and in excess of 12 percentage points of the S&P 500. However, even at the gross level, still only 70% of all buyout funds beat the S&P 500. We estimate that the gross outperformance is equally split between GPs and LPs over

the period 1980 to 2004, with the managers of our 764 funds retaining around \$200bn in fees and carried interest.

2. Empirical framework and literature

Private equity funds are closed-end with an expected lifetime of 10 to 12 years, and an optional extension to liquidate remaining investments. Outside investors (LPs) commit to subscribe capital and the fund manager (GP) subsequently calls this capital for investments or management fees during the first 5 to 6 years of a fund's lifetime. Cash distributions back to LPs may start as early as the third year, as first investments are exited or recapitalized, and continue until the fund is fully liquidated.

2.1. The profile of returns

The net return from a private equity fund can only be measured with certainty when the fund is fully-liquidated and all cash flows between the fund and its LPs are complete. Interim measures of fund performance have to combine cash flows with a net asset value (NAV), which is the accounting record of the fund's current invested capital.

NAV initially records the purchase cost of investments. NAV is written down if the recoverable value falls below cost but, since 2006, industry guidelines and GAAP (SFAS157, IAS39) require NAV to be recorded at 'fair value', that is, written up to current value as well as written down. This codified what was already widespread practice in the private equity industry. In principle, fair value is an arm's-length exchange value for the asset but in very illiquid markets there is no consensus on how to measure fair value. So on the one hand, NAVs may display accounting conservatism; they may understate the current realizable value of the assets and, in particular, are likely to provide an underestimate of the outturn of future cash flows. On the other hand, GPs may opportunistically overstate NAVs

at certain points of a fund's lifecycle, for example, at times of raising a follow-on fund.⁴ In this paper we are agnostic on the direction of bias.

A fund's remaining NAV is commonly related to the total of invested capital, and presented by the 'residual value to paid-in capital' (RVPI) ratio. The expected profile of RVPI would be to peak at around year 4 to 5; thereafter, cash distributions start to exceed final calls and RVPI trends to zero as investments are realized or written-off. The 'total value to paid-in capital' (TVPI) ratio or 'money multiple' is the sum of the 'distribution to paid-in capital' (DPI) ratio and the RVPI. So the TVPI is an undiscounted measure of performance that is not sensitive to the timing of distributions. Annual and quarterly IRRs effectively use the current NAV as terminal cash flow.

2.2. *TVE and residual values*

Table I presents RVPI ratios of TVE, CA, Preqin, and a group of public reporting institutions (PRI) for U.S. buyout funds as of December 2009. While RVPIs by CA, Preqin and PRI all follow the expected profile following their 10th anniversary and are very similar to each other, the TVE RVPIs are significantly higher. Half of the funds from the 1980s still carry positive RVPIs 20 to 30 years after inception, the average of which is almost 40%. Similarly, half of the funds from 1990 to 1996 have RVPIs above 10%, the average of which is almost 60%.

One explanation might be that TVE is simply more complete than other data aggregators with respect to failed funds, that is, CA, Preqin or PRI data may be subject to a survivorship bias. However, inspection of the TVE database does not support this conjecture: incomplete funds appear to be randomly drawn with respect to interim performance, with respect to size, and with respect to fund age. In terms of age, many funds that enter stasis in TVE do so quite early in life. Instead, Stucke (2011) shows that the reason for these implausibly high residual values are a large number of funds in the TVE database that stopped being updated during their active lifetime, so their data records were

⁴ Certainly, when private equity firms engage in club deals, material differences in measured NAVs for the same asset are regularly observed.

truncated and their NAVs have simply been carried forward since that date and remained constant. As a consequence, significant cash distributions are missing in the TVE data.

The two major studies using early TVE data, Kaplan and Schoar (2005, KS) and Phalippou and Gottschalg (2009, PG), are impacted by incomplete fund data in different ways.

KS compare the performance of U.S. buyout and U.S. venture capital funds from 1980 to 1995 to the S&P 500, using TVE data at December 2001. The authors conclude that, on average, overall net returns of the asset class are approximately equal to the S&P 500, while U.S. buyout returns are slightly below those of the S&P. KS seek to sample funds that are no longer active and use two criteria to establish this: the fund has been officially liquidated, or the fund had no more cash flow activity for at least the final 6 quarters. However, the ‘no more cash flow’ criterion allows all funds with truncated data into the sample, while mature and complete funds with minor cash flow activity, such as dividend payments from remaining equity stakes, are removed. Consequently, the authors oversample incomplete funds in most vintage years, which is the main reason for the downward bias of their results. As an example, the KS sample at December 2001 includes a number of funds from vintage years 1992 to 1995, though, in practice, it would be rare for a private equity fund to have zero cash flow activity between its 5th to 8th anniversary, or to be even liquidated that early.

PG merge TVE’s U.S. and European buyout and venture capital funds with 1980 to 1993 vintage years into a single sample, using data at December 2003. The authors report a substantial underperformance of 3% per year with respect to the S&P 500. Unlike KS, PG actively discuss the high proportion of funds with constant residual values and no cash flow activity. Using the same ‘6 quarters of inactivity’ filter, PG find that as many as 50% of the funds in their working sample have abnormally high residual values.⁵ But rather than the non-updating explanation for the truncated data, the authors interpret constant NAVs as evidence of valueless ‘living dead investments’, and write NAVs off to zero. Given this

⁵ PG write that 462 of their 852 sample funds, which are between 10 and 24 years old, still carry positive residual values that total as much as 43% of the amount they invested, and that most of these funds have not shown any sign of life for a long time.

treatment, PG's conclusion is probably not surprising; reducing the absolute returns of more than every second fund by an average of 43 percentage points inevitably has a strong negative effect.

While PG do not detail the number of U.S.-only funds in their 2003 sample, in an earlier study Gottschalg, Phalippou and Zollo (2003, GPZ) find 161 U.S. buyout funds with vintage years from 1980 to 1993, a decrease by 36 funds. As of 2010, the TVE database has just 148 U.S. buyout funds left for the same period – a further decrease by 13 funds, and a drop of 25 percent since 2001 (see Table II, Panel A). Overall, GPZ document a total of 983 U.S. and European buyout and venture capital funds from 1980 to 1993 in their 2003 sample, only 898 of which are left by 2010. This difference of 85 funds is about the same as the difference between the 'more than 398' funds without 'any sign of activity over the last two years' prior to Dec. 2003 that Phalippou and Zollo (2005) report (plus about 30 funds with constant residual values in TVE's 'officially liquidated' sample), and the 348 funds without any activity over this period that are still in the TVE database as of 2010. We conjecture that the decrease in overall funds between 2003 and 2010 in general, as well as in U.S. buyout funds between 2001, 2003 and 2010 in particular, is due to incomplete funds that were subsequently removed from the TVE database. As a result, vintage years from 1980 to 1993 seem to be in much better shape today (we revisit June 2010 PME values of TVE later).

The impact of extending the subset of truly liquidated funds with these incomplete funds seems to be material. For the 169 U.S. buyout funds in KS's working sample the authors calculate a weighted-average PME value of 0.93. For the subset of 64 officially liquidated funds, Stucke (2011) finds a PME value of 1.09. Similarly, GPZ report that their minority of liquidated U.S. and European buyout funds reached a PME value of 1.06 (with U.S. funds performing better), while adding the remaining buyout funds reduces this value to 0.97. The total of GPZ's liquidated buyout and venture capital funds reached a PME value of 1.03, while adding the majority of incomplete and non-liquidated funds also results in a PME of 0.97.

2.3. Evidence based on single-limited partner data

Ljungqvist and Richardson (2003, LR) use a sample of private equity funds that come from one of the largest institutional investors in private equity in the U.S. Their sample of 73 mature funds consists of 54 buyout funds and 19 venture capital funds with vintage years from 1981 to 1993, and cash flow records up to September 30, 2002. To benchmark, the authors invest into the S&P 500 according to the funds' actual (or average) drawdown schedules. Instead of following the funds' actual distribution schedules, however, the authors assume a single, full distribution from the S&P 500 at the end of year 10 at the index's actual value or the index's average value during year 10.

LR calculate average IRR spreads between the private equity funds and their corresponding index investments of 5.7 to 7.5 percentage points, which is high compared to other studies and compared to our results for this period. However, the IRR spreads of LR's approach are not directly comparable. As measured IRR is sensitive to the timing of distributions, a single distribution of the index investments at the end of year 10 is likely to result in a higher IRR spread, since, as LR document, the average private equity fund in their sample has already delivered one third of all cash distributions by shortly after its 6th anniversary and another third by its 9th anniversary. Using the authors' reported vintage year IRRs and TVPIs we reestimate the performance of their sample to have a positive IRR spread (comparable to our approach) of about 2.1 percentage points, which is broadly in line with our results reported later.

Robinson and Sensoy (2011, RS) compare private equity returns to the S&P 500 for a mixed sample of U.S. and international buyout and venture capital funds with data provided by a large, single limited partner. For their group of liquidated buyout funds, the authors find an outperformance of about 2.5 percentage points.

To form their sample of liquidated funds, RS use the same rule as KS – they keep only 'funds that were either officially liquidated as of 6/30/2010, or had no cash flow activity for the last six quarters'. This rule generates a surprisingly large number of funds with recent vintage years. For vintage years from 1998 to 2005, Panel B of Table II

compares the number of U.S. & international buyout funds in RS's full sample, as well as the number and fraction of funds that were either liquidated or had no more cash flow activity for the last 6 quarters in their 'liquidated' sample, with corresponding figures for our sample of U.S. buyout funds. The fractions of funds that match this rule are significantly different. This is particularly notable for funds with vintage years 1998 to 2001, where the overlap between RS's and our sample must be large. One explanation might be that there are truncated records in RS's data, too.

A recent study by Harris, Jenkinson, and Kaplan (2011, HJK) compares IRRs and money multiples of four commercial databases (TVE, Cambridge Associates, Preqin and Burgiss) and two academic studies (KS and RS). HJK then calculate PME values for a sample of U.S. venture capital and buyout funds from the Burgiss Group, and estimate PME values for the other commercial data providers based on their vintage year multiples and IRRs. For buyout funds, the authors reach a conclusion similar to RS, estimating a positive performance of about 3 percentage points relative to the S&P 500. However, the Burgiss data is comparably young.

3. Data and methodology

3.1. The universe of buyout funds

For research into public equity performance, exchange listing provides a convenient institutional research frame. In the case of private equity, identifying the universe of buyout funds is challenging. Both TVE and Preqin maintain and publish a record of the universe of buyout funds. However, these lists are not identical. For example, the Preqin universe increases significantly by the mid-1990s, while the TVE universe is large in the 1980s and 1990s, but declines in the 2000s. There are many discrepancies of data and definition in terms of fund size, fund vintage year, and fund type between both databases. Merging the Preqin and TVE funds by hand, using a conservative rule that retains all U.S. funds that are categorized as 'buyout' in at least one of the two databases, results in a total of capital

raised of \$1,138bn between 1980 and 2008.⁶ Similarly, the Dow Jones LP Source database reports an amount of capital raised of \$1,231bn over the same period.

With respect to the number of funds, our merge of Preqin and TVE suggests a maximum of about 1,750 funds. However, TVE lists a large number of small funds, side funds and sub funds (about 500 funds are below \$100m, 275 of which below \$50m). The number of discrete funds in LP Source is about 1,500 funds. Since the Dow Jones database has a constantly high coverage throughout the past three decades, and appears to be highly accurate, we benchmark to the Dow Jones figures in the following.

3.2. Our sample of buyout funds

Our base sample comprises all U.S. buyout funds from Cambridge Associates' private equity fund database. CA was formed in the 1970s and became the world's leading private equity advisory firm with over 900 LP clients. It maintains a cash flow and NAV database for over 4,000 private equity and venture capital funds, most of which are administrated on behalf of their LP clients in its role as a data custodian and running customized accounts. We use CA data because it has the data integrity of limited partner data, but with broad coverage and a long history.⁷ We have 556 funds for the vintage years from 1986 to 2008 with combined capital commitments of about \$668bn, and with data updated to the second quarter of 2010. For each fund we have quarterly data on capital calls and capital distributions between the fund and its LPs, and net-to-LP NAVs.

