

Updating History

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Abstract

The Thomson VentureXpert database has been used for over two decades by practitioners and academics to benchmark and judge the performance of private equity and venture capital. A closer look at aggregated and individual figures, however, reveals severe anomalies in the underlying data which are the result of ceasing data updates. Since existing errors have a systematic and persistent character, they do not just increase noise but result in a significant downward bias of presented performances. Consequently, many empirical results established using this database may not be replicable with correct data. In particular, the claim that private equity has not outperformed public equity is unlikely to hold with true numbers.

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1. Introduction

Since the inception of private equity in the early 1980s, capital allocations to this asset class have grown tremendously. Private equity funds seem to have regularly outperformed all other asset classes, with annual rates of returns of 25 percent and more hitting the headlines. Endowments, such as Harvard and Yale substantially increased in value – not least due to high allocations to private equity. The investment approach of institutionalized private equity has spread around the globe since then.

Published academic research on the performance of private equity, however, has shown rather discouraging results compared to public equity. Kaplan and Schoar (2005) report average private equity returns to be broadly in line with those of the S&P 500. Phalippou and Gottschalg (2009) even find that private equity substantially underperforms the S&P. These results, however, are surprising. Traditionally, private equity has employed high levels of comparably cheap debt in their transactions – far beyond those of public markets with up to 90% in earlier years and about 70% thereafter. While equity markets in the 1980s and 90s grew strongly in value (and default rates of leveraged buyouts remained mostly at moderate levels), the very vast majorities of all highly leveraged equity returns must have been captured by the private equity funds. Consequently, one should expect to find private equity having systematically outperformed public equity.

One explanation could be the high costs associated with investing in private equity. Profit sharing agreements leave 20% of all profits with the fund manager. All sorts of fees can make up another 20% over a fund's lifetime. Nonetheless, it is hard to imagine that all excess returns remain with the fund managers and investors are delivered – at best – returns similar to public equity. Another explanation could be that the underlying data was partly corrupted. Both studies used individual fund performance data of Thomson VentureXpert (TVE) for their analysis. On closer examination of TVE data, this is exactly what I find.

This paper explores the question to what extent the results from above publications were affected by shortfalls in the underlying data, and whether private equity funds from the 1980s and early 1990s delivered higher returns than equivalent investments in public equity. First, I compare aggregated performance numbers of TVE with those from other

data providers and highlight significant differences. Next, I have a closer look at individual capital and valuation data that underlie TVE and form the basis of aggregated performance figures. In particular, I pay special attention to the net asset values within TVE, as Phalippou and Gottschalg (2009) have found occurrences of constant residual values.¹ I then screen the identified inconsistencies for characteristic patterns to better understand the causes and effects, and estimate a performance bias resulting from these shortfalls. Finally, I conduct an updated public market equivalent (PME) analysis with the fully liquidated part of the TVE sample to support the hypothesis of general outperformance of private equity during that period.

The results presented in this paper are significant: about 40 percent of the funds in the TVE sample stopped being updated by a certain point during their active lifetime. Missing cash distributions and carried-forward residual values impact on the performance statistics of private equity and venture capital. Since identified errors have a systematic and persistent character, they do not just increase noise but result in a significant downward bias of aggregated performances with up to 10 percentage points in recent years (see Figure I for a first impression). Consequently, many empirical results established using TVE may not be replicable with correct data. Although TVE's individual fund performance data have been used widely by academics and practitioners, this is the first paper to document this important observation.

This paper is relevant to both academia and industry practice. It contributes to the existing academic literature by explaining and amending the surprisingly negative findings on private equity performance. It presents private equity returns from that period in a much different light relative to public equity which – it could be argued – is consistent with the observed wealth effects to most early investors and the increasing popularity of the asset class. It further helps to explain a number of curious findings and interpretations among other articles based on TVE's individual fund performance data.

With respect to industry practice, this paper helps to explain why there have been far too many private equity firms in the past reasonably claiming to be 'top-quartile' by comparing the performance of their previous funds with TVE's performance index.

¹ I use the terms 'residual values' and 'net asset values' (NAVs) interchangeably throughout this paper.

Furthermore, the relative success of the private equity programs from hundreds of institutional investors who benchmark their portfolio against TVE might appear in a very different light, and large sums of bonus payments have inevitably been inflated over the past decade. Finally, all kinds of cash flow forecasts – particularly on the distribution side – that were based on TVE data are likely to be underestimated, which might have considerably affected the rating and pricing of a number of collateralized fund obligations (CFOs) as well as exchange traded fund of funds in the market.

Unlike the aforementioned two publications, Ljungqvist and Richardson (2003) come to a positive conclusion on private equity returns relative to public markets. The authors use a proprietary sample of 73 U.S. buyout and venture capital funds from 1981-93 and find excess returns of 500-800 basis points (bps) per annum compared to the S&P 500 – a result that is strikingly different to the findings based on TVE data. However, Lerner, Schoar and Wongsunwai (2007) find that different types of limited partners achieve systematically different returns from investing into private equity – consequently, it is hard to generalize findings based on data from a single, sophisticated investor.