No single data source is complete with respect to the universe: for example, for the vintage years 1980 to 2005, the TVE sample has 497 funds; Cambridge Associates has 431 funds; State Street has 419 funds; Burgiss has 399 funds; Preqin has cash flow data for 290 funds. As a result, even studies that use broad coverage databases sourced from data aggregators are vulnerable to the accusation of selection bias. In the case of Cambridge Associates, some practitioners have interpreted CA's apparently higher benchmarks,

⁶ If there were differences in the size of a fund between both databases, we count the larger value. If the vintage year did not match, we took the earlier of both years.

⁷ CA has recently been appointed by the Institutional Limited Partners Association to create the industry's official future benchmarks for LPs.

compared to TVE, as a result of success bias, perhaps resulting from investments in outperforming first-time funds. As we note below, we find no indication that Cambridge data has a bias in any direction.

To increase coverage relative to the universe, we extend the sample by adding a further 613 U.S. buyout funds with capital commitments of \$356bn, collected from a number of single LPs.⁸ The full sample of 1,169 funds provides additional coverage primarily of smaller funds from the 1980s and 1990s. In total, the 1,169 funds have capital commitments of \$1,024bn, and have quarterly cash flows and valuation figures until the second quarter of 2010. The full sample covers about 90% of the capital raised by the combined Preqin/TVE universe of U.S. buyout funds. With respect to the LP Source universe, we cover almost 85% by value. Importantly, the coverage is fairly evenly distributed back to 1980.

Table III, Panel A, compares the number of funds from the different data sources and in past studies. Panel B compares the CA sample and the full sample to the LP Source universe in capital terms. Figure I compares the median IRRs of the CA sample and the full sample to different data sources.

3.3. *Methodology*

We calculate our absolute performance measures (IRRs and TVPIs) and our relative performance measures (IRR spreads and adjusted TVPIs) for our sample funds by vintage year, for sub-periods, and overall. All capital-weighted and equally-weighted average performance measures are calculated on an annually-pooled cash flow basis. For any period of vintage years we aggregate individual values by weighting them by their underlying amount of invested capital or by the number of underlying funds.

We benchmark against the total (gross) returns of different public equity indices using the traditional ICM approach first documented by Long and Nickels (1996), as well

⁸ These LPs are randomly distributed with respect to their private equity experience (8 to 34 years as of 2012) and assets under management (\$200m to over \$20bn). They cover the full spectrum of institutional investors, including public and corporate pension funds, fund of funds, insurance companies, banks and endowments from the U.S., the U.K. and Continental Europe (Germany and Switzerland).

as the approach of KS. The rationale of the Long and Nickels approach is to invest equally in a public equity index whenever a private equity fund calls capital from its LPs, and to divest an equivalent amount from the index whenever a private equity fund distributes capital back to LPs.⁹ In the meantime, all invested capital changes in value corresponding to the index. The result is a spread between the IRR of the private equity fund and the IRR of the equivalent index investments. KS discount capital distributions and capital calls separately according to the changes in the index and calculate the ratio of both present values. The result is an index-adjusted TVPI.

4. The net returns from U.S. buyout funds

This section presents the net returns generated by U.S. buyout funds for their investors for the 29 vintage years from 1980 to 2008. We study the absolute performance of funds for LPs, the performance relative to the S&P 500, and finally compare our results with the literature and other data sources.

4.1. Absolute returns to LPs

Table IV shows the distribution and absolute performance of the 556 U.S. buyout funds in the CA sample from 1986 to 2008, while Table V shows the same data for the full sample containing all funds. We show capital-weighted, equally-weighted and median IRRs and TVPIs. The IRRs and TVPIs include the reported NAVs, where relevant, as of June 2010.

Over all years, U.S. buyout funds in the CA sample have delivered an average IRR of 8.0% and a TVPI of 1.38. The full sample of U.S. buyout funds delivered an overall IRR of 8.6% and a TVPI of 1.41. The slightly better performance of the full sample comes mainly from the vintage years 1980 to 1985 which are not carried in CA. These were golden (vintage) years for buyout performance, though they involved few funds and relatively little capital.¹⁰ Otherwise, the CA data appears to be highly representative of the

⁹ In contrast to the original ICM approach, we avoid running into a short position with the index equivalent.

¹⁰ Most funds in the earlier 1980s focused on venture capital, or a combination of venture, growth and buyout investments. Funds in our sample are those exclusively conducting leveraged buyouts.

full sample of buyout funds in terms of performance and there is no evidence of a success bias in the CA data. Figure II plots the capital-weighted and median IRRs and TVPIs for the CA sample and for the full sample since the mid-1990s. This emphasizes the consistency between them; the CA returns are almost identical to those of the full sample.

Figure III graphically depicts the strong downward trend of absolute U.S. buyout returns over time, and the highly cyclical nature of buyout returns in general. For the full sample from 1980 to 2008, Figure III plots 3-years rolling IRRs and TVPIs (to account for overlapping investment periods and to smooth). IRRs of above 25% and TVPIs of above 2.5 achieved by many funds in the first half of the 1980s became the unofficial return goal of the buyout industry: ‘returns of 25 and 2.5’. IRRs and TVPIs fell in the second half of the 1980s due to many overleveraged companies and a weak U.S. economy in the early 1990s. Funds with vintage years from the earlier 1990s that exited their investments during the economic boom towards 2000 show again IRRs around 25% and TVPIs up to 2.5. Later-1990s vintage years delivered correspondingly poor returns – for the first time with single-digit IRRs. The 2000s followed the same pattern as the 1980s and 1990s, though funds in the 2000s increasingly contain unrealized investments.

The cyclical nature of private equity returns has often been noted. KS argue that cyclical underperformance is a result of capital flowing to underperforming funds and to new funds in boom periods. Gompers and Lerner (2000) talk about the ‘money chasing deals’ feature of private equity performance. The evident inverse correlation between the performance cycles in Figure III and equity and debt capital market cycles, and with the business cycle, suggests that wider economic factors have a significant impact.

4.2. Relative performance to the S&P 500

U.S. buyout funds outperformed the S&P 500 in almost every vintage year since 1980 (Table VI). The overall capital-weighted average IRR for 1980 to 2008 vintage years is 544 basis points higher than for equivalent investments in the S&P 500. Excluding the very young vintage years 2006 to 2008, this number rises to 809 basis points per annum. Over the whole period, the equally-weighted average IRR is 468 basis points higher than the

S&P 500, and the median buyout fund has a positive spread of 390 basis points, against the accepted wisdom that the average or median buyout fund does not outperform public equity.

In most vintage years the average outperformance is above the median, often significantly, indicating that the substantial excess returns are largely driven by positive outliers. This observation is underscored by the fact that just 63% of the sample displays a positive IRR spread against the S&P 500. Over all 29 vintage years, the S&P adjusted TVPI is 1.23 for the capital-weighted and 1.21 for the equally-weighted average fund, as well as 1.11 for the median fund. Excluding funds from 2006 to 2008, these multiples increase to 1.35, 1.30 and 1.21, respectively.

U.S. buyout funds from the 1980s delivered weighted-average excess returns of 244 basis points per annum over the S&P 500. This number is very similar in size to our estimation based on the data of Ljungqvist and Richardson (2003). The equally-weighted average fund performed better with an IRR spread of 370 basis points.¹¹ The median fund in the 1980s slightly underperformed the S&P. The average U.S. buyout fund from the 1990s delivered excess returns of about 470 basis points per annum, while the median fund reached 300 basis points. Although the absolute performance of U.S. buyout funds was very cyclical in the 1990s, the excess returns over the S&P 500 remained comparably stable throughout the decade.

Funds from 2000 to 2005 have average IRR spreads of around 1,000 basis points or above. The likely reasons for this strong outperformance were relatively low entry multiples until the mid-2000s, and unprecedented levels of cheap debt, leveraged recapitalizations and secondary sales. However, the outperformance of these younger funds measured at June 2010 partly relies on net asset values since these funds are not yet fully liquidated. Unreported estimates suggest that vintage-year 2000 and 2001 funds would remain strong outperformers even if their residual values of 42 to 50% of invested capital were entirely valueless. Funds from 2002 to 2005 need to realize 30%, 20%, 55% and 75%, respectively, of their residual values to continue outperforming the S&P 500.

¹¹ Many large funds from 1986 to 1988 delivered below average returns. Especially one outlier in 1987 that accounted for roughly 40% of funds raised in that vintage year.

Average funds from 2006 and 2007 mostly have positive interim spreads. However, it is far too early to make a serious judgment as most of these funds have not even finished their investment period. Overall, vintage years from 2005 to 2008 account for roughly 50% of capital ever raised by U.S. buyout funds, and their final returns will ultimately be influential for the overall outperformance of the asset class.

4.3. Comparison with other studies, and with other data sources

In the following, we compare the S&P 500-adjusted TVPI ratios – PME values – with results reported by KS, RS and HJK. We also present PMEs based on pooled vintage year cash flows from various data sources, some of which might contain a part of the 15 percent of funds not covered by our full sample. Although some differences are present, mainly due to smaller sample sizes prior to 1997, PME values based on Burgiss, State Street, Preqin, Calpers, and the full TVE sample (as of June 2010) support our finding that U.S. buyout funds have systematically outperformed the S&P 500 over a long period.

Figure IV, Chart A, compares our adjusted TVPIs with the results of KS, which start in 1983. Although KS's PME values are systematically lower from 1984 to 1995, for reasons discussed earlier, both time series are clearly correlated. In 1983, 1984 and 1986 results are similarly positive, then also drop below 1.0 in 1987 and 1988, followed by an upward trend. From 1991 to 1995, PME values of KS are systematically below 1.0, while our corresponding figures are above 1.0. Nonetheless, a certain level of co-movement is present.

Chart B compares our results to RS. For the ten vintage years from 1984 to 1993 their PME values are comparably volatile. In certain years (1985, 1988 to 1990, and 1992) RS's PME values are similar to ours; these are vintage years with comparably more funds in their sample. In other years (1986, 1991 and 1993) their PME values are quite different. From 1994 to 1998, PME values are very much in line with each other, which is probably the result of a large overlap between the samples. From 1995 to 1998 the RS PME values are consistently higher, which may reflect the presence in the RS sample of a number of European buyout funds that performed better than their U.S. counterparts in those vintage

years. The post-1998 PME values that RS calculate are much lower than our PMEs, and this is particularly notable for 2000 and 2001 when the overlap between both samples must be significant. As mentioned before, a possible explanation might be truncated data.

In Chart C we compare our PME values with those that HJK calculated based on fund cash flow and NAV data from the Burgiss Group. As for RS, results of HJK are more volatile than ours from 1984 to 1994, with PME values being closer in vintage years with comparably more funds in the Burgiss data (1989, 1991 and 1993), and vice versa. In 1987 and 1988, HJK find positive PME values, while their sample seems also not to contain the major outlier fund of 1987 (see Table 2 of their study), the positive PME value in 1988 is in contrast to both, RS and us. From 1995 to 1997 their PME values are similar to ours (in fact, slightly below). In 1998 to 2000, 2002 and 2003 their PME values are almost the same. However, on a like-with-like comparison, these PME values should also be a bit below, as their calculations include NAVs as of December 2010, which were significantly higher than in June 2010 (the final quarter of our funds).

Charts D through G compare with evidence from State Street, Preqin, Calpers and TVE's full sample, reflecting their different periods of coverage. The State Street and Preqin results are broadly in line with ours since those dates, with occasional exceptions – State Street's 1996 points in the opposite direction to our results and to HJK and RS. Preqin's drop in 2002 is similar to the drop in 2001 documented by HJK. Calpers is the U.S.'s largest public pension fund, and has been a performance touchstone for a long time. Since 1999, their PME values are consistently higher than those of our full sample, perhaps indicating superior fund selection skills. Vintage years with lower PME values in the full TVE sample (1990, 1991, 1994, 1995) are correlated with higher fractions of incomplete funds, and vice versa.

5. Evidence based on liquidated funds

The return metrics reported above treat the final NAV as a cash flow. Concern about the integrity and uncertain outcome of NAV numbers has led researchers to focus on liquidated funds. We define a fund as ‘effectively liquidated’ if its residual value is less than 10% of invested capital. Table VII profiles the full sample by vintage year on the basis of RVPIs, focusing on the period 1990 to 2005. As at June 2010, all funds with vintage years up to 1992 were liquidated. For post-1996 vintage years, the number of effectively liquidated funds falls off sharply, and for funds formed since 2000 a significant part of returns is still represented by unrealized investments so that few of these funds make it into our liquidated sample. Setting the cutoff following vintage year 2000, there are 410 liquidated funds out of 584 funds for the 1980 to 2000 period.

Table VIII, Panel A, shows the returns to this liquidated subset, benchmarked against the S&P 500. All numbers are calculated based only on the actual cash flows of the funds, not reported NAVs. Overall, for the period 1980 to 2000, liquidated funds have delivered weighted-average excess returns of 387 basis points and average excess returns of 462 basis points per annum (adjusted TVPIs are 1.18 and 1.20). The median fund has delivered excess returns of 158 basis points – in total, 55% of all liquidated funds did better than the S&P 500. As for the full sample, the substantial positive spread of the average fund is largely driven by positive outliers. While the returns in Panel A are calculated using only realized cash flows, the inclusion of their (inevitably small) NAVs does not materially alter the result. As shown in the bottom row of the table, the overall weighted-average IRR spread increases to 410 basis points and the average spread increases to 474 basis points per annum if one accounts for residual values.

Focusing only on effectively liquidated funds risks bringing a downward bias to estimates of the ultimate performance of this period, as it is primarily the more successful and larger funds from the later-1990s that still have an RVPI above 10%, and these are excluded. This is also the reason why the average performance exceeds the weighted-average in the liquidated sample.

An alternative methodology is to assume a sale of remaining fund interests in the secondary market using reported secondary market prices. Cogent Partners and UBS are the two most active intermediaries in the secondary market and report discounts to buyout fund NAVs of 12.0% and 12.6%, respectively, at June 2010. This approach will be more unreliable the more immature a fund is, so we argue that funds from 2006 to 2008 are too young to be priced using a general secondary market discount, as the large undrawn commitments require individual fund valuations.

Assuming a sale in the secondary market at a 12.6% discount in mid-2010, investors into U.S. buyout funds from 1980 to 2000 would have gained excess returns over the S&P 500 of 534 basis points (see Panel B). The average fund would have returned 508 basis points, and the median fund would have returned 341 basis points over the S&P. This increase in excess returns relative to the subset of effectively liquidated funds in Panel A is driven by the stronger outperformance of funds from 1995 to 1999 that still have an RVPI above 10%. Adding funds until 2005, the overall excess returns rise to 692 basis points for the weighted-average, and 586 basis points for the average fund following the sale of the partnership interests in the secondary market.

6. The effect of benchmark

Compared to other alternative investment asset classes, performance benchmarking in the buyout literature remains unsophisticated, which is a result of the intractable nature of the asset class – there is no active or liquid market in private equity assets, and fund returns cannot be reliably estimated until a fund is widely liquidated, so the conventional estimation of factor pricing models is infeasible. Studies of private equity performance have benchmarked against the S&P 500 index, even though it is not obviously comparable in terms of size, liquidity or leverage. Since the focus of the current paper is the measurement of returns, we also use the S&P 500, for comparability with previous studies.

However, the minimum size threshold of the S&P 500 – \$5bn at current prices – exceeds the transaction size of 99% of historic leveraged buyouts by far.¹² As a pointer to the importance of benchmark we repeat our analysis using the S&P 600 Small-Cap performance index, which contains 600 publicly-listed U.S. companies with an equity value of \$200m to \$1,000m – much more in line with past buyout transactions sizes.

Table IX presents IRR spreads and adjusted TVPIs for the full sample using the S&P 600 as the benchmark.¹³ The cyclical pattern is broadly the same as we observed in Table V and partly in Table VI. However, using the S&P 600 benchmark reduces outperformance by over 300 basis points compared to the S&P 500. Over the full period from 1980 to 2008, U.S. buyout funds delivered a weighted-average IRR spread of 184 basis points. Excluding funds from 2006 to 2008, the outperformance rises to 481 basis points. Numbers for the average fund are very similar with 199 and 478 basis points. The median fund’s outperformance is again below the average, and only slightly over 50% of the funds have generated excess returns over the S&P 600.

Funds from 1980 to 1986 performed extremely well with weighted-average excess returns of about 1,600 basis points per annum (about 1,400 for the average and almost 900 basis points for the median fund). Funds from the late-1980s substantially offset this success. The 1990s and 2000s show almost the same pattern, however, on a lower level compared to the 1980s: the first six vintage years of both decades did very well, while the subsequent vintage years substantially underperformed the S&P 600.

7. Fund size and performance

In a world where skilled managers attract larger funds, there may be a systematic relationship between the size of a buyout fund and its achieved performance. Past studies

¹² Moreover, the combined market capitalization of only the 10 largest (out of 500) companies in the S&P 500 exceeded the amounts of capital ever raised by U.S. private equity funds at any point in history.

¹³ In unreported work we find that benchmarking against a number of other smaller listed company performance indices, including the Russell Microcap, the Dow Jones U.S. Small-Cap and the MSCI U.S. Small-Cap gives essentially the same results. The Russell Microcap index contains 2,000 U.S. stocks with capitalizations from \$50m to \$2,500m. The Dow Jones U.S. Small-Cap index contains 1,750 U.S. stocks with capitalizations up to \$4,500m, half of which below \$600m. The MSCI U.S. Small-Cap index contains 1,750 U.S. stocks with capitalizations from \$300m to \$2,800m.

report ambiguous results. KS find a positive, concave relationship between size and performance in their full sample, but not for their subsample of buyout funds. RS find significance, but only after including sequence numbers.

We look for such a relationship, using as dependent variables a fund's IRR and its IRR spread over the S&P 500, and three measures of fund size: the natural logarithm of the amount of invested capital; the fund's percentile rank within its single vintage year; the fund's rank within three adjacent vintage years. We add the square of log fund size to test for concavity, and vintage year dummies to control for inter-year variation in returns. Table X presents the results. Panel A shows a systematic positive relationship between the IRR of a fund and its size that is statistically significant at the 5% level. Coefficients are similar for the one and three-year rank and suggest that a decile in relative size yielded additional 40 basis points per annum. With respect to log fund size, a fund two times in size has delivered an additional 60 basis points in annualized returns.

For the IRR spread over the S&P 500, there is also a positive relationship that is significant at the 5% level, suggesting that larger funds have also generated a higher outperformance relative to public equity. Coefficients for the IRR spreads are almost the same as for the absolute IRRs of a fund. In unreported regressions we find that an increase in a fund's IRR almost perfectly translates into an equal increase of its IRR spread over the index, with a coefficient of 0.92 and an explanatory power of the variation in IRR spreads as high as 96%. Using the IRR spread over the S&P 600 as the dependent variable, coefficients of our size measures are almost the same as for the S&P 500. Both observations are intuitively plausible: the overall timing of drawdowns and distributions for most buyout funds within a vintage year are reasonably similar – not least, since both are much determined by general market conditions and macro-economic factors. The main difference between funds is the magnitude of distributions to paid-in capital, depending on the success of their investments. Thus, an absolute adjustment by a single market factor, such as the growth of a public equity index affects the funds within a vintage year in very much the same way. And in case of a linear relationship between two market factors, e.g., two equity indices the impact will be equivalent, resulting in similar coefficients in the cross section.

In contrast to both RS and KS, we find no evidence for a concave relationship between size and performance in either of our equations. If RS data contained truncated records in later vintage years, this might explain their finding of concavity, since larger funds towards the end of each sample may simply have suffered a lower performance due to incomplete records.

In Panel B we explore the question, whether the systematically higher performance of larger funds is particularly pronounced in certain years or periods. As larger private equity funds have regularly been able to borrow higher levels of debt for their (larger) transactions, one might assume that large funds from those vintage years have performed better, whose investments were less affected by a subsequent U.S. recession, i.e., the fund has been fully invested and portfolio companies had some time to deleverage the peak of their debt before the economy turned down. Under such a scenario funds would be able to fully appreciate the higher levels of initial debt. With respect to the U.S. recession starting in 1991, we set the cut-off following the year 1985. With respect to the 2001 downturn, we similarly choose 1995, and with respect to the 2009 downturn we stop in 2005.¹⁴

When focusing on these three periods, we find the absolute IRR and the relative IRR spreads to have a highly significant relationship with our three measures of fund size. Coefficients are again very similar. In the cross-section, an increase in the size rank by a decile translates into a higher IRR and higher IRR spreads of 70 to 75 basis points. As fund sizes double, the IRR and the IRR spreads increase by about 130 basis points. These are economically significant results for this asset class. Panel C shows regression results for the complementary vintage years 1986 to 1989 and 1996 to 1999. Coefficients of our three size measures are roughly similar in magnitude but with a negative sign in all cases. However, none of our size measures shows statistical significance. Critical for the overall historic success of larger buyout funds will be the final outcome of the very large funds being

¹⁴ One might argue that funds of 2005 invested too close to the recession in 2009. However, unlike in the later-1980s and 90s, new developments were substantially benefitting equity investors: senior debt for large LBOs in the U.S. was often ‘covenant-lite’ in 2005-07, i.e., did not contain financial maintenance covenants such as decreasing debt to EBITDA ratios. Furthermore, recent years saw unprecedented levels of discounted debt buybacks that were even treated tax neutral by the government.

closed in 2006 and 2007. Although few of the associated ‘mega buyouts’ have gone bankrupt, many of the deals were done at historically high entry multiples.

8. Gross returns from U.S. buyout funds

Per se, the results of KS and PG may simply have implied that rent-seeking GPs fully appropriated the excess returns to buyouts through fees and carried interest, leaving net returns to investors that were no better than a random drawing from the S&P. This would be consistent with the evidence for mutual funds (Berk and Green (2004)) and for hedge funds (Fung, Hsieh, Naik, Ramadorai (2008)), that fund managers capture most or all of the rent and leave little or no alpha for investors.

Correctly measured, the net returns of U.S. buyout funds have been systematically higher than those of public equity, a variety of additional questions arise, such as about the magnitude of excess returns at the gross level and the number of funds that outperform public equity before charging fees and carried interest. Benchmarking gross returns against the same index further provides the opportunity to analyze how excess returns are split between GPs and LPs.

Without original data on the gross cash flows between the private equity fund and its investments, we need to infer the fees and carried interest from the net cash flows to LPs and the (interim) fund performance by making reasonable assumptions about the terms of the partnership agreement. Fortunately, the economics of private equity funds in the 1980s and 1990s were fairly standard (Gompers and Lerner (1999), Metrick and Yasuda (2007)).

We assume an investment period of 5 years for our funds with a management fee of 2% per annum based on committed capital, a 1.5% management fee on remaining invested capital at cost during years 6 to 10, and no fees thereafter. We approximate the remaining invested capital at cost by dividing the interim NAV with the interim TVPI at each quarter. Fees in early years of a fund’s lifetime are drawn from committed capital, and afterwards are kept and recouped from distributions. We also assume an 8% soft hurdle rate with 100% catch-up, and 20% carried interest timed at the deal level (American waterfall), both of which were standard in the U.S. in the 1980s and 1990s.

These assumed parameters provide a realistic, though conservative, estimate of gross performance over this period. 2.5% management fees were common in earlier years and for smaller funds; a number of funds have a 6 years investment period; step-down in fees was not standard in 1980s, nor was netting write-downs or write-offs between investments. After 2000 larger funds moved to carried interest on a whole-fund basis (European waterfall) and fees rates fell below 2%, particularly in larger funds. However, GPs increasingly sought to offset reductions in management fees with other types of fees that were only partly nettable against management fees. In general, we ignore other kinds of fees, such as transaction or monitoring fees, in our simulation, so that our fee estimations rather provide a lower bound.

Table XI reports the weighted-average and average gross IRRs of our funds before fees and carried interest, the net IRRs as seen in previous tables, as well as the IRRs of the equivalent investments in the S&P 500. Panel A presents these numbers for our subset of liquidated funds, and Panel B contains the numbers for all funds from 1995 to 2004. Table XI also reports the percentage of funds that delivered a gross IRR greater than the S&P 500. Given the intensity of the buyout process and the high levels of leverage involved, it might seem surprising that this percentage is not reliably 100%. Overall, around 70% of all funds from 1980 to 1999 earn a gross return greater than the S&P 500.¹⁵ As noted, U.S. buyout funds performed better in the first part of each decade, and this continues into the 2000s where 92% of the funds with vintage years 2000 to 2004 beat the S&P 500 at the gross level. However these returns are to a greater or lesser extent dependent on NAVs.