In contrast to most investment funds, such as mutual or hedge funds, private equity funds are closed-end funds with a typical lifetime of ten years plus an optional extension in case of unrealized investments. The first five to six years of a private equity fund represent its investment period. Rather than paying the entire amount upfront, fund investors (so called limited partners, or LPs) commit capital to a private equity fund, which the fund manager (general partner, GP) then calls once a new investment is identified or management fees are due. This characteristic of drawing down capital from LPs into the fund when needed is common practice in private equity. Cash outflows back to LPs usually start between the third and the fifth year, once initial investments are (partly) exited or recapitalized and last up to year ten, or beyond, until the fund is fully liquidated. During the lifetime of a fund, the GP reports the overall net asset value (NAV) of the fund's actual portfolio companies on a quarterly updated basis to his LPs. Since portfolio companies are normally held privately, the NAV is estimated by the GP (e.g., via comparable public companies incl. adjustments for differences in the capital structure). A fund's NAV starts to increase in early years as capital is called and invested, to peak at around year 4 or 5 when

first capital distributions exceed final capital calls (plus asset write-ups), as well as continuously decrease afterwards to finally become zero.

These characteristics of subsequent cash inflows, delayed cash outflows, and interim valuation figures give private equity funds a typical cash flow and valuation pattern. Figure II illustrates these values for a fully liquidated fund over its lifetime and gives an impression of how the different measures correspond to each other. On a quarterly basis, the GP or fund administrator also reports the (interim) IRR and the money multiple (MM) of the fund. Both are standard performance measures in private equity and incorporate the actual NAV of unrealized investments at their current (equity) value.

The rest of the paper is structured as follows. Section 2 presents an overview on the main findings of previous research that involved individual fund performance data of TVE. Section 3 explores anomalies in aggregated valuation figures of TVE, analyzes the integrity of the underlying individual fund data, and proves the hypothesis of missing data updates and carried-forward interim NAVs. Section 4 investigates the causes of ceasing updates by analyzing patterns among incomplete funds, discusses the theoretical effects and provides empirical evidence for a resulting downward bias of TVE. Section 5 shows in detail how previous PME analyses were affected by incomplete fund data and wrong assumptions, and conducts an updated PME analysis with only the fully liquidated funds in the TVE sample.

2. Research based on TVE fund performance data

The TVE fund performance data have been the first choice for research in the area of private equity and venture capital performance since the 1990s. Numerous studies are based on aggregated performance statistics from TVE.² More recently, the underlying individual fund cash flow and valuation data have been used extensively (see Table I for an overview on related publications).

The two publications comparing private equity performance to public equity returns are Kaplan and Schoar (2005) and Phalippou and Gottschalg (2009). Although Kaplan and Schoar (2005) focus mainly on the persistence of fund returns, the first part of their study is related to the PME approach. Phalippou and Gottschalg (2009) conduct another PME analysis with particular focus on NAVs within the TVE data.

Using TVE's individual cash flow and valuation data as of December 2001, Kaplan and Schoar (2005) compare the performance of U.S. venture capital and U.S. buyout funds from 1980-95 to the S&P 500 index. The authors limit the TVE sample to funds that have been officially liquidated or whose returns are unchanged for at least the final six quarters. On a capital-weighted average basis, the authors find a slight outperformance of all funds (PME value of 1.05)³ which was driven by a substantial outperformance of venture capital funds (1.21), and partly offset by an underperformance of buyout funds (0.93). On an equally-weighted average basis, the authors find a slight underperformance of all funds in their sample (0.96), as well as venture capital and buyout funds individually (0.96 and 0.97).⁴ In summary, Kaplan and Schoar (2005) conclude that average fund returns approximately equal the S&P 500.

Phalippou and Gottschalg (2009) come to a different conclusion, using TVE cash flow and NAV data as of December 2003. The authors merge the four TVE sub-samples with 1980-93 vintage years into one large sample (i.e., U.S. venture capital, U.S. buyout, European venture capital, and European buyout funds that are older than 10 years), and

² As of December 5, 2010, Google Scholar identifies 2,150 academic articles and studies using the query ("VentureXpert" OR "Venture Economics") AND "Performance".

³ A PME value above 1 indicates higher returns of the private equity investments; a PME value below 1 indicates higher returns of the equivalent public equity index investments. See Section 5.1 for further details.

⁴ For the sole 1980s the authors find an average PME value of about 1 for U.S. buyout funds.

apply the same limitations as Kaplan and Schoar (2005) do. In addition to this, however, the authors recognize that a large fraction of their sample funds have constant residual values and no more cash flow activity for many years. The authors then interpret these residual values as valueless “living dead investments”⁵ and claim that NAVs of mature funds are generally overstated. After fully writing-off the remaining NAVs of all funds to zero the authors arrive at a PME value of 0.92 compared to the S&P 500 index.