Over the period 1980 to 2000, the gross IRR of the weighted-average liquidated fund is 8.4 percentage points higher than its net IRR. The spread of the average liquidated fund is 8.8 percentage points. This corresponds to an increase of around 60% to the net IRR. Compared to the annualized returns of the equivalent investments in the S&P 500, the gross IRR of the weighted-average and average fund is 12.2 and 13.4 percentage points in excess of the index returns. This implies that the gross returns of our sample of liquidated U.S. buyout funds are more than twice as high as the returns from the S&P 500 (9.8 and

¹⁵ Even if we assume fees and carried interest to be at the higher end, the percentage does not exceed 75%.

11.8 percent). Moreover, the spread between the gross IRR and the S&P 500 is about three times the spread of the net IRR and the S&P.

Since higher net IRRs usually correspond with disproportionately higher gross IRRs, i.e., an increase in the absolute spread between gross and net values, we find larger spreads in the first half of the 1980s and 1990s compared to the second half of each decade. The spread during the period 2000 to 2004 increases to 12.0 percentage points for the weighted-average fund and 10.6 percentage points for the average fund, which is around 70% above the net IRR.

Table XII decomposes the quantum of value created by U.S. buyout funds into equivalent returns from the S&P 500, excess returns for limited partners, carried interest and management fees. Panel A shows the results for the subset of liquidated funds, and Panel B provides evidence for the full sample until 2004.

The 410 funds in our liquidated subset invested a total of \$157.2bn over the period from 1980 to 2000. While equivalent investments into the S&P 500 had rewarded public equity investors with additional \$75.6bn (i.e., had returned a total of \$232.8bn), U.S. buyout funds generated an additional \$53.5bn for their limited partners. General partners were compensated with carried interest of a very similar size, \$52.7bn, as well as received fees for managing the funds of \$19.7bn. Figure V illustrates the split of excess returns at the gross level into the surplus for LPs, carried interest and management fees for the different periods. Overall, 57.5% of all excess returns remained with the fund manager and 42.5% were passed on to their investors. However, this distribution varies with the extent of outperformance of the funds.

The 764 funds in the full sample from 1980 to 2004 invested a total of \$432.6bn. This number is mainly driven by larger funds from the second half of the 1990s, as well as funds with vintage years 2000 to 2004. Invested in the S&P 500 the compensation would have been \$111.4bn, resulting in overall returns of \$544.0bn. Excess returns for limited partners sum up to \$194.2bn, while fund manager kept an overall similar piece: \$136.4bn through profit sharing agreements, and \$53.5bn via management fees.

9. Summary and discussion

Private equity firms are highly selective in their acquisitions and seek to cherry pick targets that have significant value creation potential. They tend to focus on industries within their expertise. They do extensive due diligence and arrive with a clear strategic plan that they execute urgently, motivating senior management with a large stick and a large carrot. They recoup invested equity as quickly as possible and use financial leverage to amplify the return on invested equity. Given the intensity of this process, it would be truly surprising if private equity investors did not generate positive gross returns.

As the early and highly influential results of Kaplan and Schoar (2005, KS) and Phalippou and Gottschalg (2009, PG) related to the net returns to investors, their results were not necessarily surprising. This is what would be expected in a world where rent-seeking fund manager fully appropriated the excess returns through fees and carried interest, leaving net returns to investors that are no better than a random drawing from the S&P. This would be consistent with the evidence for mutual funds (Berk and Green (2004)) and for hedge funds (Fung, Hsieh, Naik, and Ramadorai (2008)) that fund managers capture most or all of the rent and leave little or no alpha for investors. However, the KS and PG results sat uncomfortably alongside the results from single-limited partner studies. They were also at odds with the observation that capital allocations to private equity have grown tremendously since 1980.

We show that U.S. buyout funds have significantly outperformed public equity for almost every year since 1980. We believe that the results reported in this paper are now definitive for the outperformance of U.S. buyout funds. However, these results need extending in several ways. Perhaps the biggest question is the outturn of the funds raised since the mid-2000s in the lead up to the recession. A reliable judgment on this needs data that will take years to emerge.

The more pressing issue is the question of benchmark. Since the principal focus of this paper was the measurement of returns, we adopted the S&P 500 as a benchmark, consistent with the existing literature. But hard conclusions about whether or not the U.S. buyout industry has created alpha for its investors requires further research on the

appropriate benchmark. Finally, appropriate adjustments for risk will be necessary to draw a definitive conclusion on the risk-adjusted performance of U.S. buyout funds.

References

Berk, Jonathan B., and Richard C. Green, 2004, Mutual Fund Flows and Performance in Rational Markets, *Journal of Political Economy*, 112, 6, 1269-1295.

Fung, William, David A. Hsieh, Narayan Y. Naik, and Ttarun Ramadorai, 2008, Hedge Funds: Performance, Risk, and Capital Formation, *Journal of Finance*, 63, 4, 1777-1803.

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

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

Gottschalg, Oliver, Ludovic Phalippou, and Maurizio Zollo, 2003, Performance of Private Equity Funds: Another Puzzle?, INSEAD Working Paper.

Kaplan, Steven N., and Antoinette Schoar, 2005, Private Equity Performance: Returns, Persistence, and Capital Flows, *Journal of Finance*, 60, 4, 1791-1823.

Lerner, Josh, Antoinette Schoar, and Wan Wongsunwai, 2007, Smart Institutions, Foolish Choices? The Limited Partner Performance Puzzle, *Journal of Finance*, 62, 2, 731-764.

Long, Austin M., and Craig J. Nickels, 1996, A Private Investment Benchmark, Working Paper.

Ljungqvist, Alexander, and Matthew P. Richardson, 2003, The Cash Flow, Return, and Risk Characteristics of Private Equity, NBER Working Paper.

Metrick, Andrew, and Ayako Yasuda, 2010, The Economics of Private Equity Funds, *Review of Financial Studies*, 23, 6, 2303-2341.

Phalippou, Ludovic, and Oliver Gottschalg, 2009, The Performance of Private Equity Funds, *Review of Financial Studies*, 22, 4, 1747-1776.

Phalippou, Ludovic, and Maurizio Zollo, 2005, What drives Private Equity Fund Performance?, Working Paper.

Phalippou, Ludovic, 2012, A Comment on Recent Evidence on Private Equity Performance, Working Paper.

Robinson, David T., and Berk A. Sensoy, 2011, Private Equity in the 21st Century: Liquidity, Cash Flows and Performance from 1984-2010, NBER Working Paper.

Stucke, Rüdiger, 2011, Updating History, Working Paper.

Table I - Vintage years RVPIs from different data sources

This table presents residual value to paid-in capital ratios for U.S. buyout funds as of December 2009 for Thomson VentureXpert (TVE), Preqin, Cambridge Associates (CA), and major public reporting institutions (PRI). Public reporting institutions include CalPERS, Washington State Board and University of California.

Vintage Year	Sample Size				RVPI (Avg)				RVPI (Wtd-avg)			
	TVE	Preqin	CA	PRI	TVE	Preqin	CA	PRI	TVE	Preqin	CA	PRI
1980-83	9	7	n/a	2	.03	.00	n/a	.00	.01	.00	n/a	.00
1984	7	6	n/a	1	.18	.00	n/a	.00	.05	.00	n/a	.00
1985	7	3	n/a	4	.17	.00	n/a	.00	.02	.00	n/a	.00
1986	10	5	7	1	.33	.00	.00	.00	.26	.00	.00	.00
1987	25	6	7	2	.17	.00	.00	.01	.18	.00	.00	.01
1988	17	8	12	–	.11	.00	.00	–	.11	.00	.00	–
1989	24	10	13	1	.29	.00	.01	.00	.13	.00	.00	.00
1990	9	10	2	1	.27	.00	.00	.01	.16	.00	.00	.01
1991	5	7	7	3	.68	.00	.00	.00	.38	.00	.01	.00
1992	15	11	8	2	.22	.00	.00	.00	.30	.00	.00	.00
1993	21	16	8	6	.25	.01	.03	.02	.29	.01	.04	.01
1994	26	21	21	11	.27	.03	.03	.02	.37	.06	.04	.03
1995	23	20	17	12	.21	.02	.04	.02	.12	.03	.06	.03
1996	23	21	24	10	.44	.05	.05	.05	.32	.07	.07	.05
1997	40	28	31	13	.32	.11	.09	.08	.43	.12	.11	.12
1998	53	46	37	15	.37	.16	.16	.16	.31	.13	.16	.17
1999	38	34	35	20	.66	.27	.26	.26	.61	.25	.24	.23
Total	352	259	229	104								

Source: Stucke (2011).

Table II - Buyout funds in previous studies

Panel A shows the number of U.S. (and European) buyout funds in the TVE sample as reported by Kaplan and Schoar (2005) for Dec. 2001, Gottschalg et al. (2003) for June 2003, and TVE as of June 2010. Panel B compares the number of U.S. & international buyout funds in Robinson and Sensoy's (2011) full sample, and the number and fraction of their funds that were either liquidated or had no cash flow activity since 2009, with corresponding figures from our sample.

Panel A: Number of buyout funds in different TVE samples.

	Kaplan and Schoar (2005) TVE data as of Dec. 2001	Gottschalg et al. (2003) TVE data as of June 2003	TVE data as of June 2010
U.S. Buyout Funds, 1980-93	197	161	148
E.U. Buyout Funds, 1980-93	-	121	88

Panel B: Liquidated sample of Robinson and Sensoy (2011).

Vintage Year	Robinson and Sensoy U.S. & International Buyout Funds			Higson and Stucke U.S. Buyout Funds		
	Full Sample	Liquidated or	Fraction	Full Sample	Liquidated or	Fraction
	(U.S. in brackets)	no CF for 6Q	of all		no CF for 6Q	of all
1998	78 (59)	54	69%	72	18	25%
1999	69 (59)	37	54%	58	9	16%
2000	83 (68)	60	72%	84	11	13%
2001	33 (26)	22	67%	47	1	2%
2002	7 (5)	6	86%	37	2	5%
2003	8 (8)	7	88%	34	2	6%
2004	4 (3)	2	50%	62	1	2%
2005	2 (2)	2	100%	92	2	2%

Source: Gottschalg et al. (2003), Kaplan and Schoar (2005), Robinson and Sensoy (2011), Thomson VentureXpert, Cambridge Associates and own LP sample data.

Table III - Coverage of the CA sample and the full sample

Panel A compares sample sizes from different data sources and past studies. Panel B compares the amount of capital raised by the funds in the CA sample and the full sample with the Dow Jones' universe.

Panel A: Comparison of sample sizes from different sources.

Vintage Year	Higson & Stucke	Kaplan & Schoar	Robinson & Sensoy	Burgiss (Harris et al.)	Cambridge Associates	State Street	Preqin	TVE	Calpers
1980	6	-	-	-	-	↑	2	2	-
1981	2	-	-	-	-	↑	-	1	-
1982	4	-	-	-	-	↑	-	1	-
1983	8	6	-	-	-	↑	-	5	-
1984	10	6	3	2	-	17	2	7	-
1985	8	12	5	1	-	↓	3	7	-
1986	18	16	1	5	7	↓	3	10	-
1987	24	22	9	7	7	↓	4	25	-
1988	23	21	14	7	12	↓	5	17	-
1989	26	22	15	8	13	↓	4	24	-
1990	16	14	7	2	2	4	7	9	-
1991	11	6	2	4	7	7	1	5	3
1992	21	17	4	5	8	8	8	15	2
1993	23	11	6	11	8	10	12	21	4
1994	42	6	22	13	21	22	13	26	9
1995	36	7	24	17	17	16	9	23	6
1996	36	-	36	9	24	15	17	23	6
1997	56	-	30	30	31	30	16	40	6
1998	72	-	54	38	37	33	28	53	8
1999	58	-	37	28	35	30	21	38	6
2000	84	-	60	39	52	38	31	47	11
2001	47	-	22	26	20	42	12	27	7
2002	37	-	6	21	19	21	16	16	4
2003	34	-	7	13	23	25	15	13	7
2004	62	-	2	46	36	43	22	18	8
2005	92	-	2	57	52	58	39	24	10
2006	108	-	-	67	43	63	34	27	15
2007	107	-	-	74	44	69	37	27	12
2008	98	-	-	68	38	67	30	14	6
	1,169	166	368	598	556	618	391	565	130

Panel B: Coverage of the Dow Jones universe by the CA sample and the full sample.

Vintage Years	Dow Jones Universe Size (\$bn)	CA Sample % of Size	Full Sample % of Size
1980-84	6.4	-	86.2
1985-89	46.5	41.1	72.3
1990-94	43.6	37.8	87.3
1995-99	189.0	60.2	83.4
2000-04	260.0	58.8	84.2
2005-08	685.2	53.5	83.1
1980-08	1,230.7	54.7	83.1

Source: Cambridge Associates and own LP sample data, Kaplan and Schoar (2005), Robinson and Sensoy (2011), Harris et al. (2012), State Street, Preqin, Thomson VentureXpert, Calpers, Dow Jones LP Source.

Table IV - Absolute performance of the CA sample

This table shows IRRs and TVPIs for the Cambridge Associates sample. Capital-weighted averages (Cap) and equally-weighted averages (Eq) are calculated on an annually-pooled cash flow basis. For periods of vintage years we weight by invested capital or the number of funds.

Vintage Year	# of Funds	Internal Rate of Return			TVPI		
		Cap	Eq	Med	Cap	Eq	Med
1986	7	20.5	15.0	13.9	3.75	2.55	2.23
1987	7	10.1	14.2	11.3	1.88	2.65	2.19
1988	12	13.3	10.6	10.8	1.75	1.65	1.61
1989	13	22.3	22.1	20.7	2.67	2.39	2.05
1990	2	43.2	41.5	42.4	3.08	3.02	3.02
1991	7	27.0	29.9	26.9	3.05	2.78	2.85
1992	8	33.8	31.2	26.0	3.10	2.68	2.60
1993	8	24.8	26.6	24.4	2.37	2.43	2.15
1994	21	26.4	19.5	14.5	2.33	1.97	1.64
1995	17	13.3	15.3	11.3	1.67	1.71	1.55
1996	24	5.9	7.1	3.9	1.31	1.36	1.25
1997	31	9.4	4.5	4.7	1.55	1.24	1.27
1998	37	5.0	7.5	8.2	1.29	1.43	1.40
1999	35	10.0	10.0	10.5	1.51	1.54	1.52
2000	52	17.0	16.1	13.4	1.77	1.78	1.66
2001	20	19.0	18.9	16.4	1.73	1.74	1.60
2002	19	19.9	17.0	15.2	1.71	1.66	1.67
2003	23	22.5	16.5	15.2	1.71	1.57	1.58
2004	36	12.3	11.1	10.5	1.42	1.36	1.33
2005	52	4.4	3.6	4.2	1.13	1.10	1.11
2006	43	-1.9	0.0	-2.3	0.95	0.95	0.95
2007	44	-0.6	1.5	1.2	0.99	1.02	1.02
2008	38	-2.6	-10.8	-9.9	0.97	0.90	0.89
1986-89	39	14.4	15.9	12.7	2.19	2.24	1.82
1990-99	190	10.4	12.4	9.8	1.57	1.66	1.50
2000-08	327	6.9	6.6	7.4	1.27	1.29	1.17
1986-99	229	10.9	13.0	10.5	1.65	1.76	1.57
1986-05	431	12.8	12.7	10.9	1.59	1.63	1.49
1986-08	556	8.0	9.2	8.8	1.38	1.48	1.32

Source: Cambridge Associates sample data, own calculations.

Table V - Absolute performance of the full sample

This table shows IRRs and TVPIs for the full sample. Capital-weighted averages (Cap) and equally-weighted averages (Eq) are calculated on an annually-pooled cash flow basis. For periods of vintage years we weight by invested capital or the number of funds.

Vintage Year	# of Funds	Internal Rate of Return			TVPI		
		Cap	Eq	Med	Cap	Eq	Med
1980	6	30.9	25.5	23.3	5.87	4.89	3.34
1981	2	33.6	29.4	26.6	4.67	4.01	4.01
1982	4	38.7	23.1	24.7	3.24	2.68	2.76
1983	8	20.2	23.8	15.5	2.46	2.48	2.16
1984	10	23.6	16.9	12.0	3.92	2.50	1.70
1985	8	24.2	20.7	20.4	2.39	2.25	2.11
1986	18	20.1	20.6	16.2	3.20	2.86	2.32
1987	24	11.7	14.7	13.2	1.92	2.33	2.17
1988	23	14.1	13.7	11.3	1.82	1.87	1.62
1989	26	20.4	18.9	18.5	2.53	2.27	1.93
1990	16	20.4	19.3	18.7	2.26	2.16	2.12
1991	11	29.5	31.0	27.9	2.68	2.70	2.68
1992	21	26.5	24.3	20.9	2.64	2.48	2.36
1993	23	22.7	27.1	20.1	2.09	2.26	1.92
1994	42	29.8	21.3	15.1	2.57	1.97	1.58
1995	36	18.9	20.7	13.7	1.88	2.00	1.88
1996	36	5.8	7.0	6.0	1.30	1.36	1.28
1997	56	9.7	8.3	4.9	1.55	1.42	1.27
1998	72	4.7	7.9	7.8	1.26	1.45	1.39
1999	58	8.5	7.1	8.4	1.41	1.39	1.43
2000	84	15.3	14.2	12.1	1.72	1.69	1.56
2001	47	19.8	18.4	18.6	1.79	1.76	1.69
2002	37	21.1	18.4	16.6	1.80	1.69	1.69
2003	34	22.1	22.2	14.4	1.71	1.86	1.63
2004	62	13.3	11.6	9.7	1.45	1.38	1.33
2005	92	7.4	5.5	4.5	1.23	1.15	1.12
2006	108	-1.0	-0.3	-1.2	0.98	0.99	0.98
2007	107	-1.7	2.0	1.9	0.97	1.04	1.03
2008	98	0.2	-4.5	-6.3	1.01	0.97	0.95
1980-89	129	16.5	18.3	14.2	2.34	2.48	2.05
1990-99	371	11.4	13.8	9.9	1.61	1.71	1.51
2000-08	669	7.2	6.7	6.5	1.28	1.28	1.16
1980-99	500	12.2	15.0	11.5	1.72	1.91	1.64
1980-05	856	13.6	14.3	11.3	1.64	1.75	1.52
1980-08	1169	8.6	10.2	8.9	1.41	1.55	1.31

Source: Cambridge Associates and own LP sample data, own calculations.

Table VI - Full sample benchmarked against the S&P 500

This table shows the results of a public market equivalent analysis between the full sample and the S&P 500 performance index. Capital-weighted averages (Cap) and equally-weighted averages (Eq) are calculated on an annually-pooled cash flow basis. Median (Med) values are derived from individual calculations. For periods of vintage years we weight by invested capital or the number of funds. 'IRR spread' follows the approach by Long and Nickels (1996), and 'Adjusted TVPI' follows the approach by Kaplan and Schoar (2005). 'Spread > 0' shows the number and fraction of funds that generated excess returns over the S&P 500.

Vintage Year	# of Funds	IRR Spread (bps)			Spread > 0		Adjusted TVPI		
		Cap	Eq	Med	#	%	Cap	Eq	Med
1980	6	1,394	779	615	3	50	1.88	1.54	1.29
1981	2	1,551	1,168	864	1	50	2.02	1.71	1.73
1982	4	1,839	418	624	2	50	1.67	1.20	1.22
1983	8	244	491	-166	3	38	1.10	1.22	0.91
1984	10	637	44	-225	5	50	1.38	1.02	0.85
1985	8	1,170	749	680	5	63	1.35	1.25	1.25
1986	18	648	773	303	10	56	1.28	1.33	1.17
1987	24	-123	42	1	12	50	0.89	1.03	0.96
1988	23	-43	-29	-318	7	30	0.95	0.97	0.84
1989	26	611	557	456	15	58	1.25	1.19	1.12
1990	16	241	148	78	9	56	1.09	1.09	1.04
1991	11	1,319	1,422	1,207	10	91	1.41	1.44	1.39
1992	21	422	233	157	12	57	1.27	1.17	1.11
1993	23	194	341	138	13	57	1.14	1.23	1.06
1994	42	475	194	-76	19	45	1.43	1.14	0.93
1995	36	442	437	268	23	64	1.26	1.28	1.19
1996	36	6	61	-31	17	47	1.00	1.04	0.98
1997	56	765	516	311	33	59	1.37	1.23	1.16
1998	72	387	804	655	52	72	1.20	1.38	1.28
1999	58	550	547	618	41	71	1.28	1.30	1.40
2000	84	918	992	785	72	86	1.48	1.52	1.41
2001	47	1,167	1,032	1,125	38	81	1.55	1.50	1.44
2002	37	1,284	1,029	1,153	32	86	1.55	1.43	1.42
2003	34	1,709	1,727	1,259	29	85	1.59	1.71	1.48
2004	62	1,209	1,053	895	48	77	1.41	1.35	1.33
2005	92	932	704	626	68	74	1.28	1.19	1.16
2006	108	290	179	26	58	54	1.07	1.04	1.01
2007	107	-10	215	193	62	58	1.00	1.04	1.03
2008	98	-424	-790	-1,166	33	34	0.96	0.92	0.90
1980-89	129	244	370	-59	63	49	1.08	1.16	0.97
1990-99	371	470	472	297	229	62	1.25	1.24	1.14
2000-08	669	588	484	518	440	66	1.24	1.22	1.14
1980-99	500	434	446	246	292	58	1.22	1.22	1.12
1980-05	856	809	680	530	579	68	1.35	1.30	1.21
1980-08	1169	544	468	390	732	63	1.23	1.22	1.13

Source: Cambridge Associates and own LP sample data, S&P Index Service, TF Datastream, own calculations.

Table VII - Distribution of residual values

This table shows the distribution of ‘residual value to paid-in capital’ (RVPI) ratios for the capital-weighted average (Cap) and the equally-weighted average (Eq) fund, as well as the values at the Median (Med), the bottom (1st) and the top quartile (3rd) for funds in the full sample with vintage years 1990-2005. The final two columns present the number and fraction of funds with an RVPI ratio below 10 percent.

Vintage Year	# of Funds	Residual Value to Paid-In (%)					RVPI < 10%	
		Cap	Eq	1st	Med	3rd	#	%
1990	16	0	0	0	0	0	16	100
1991	11	0	0	0	0	0	11	100
1992	21	0	0	0	0	0	21	100
1993	23	2	2	0	0	2	22	96
1994	42	3	3	0	0	2	38	90
1995	36	4	5	0	1	5	30	83
1996	36	5	4	0	0	7	31	86
1997	56	10	7	0	2	11	41	73
1998	72	14	14	1	8	20	39	54
1999	58	22	25	5	18	40	22	38
2000	84	42	41	20	37	56	10	12
2001	47	50	45	24	43	56	4	9
2002	37	67	58	26	53	71	2	5
2003	34	77	92	55	77	117	2	6
2004	62	88	85	66	82	103	0	0
2005	92	97	93	76	93	106	0	0

Source: Cambridge Associates and own LP sample data, own calculations.

Table VIII - Benchmarks against the S&P 500 based on cash flows

Panel A shows the results of a public market equivalent analysis between the liquidated subset of the full sample and the S&P 500 performance index. All calculations are based only on the actual cash flows of the funds, not reported net asset values (with the exception of the final row). Capital-weighted averages (Cap) and equally-weighted averages (Eq) are calculated on an annually-pooled cash flow basis. Median (Med) values are derived from individual calculations. For periods of vintage years we weight by invested capital or the number of funds. ‘IRR spread’ follows the approach by Long and Nickels (1996), and ‘Adjusted TVPI’ follows the approach by Kaplan and Schoar (2005). ‘Spread > 0’ counts the number and fraction of funds that generated excess returns over the S&P 500. Panel B shows all funds from 1980 to 2005, with remaining net asset values being discounted by 12.6% as of June 2010.

Panel A: Liquidated Funds.

Vintage Year	# of Funds	IRR Spread (bps)			Spread > 0		Adjusted TVPI		
		Cap	Eq	Med	#	%	Cap	Eq	Med
1980-84	30	772	435	-166	14	47	1.40	1.25	0.91
1985-89	99	192	351	-23	49	49	1.04	1.13	0.99
1990-94	108	457	337	144	61	56	1.27	1.18	1.07
1995-99	163	340	443	207	94	58	1.15	1.20	1.11
1980-89	129	244	370	-59	63	49	1.08	1.16	0.97
1990-99	271	374	401	167	155	57	1.19	1.19	1.09
1980-00	410	387	462	158	225	55	1.18	1.20	1.08
+ NAV	410	410	474	165	228	56	1.19	1.21	1.08

Panel B: All funds from 1980-05 incl. secondary market discounts.

Vintage Year	# of Funds	IRR Spread (bps)			Spread > 0		Adjusted TVPI		
		Cap	Eq	Med	#	%	Cap	Eq	Med
1980-84	30	772	435	-165	14	47	1.40	1.25	0.91
1985-89	99	192	351	-22	49	49	1.04	1.13	0.99
1990-94	113	465	344	143	63	56	1.28	1.18	1.07
1995-99	258	450	511	369	164	64	1.23	1.26	1.19
2000-04	264	1,038	977	788	209	79	1.43	1.42	1.33
1980-89	129	244	370	-58	63	49	1.08	1.16	0.97
1990-99	371	453	460	286	227	61	1.24	1.23	1.14
1980-00	584	534	508	341	359	61	1.27	1.25	1.16
1980-05	856	692	586	419	550	64	1.29	1.26	1.17

Source: Cambridge Associates and own LP sample data, S&P Index Service, TF Datastream, UBS, own calculations.

Table IX - Full sample benchmarked against the S&P 600

This table shows the results of a public market equivalent analysis between the full sample and the S&P 600 performance index. Capital-weighted averages (Cap) and equally-weighted averages (Eq) are calculated on an annually-pooled cash flow basis. Median (Med) values are derived from individual calculations. For periods of vintage years we weight by invested capital or the number of funds. 'IRR spread' follows the approach by Long and Nickels (1996), and 'Adjusted TVPI' follows the approach by Kaplan and Schoar (2005). 'Spread > 0' shows the number and fraction of funds that generated excess returns over the S&P 600.

Vintage Year	# of Funds	IRR Spread (bps)			Spread > 0		Adjusted TVPI		
		Cap	Eq	Med	#	%	Cap	Eq	Med
1980	6	1,944	1,363	1,245	6	100	2.70	2.22	1.74
1981	2	2,285	1,944	1,596	2	100	3.16	2.64	2.74
1982	4	2,660	1,236	1,495	4	100	2.23	1.75	1.78
1983	8	1,139	1,498	692	6	75	1.55	1.68	1.34
1984	10	1,634	937	428	5	50	2.12	1.46	1.14
1985	8	2,589	1,991	1,189	7	88	1.69	1.62	1.53
1986	18	1,305	1,420	848	14	78	1.64	1.66	1.38
1987	24	-27	440	448	14	58	0.98	1.20	1.11
1988	23	1	16	-229	8	35	1.00	1.01	0.89
1989	26	629	522	441	16	62	1.28	1.21	1.17
1990	16	301	235	72	8	50	1.13	1.11	1.03
1991	11	1,288	1,496	1,371	10	91	1.48	1.56	1.55
1992	21	963	776	518	14	67	1.44	1.35	1.28
1993	23	706	984	453	17	74	1.28	1.38	1.15
1994	42	1,449	591	-112	20	48	1.57	1.23	0.97
1995	36	799	860	250	21	58	1.27	1.33	1.10
1996	36	-321	-222	-230	11	31	0.86	0.91	0.87
1997	56	4	-108	-398	19	34	1.00	0.95	0.82
1998	72	-476	-190	-172	25	35	0.78	0.91	0.91
1999	58	-251	-226	-110	26	45	0.89	0.89	0.94
2000	84	393	385	185	53	63	1.19	1.18	1.09
2001	47	724	611	603	32	68	1.32	1.27	1.26
2002	37	959	692	818	28	76	1.38	1.27	1.31
2003	34	1,460	1,479	979	28	82	1.47	1.57	1.34
2004	62	1,028	849	677	46	74	1.33	1.27	1.25
2005	92	697	448	379	59	64	1.20	1.11	1.09
2006	108	-53	-135	-259	44	41	0.99	0.97	0.95
2007	107	-447	-241	-322	44	41	0.92	0.96	0.96
2008	98	-998	-1,391	-1,736	25	26	0.90	0.86	0.86
1980-89	129	523	809	391	82	64	1.25	1.39	1.17
1990-99	371	49	200	-94	171	46	1.00	1.07	0.96
2000-08	669	208	81	113	359	54	1.11	1.10	1.03
1980-99	500	125	357	31	253	51	1.04	1.16	1.01
1980-05	856	481	478	221	499	58	1.17	1.19	1.09
1980-08	1169	184	199	80	612	52	1.09	1.12	1.03

Source: Cambridge Associates and own LP sample data, S&P Index Service, TF Datastream, own calculations.

Table X - Fund size and performance

This table shows regression results between the absolute IRR and the IRR spread over the S&P 500, and three different size variables. 1-year rank is a fund's percentile position within its vintage year. 3-year rank is a fund's percentile position within 3 adjacent vintage years. Ln (size) is the natural logarithm of a fund's size. Panel A shows the results for all funds from 1980 to 2005. Panel B and C group these funds into different, complementary sub periods. Standard errors are in brackets and robust to heteroskedasticity. ***, **, * indicate that coefficients are statistically significantly different from zero at the 1%, 5%, and 10% levels, respectively.

Panel A: Regressions results for the full sample, 1980-2005.

	IRR				IRR spread over S&P 500			
1 year rank	0.037** [0.018]				0.034** [0.016]			
3 year rank	0.039** [0.019]				0.036** [0.017]			
ln (size)		0.008**	0.008			0.008**	0.007	
		[0.004]	[0.016]			[0.004]	[0.014]	
ln (size) ²			0.000				0.000	
			[0.001]				[0.001]	
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.143	0.143	0.143	0.143	0.081	0.081	0.081	0.081
No. of obs.	856	856	856	856	856	856	856	856

Panel B: Regression results for vintage years 1980-85, 1990-95, 2001-05.

	IRR				IRR spread over S&P 500			
1 year rank	0.070*** [0.026]				0.067*** [0.024]			
3 year rank	0.76*** [0.028]				0.075*** [0.025]			
ln (size)		0.019***	0.029			0.018***	0.022	
		[0.006]	[0.020]			[0.005]	[0.017]	
ln (size) ²			0.001				0.001	
			[0.019]				[0.002]	
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.138	0.139	0.141	0.141	0.075	0.076	0.076	0.076
No. of obs.	459	459	459	459	459	459	459	459

Table X (continued)

Panel C: Regression results for vintage years 1986-89 and 1996-00.

	IRR				IRR spread over S&P 500			
1 year rank	-0.004 [0.023]				-0.006 [0.022]			
3 year rank	-0.001 [0.023]				-0.006 [0.021]			
ln (size)		-0.003 [0.005]	-0.01 [0.022]			-0.003 [0.005]	-0.002 [0.020]	
ln (size) ²			0.000 [0.002]				0.000 [0.002]	
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.068	0.068	0.068	0.068	0.069	0.069	0.069	0.069
No. of obs.	397	397	397	397	397	397	397	397

Source: Cambridge Associates and own LP sample data, S&P Index Service, TF Datastream, own calculations.

Table XI - Performance gross of fees and carried interest

This table shows the capital-weighted and equally-weighted average IRRs of the S&P 500, and the net and gross cash flows for our liquidated sample (Panel A), as well as 1995 to 2004 funds of our full sample (Panel B). Capital-weighted averages (Cap) and equally-weighted averages (Eq) are calculated on an annually-pooled cash flow basis. For periods of vintage years we weight by invested capital or the number of funds. ‘Gross > S&P’ shows the number and fraction of funds whose gross cash flows generated excess returns over the S&P 500.

Panel A: Liquidated Funds.

Vintage Year	# of Funds	Capital-weighted IRR			Equally-weighted IRR			Gross > S&P	
		S&P 500	PE Net	PE Gross	S&P 500	PE Net	PE Gross	#	%
1980	6	17.0	30.9	39.7	17.7	25.5	33.2	6	100
1981	2	18.1	33.6	41.3	17.8	29.4	36.7	2	100
1982	4	20.3	38.7	51.5	18.9	23.1	31.1	3	75
1983	8	17.8	20.2	30.5	18.9	23.8	34.5	7	88
1984	10	17.2	23.6	30.6	16.4	16.9	23.2	5	50
1985	8	12.5	24.2	39.7	13.2	20.7	32.0	7	88
1986	18	13.6	20.1	27.1	12.9	20.6	28.0	14	78
1987	24	12.9	11.7	16.5	14.3	14.7	20.7	14	58
1988	23	14.5	14.1	23.4	14.0	13.7	20.6	13	57
1989	26	14.3	20.4	29.0	13.3	18.9	27.2	20	77
1990	16	18.0	20.4	30.8	17.8	19.3	29.4	12	75
1991	11	16.3	29.5	41.8	16.8	31.0	43.4	11	100
1992	21	22.3	26.5	37.6	21.9	24.3	34.9	17	81
1993	22	19.8	21.1	34.4	23.0	25.5	38.5	18	82
1994	38	24.5	29.4	42.9	19.7	21.8	34.0	26	68
1995	30	14.9	20.0	32.3	16.0	20.6	32.2	19	63
1996	31	6.0	6.9	12.3	6.9	7.3	13.6	19	61
1997	41	2.5	8.9	15.2	3.6	10.2	18.7	28	68
1998	39	0.4	1.7	6.6	-0.3	6.6	12.5	28	72
1999	22	-0.3	3.9	11.1	0.5	2.0	8.0	13	59
2000	10	-1.1	22.6	32.8	-8.6	24.4	35.1	9	90
1980-84	30	17.7	25.5	34.3	17.8	22.1	30.1	23	77
1985-89	99	13.7	15.6	23.2	13.6	17.1	24.6	68	69
1990-94	108	20.9	25.5	38.0	20.2	23.6	35.4	84	78
1995-99	163	3.8	7.2	14.0	5.2	9.6	17.3	107	66
1980-89	129	14.1	16.5	24.2	14.6	18.3	25.9	91	71
1990-99	271	8.8	12.5	21.0	11.2	15.2	24.5	191	70
1980-00	410	9.8	13.6	22.0	11.8	16.4	25.2	291	71
+NAV	410	9.8	13.9	22.2	11.8	16.5	25.3	291	71

Table XI (continued)

Panel B: All Funds (1995-2004).

Vintage Year	# of Funds	Capital-weighted IRR			Equally-weighted IRR			Gross > S&P	
		S&P 500	PE Net	PE Gross	S&P 500	PE Net	PE Gross	#	%
1995	36	14.5	18.9	30.7	16.4	20.7	32.4	24	67
1996	36	5.8	5.8	10.8	6.4	7.0	13.1	21	58
1997	56	2.1	9.7	17.0	3.2	8.3	15.5	37	66
1998	72	0.8	4.7	8.7	-0.1	7.9	13.6	56	78
1999	58	3.0	8.5	13.8	1.6	7.1	13.2	43	74
2000	84	6.1	15.3	25.6	4.3	14.2	23.1	80	95
2001	47	8.1	19.8	32.5	8.1	18.4	30.0	41	87
2002	37	8.2	21.1	35.3	8.1	18.4	30.7	33	89
2003	34	5.0	22.1	38.8	4.9	22.2	35.4	32	94
2004	62	1.2	13.3	23.0	1.1	11.6	21.1	57	92
1995-99	258	3.1	7.8	14.0	4.2	9.5	16.5	181	70
2000-04	264	5.6	17.3	29.3	4.8	16.0	26.5	243	92

Source: Cambridge Associates and own LP sample data, S&P Index Service, TF Datastream, own calculations.

Table XII - Dollar values of net and gross components

For the sample of liquidated funds (Panel A) and the full sample of funds until 2004 (Panel B) this table shows the USD amounts of capital invested, the USD amounts of gross returns, and the split into (equivalent) USD returns generated by the S&P 500, the excess returns to LPs, and the amounts kept by GPs in forms of carried interest and management fees.

Panel A: Liquidated funds.

Vintage Years	# of Funds	Capital Invested	S&P 500 Return	U.S. Buyout Excess Return	Carried Interest	Management Fees	U.S. Buyout Gross Return
1980-84	30	3.2	6.0	5.7	2.7	0.4	14.8
1985-89	99	32.8	68.5	4.1	13.6	4.4	90.6
1990-94	108	34.3	60.7	22.0	19.5	4.1	106.4
1995-99	163	83.5	94.3	17.4	15.0	10.4	137.1
1980-00	410	157.2	232.8	53.5	52.7	19.7	358.7

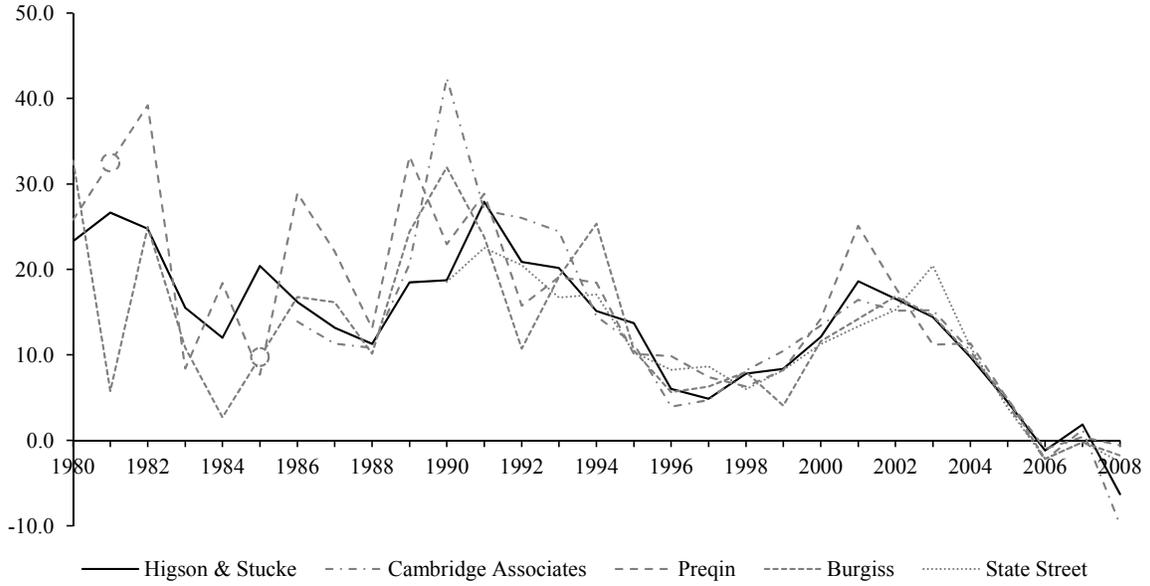
Panel B: Full sample until 2004.

Vintage Years	# of Funds	Capital Invested	S&P 500 Return	U.S. Buyout Excess Return	Carried Interest	Management Fees	U.S. Buyout Gross Return
1980-84	30	3.2	6.0	5.7	2.7	0.4	14.8
1985-89	99	32.8	68.5	4.1	13.6	4.4	90.7
1990-94	113	36.5	64.2	24.3	20.7	4.4	113.6
1995-99	258	151.2	168.4	44.4	27.2	19.3	259.3
2000-04	264	208.9	236.8	115.7	72.1	24.9	449.6
1980-04	764	432.6	544.0	194.2	136.4	53.5	928.0

Source: Cambridge Associates and own LP sample data, S&P Index Service, TF Datastream, own calculations.

Figure I - Median IRRs from different sources

This figure shows median IRR values for U.S. buyout funds of the CA sample and our full sample, as well as the Preqin, Burgiss and State Street database. The circles for Burgiss in 1985 and Preqin in 1981 indicate vintage years without funds in the respective database; we interpolate their lines in these two years.



Source: Cambridge Associates and own LP sample data, Preqin, Burgiss, and State Street sample data, own calculations and illustration.

Figure II - Performance of the Cambridge Sample and the Full Sample

This figure compares weighted-average and median IRRs and TVPIs of U.S. buyout funds from the Cambridge Associates sample and our full sample from 1994 to 2008. Panel A shows IRR values and Panel B shows TVPI ratios.

Chart A: Weighted-average and Median IRRs.

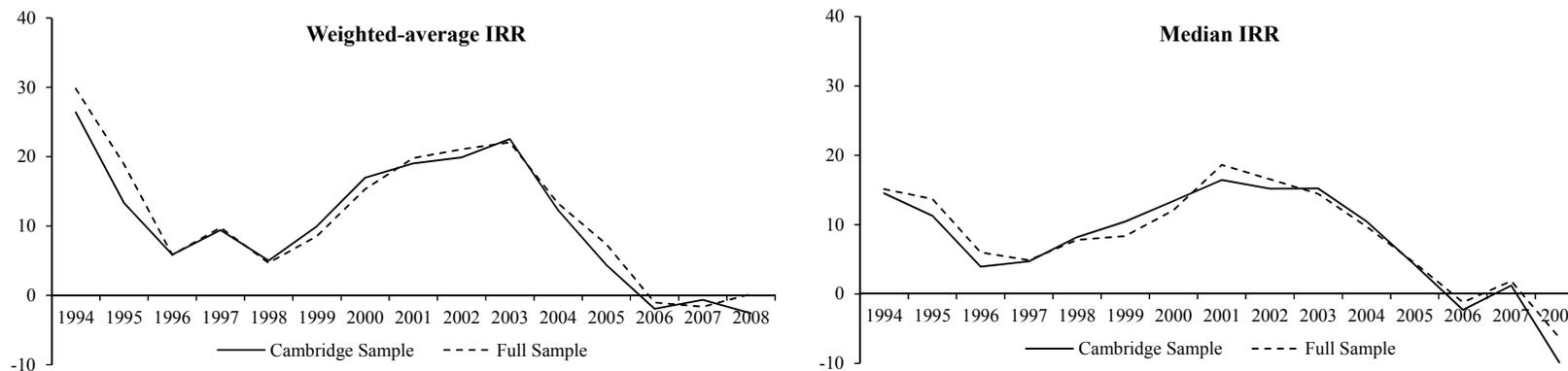
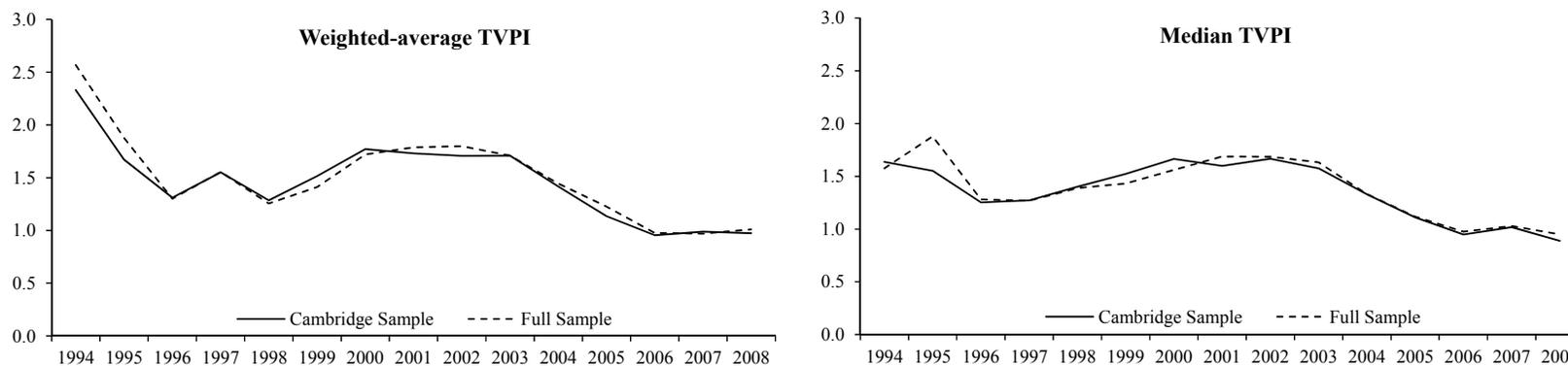


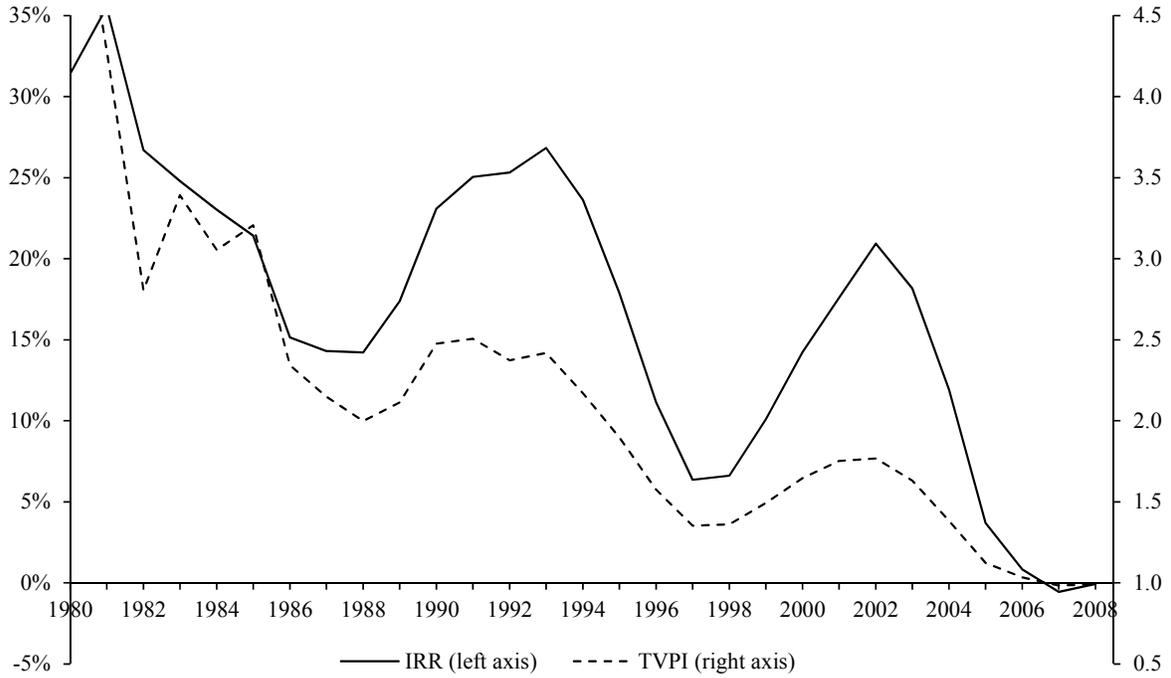
Chart B: Weighted-average and Median TVPIs.



Source: Cambridge Associates and own LP sample data, own calculations and illustrations.

Figure III - IRR and TVPI waves since 1980s

This figure shows weighted-average IRRs (left axis) and TVPIs (right axis) for the U.S. buyout funds in our full sample. To partly adjust for overlapping investment periods and to smooth we calculate rolling +/- 1 vintage year values.



Source: Cambridge Associates and own LP sample data, own calculations and illustration.

Figure IV - Comparison of our results

This figure compares our S&P 500-adjusted TVPI ratios ('PME values') with those from other studies and further data sources.

Chart A: Kaplan and Schoar (2005)

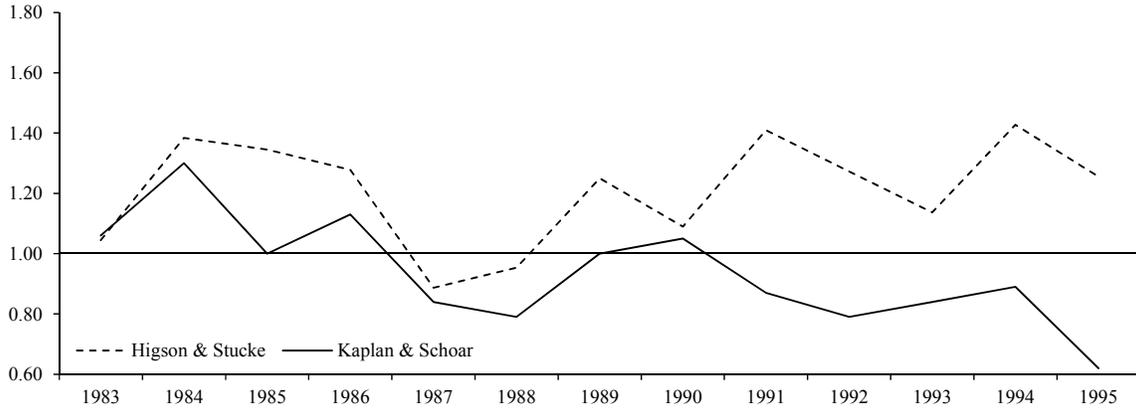


Chart B: Robinson and Sensoy (2011)

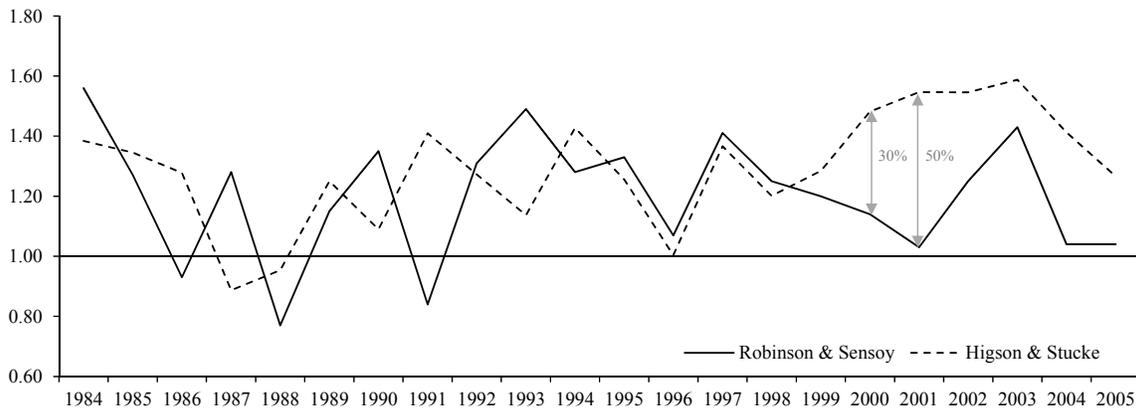


Chart C: Harris et al. (2012) / Burgiss

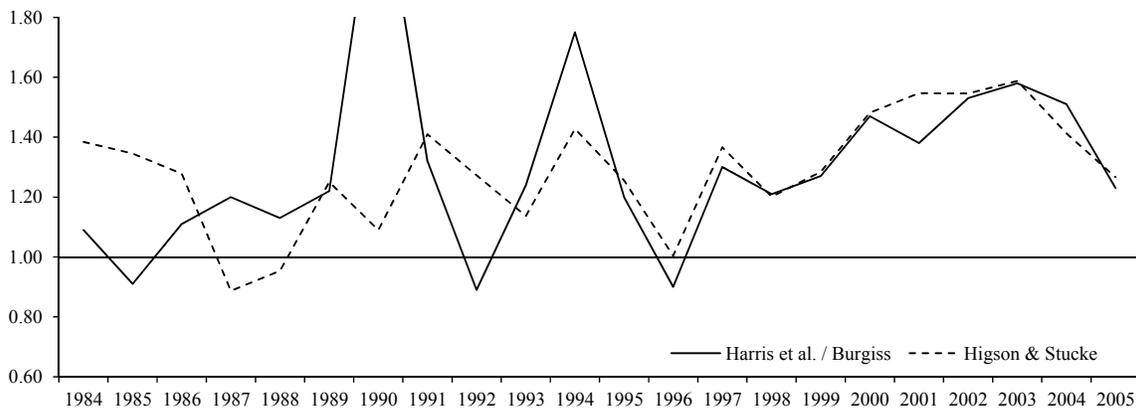


Figure IV (continued)

Chart D: State Street

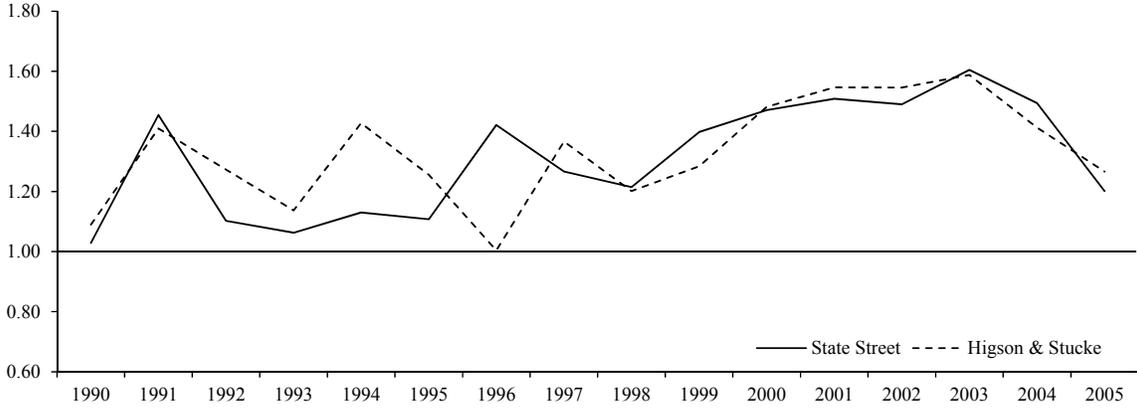


Chart E: Preqin

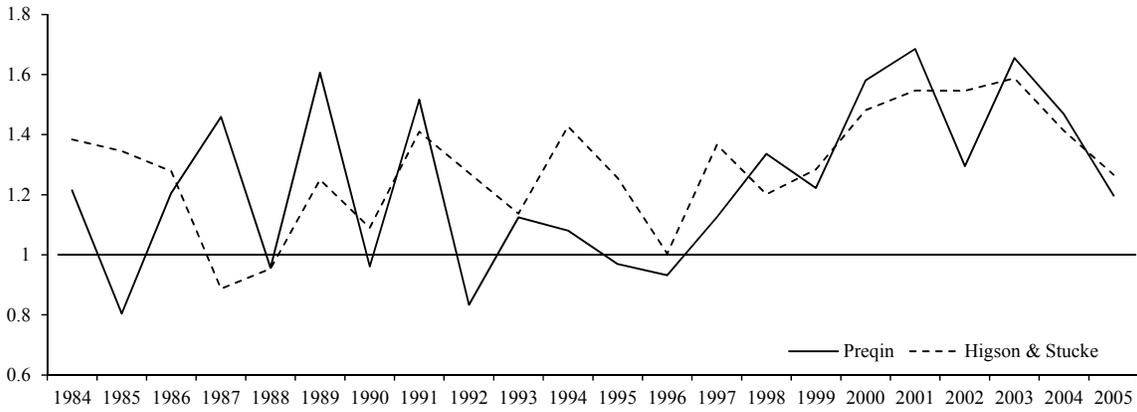


Chart F: Calpers

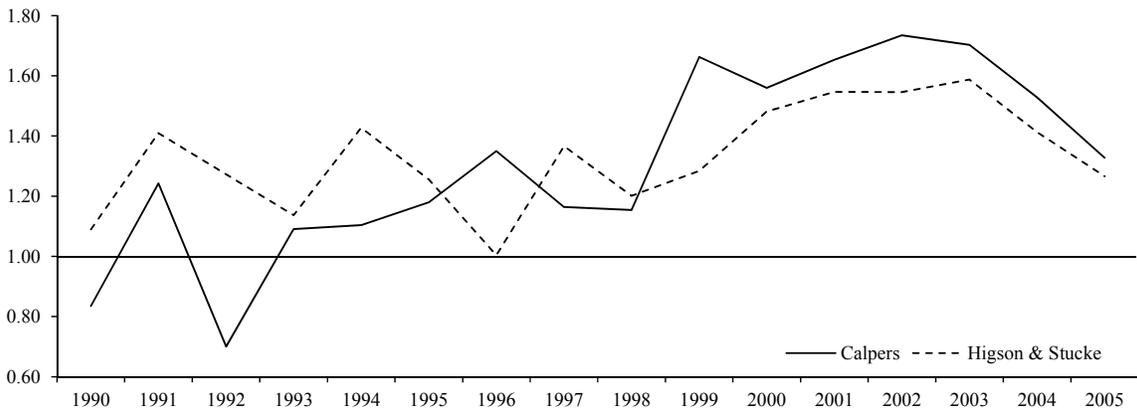
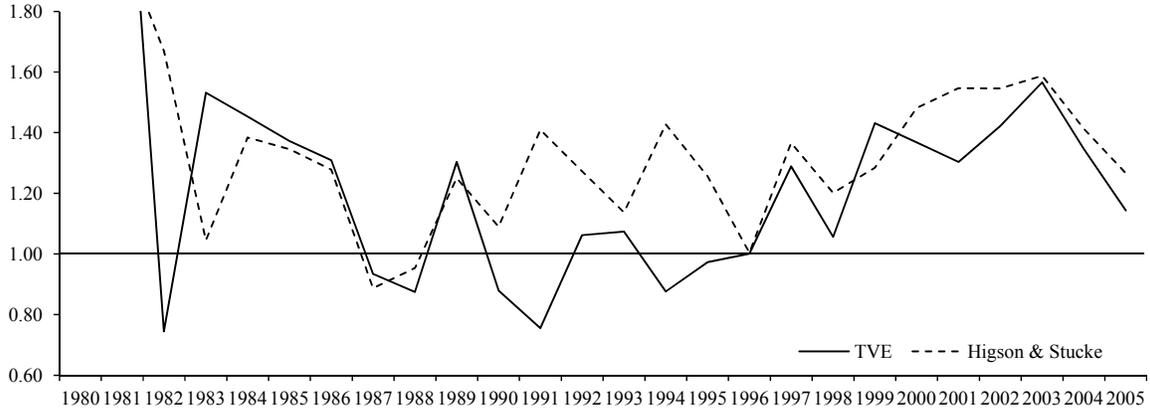


Figure IV (continued)

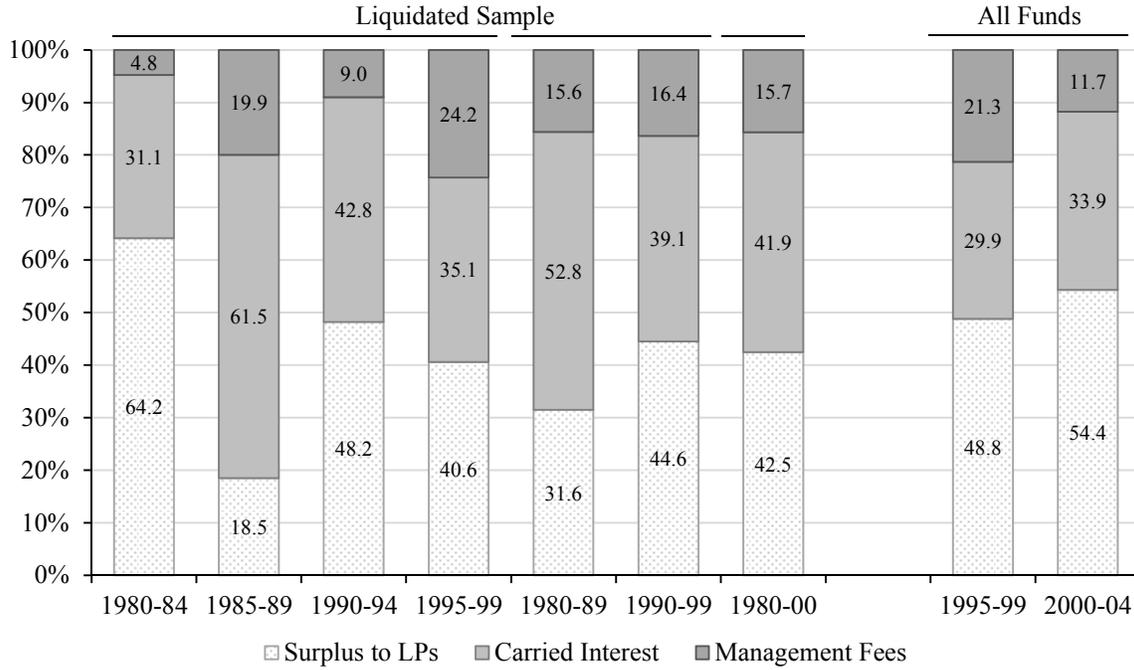
Chart G: Thomson VentureXpert



Source: Cambridge Associates and own LP sample data, Kaplan and Schoar (2005), Robinson and Sensoy (2011), Harris et al. (2012), State Street, Preqin, Thomson VentureXpert, Calpers, own calculations and illustration.

Figure V - Split of gross outperformance

This figure shows the split of U.S. buyout funds' gross excess returns over the S&P 500 into the surplus to LPs, carried interest kept by the GPs, and management fees charged by the GPs for different sub periods of our liquidated sample, as well as two sub periods of all funds.



Source: Cambridge Associates and own LP sample data, S&P Index Service, TF Datastream, own calculations and illustration.