In a next step the authors raise the hypothesis that the TVE fund performance sample further suffers a positive selection bias. To test this idea the authors try to estimate the returns of those funds that are not part of the TVE fund performance sample, but for which TVE has information on the ‘exit channel’ for at least 5 portfolio companies in their general funds and investments database. Comparing descriptive variables⁶ of these ‘out-of-sample’ funds with those for the funds that are in the TVE performance sample, the authors estimate that out-of-sample funds should have achieved a PME value of only 0.79 and conclude that the TVE performance sample significantly overstates the performance of private equity. After merging both samples the authors arrive at a PME value of 0.88, which they translate into a substantial underperformance of 3% per year with respect to the S&P 500.

In a final step Phalippou and Gottschalg (2009) argue that the beta of their sample funds must be larger than 1 relative to the S&P 500. After certain adjustments for systematic risk the authors estimate PME values of 0.75 for buyout funds and 0.77 for venture capital funds, which finally brings the underperformance to 6% per year.

⁵ The term “living dead investments” refers to underperforming company holdings of a private equity fund that have not been terminated yet.

⁶ Variables include the number of such 5+ investments exited via an IPO or M&A, the size of a fund and its sequence number, the nation of a fund’s headquarter, and the regional focus of the fund.

3. Analysis of the TVE fund performance data

The objective of this section is to review anomalies in aggregated valuation figures of the TVE fund performance sample in general, as well as to analyze the integrity of the underlying data in particular. Throughout this section I focus on the U.S. buyout part of the TVE sample, as these funds combine most of the allocated capital. For many tables and figures I also present a panel on U.S. venture capital for comparison and completeness.

3.1. *TVE and net asset values*

Phalippou and Gottschalg (2009) focus on NAVs within the TVE fund performance sample. The authors find that more than half of the funds which are older than 10 years still report substantial residual values. “71% of these residual values are reported by funds with neither cash flow activities for more than 3 years, nor revision in residual values for more than 3 years.”⁷ This observation is curious as constant NAVs rarely exist (particularly not over several years). Even in the later years of a fund’s lifetime the values of remaining investments get updated regularly. Furthermore, private equity funds without a single cash flow activity for more than three years should equally not exist (there will still be annual management fees or dividends from mature investments). In addition to this, the authors find that average NAVs of these funds equate to over 50% of the amount they invested. Keeping in mind that all of these funds are between 10 and 24 years old and most of them should be liquidated, remaining investments with a constant value as high as 50% of a fund’s size – on average – are surprising.⁸

Since net asset values are a very important part of a private equity fund’s interim performance during most of its lifetime, I am having another look at NAVs reported by TVE. As a first example, Table II shows annual and total drawdowns, distributions and

⁷ The authors find that almost 300 of their 852 sample funds show this long-term inactivity for over 3 years, with most of them for 6 years or more. In total, 462 funds (54%) still carry constant positive NAVs but didn’t have any more activity for at least 1.5 years (i.e., 6 quarters prior to Dec 2003).

⁸ For Dec 2003, University of California reports on the internet an average NAV to invested capital of 3.0% for 36 private equity funds from 1980-89 and 5.4% for 45 private equity funds from 1980-93. Washington State Investment Board reports 3.6% for 32 funds from 1980-89 and 4.8% for 36 funds from 1980-93 (1980-93 is the observation period and Dec 2003 is the last data update of Phalippou and Gottschalg (2009)).

NAVs for U.S. buyout funds with a 1994 vintage year (as reported for December 2009). Surprisingly, NAVs still equate to a substantial fraction of initially paid-in capital 15-16 years after inception of the funds. Compared to \$10.7 billion of cumulative drawdowns about \$4.0 billion are still reported as the value of actual investments. Considering that 1994 funds should be liquidated in 2009 and the 2005-07 markets offered formidable exit opportunities to sell any remaining stake, this figure appears unusually high.

Table III presents ‘Residual Value to Paid-in Capital’ (RVPI) ratios of TVE for 1980-99 vintage years (as of Dec 2009), and compares these numbers to publicly available figures from Cambridge Associates, Preqin and a set of public reporting institutions (PRI).⁹ The results I find underscore this anomaly. As highlighted in the table, RVPI ratios for funds that should be (almost) liquidated are still substantial in the TVE sample. Even funds from the mid-1980s that are older than 20 years show significant residual values. For example, funds from 1986 that are older than 23 years have an average RVPI of 33%, suggesting substantial amounts of remaining investments held by these funds. Figures provided by TVE are systematically higher than those by Cambridge, Preqin and PRI, all of which are very similar to each other and show a pattern which one would expect, i.e., a strictly monotonic decrease in residual values following a fund’s 10th anniversary. Average RVPIs of these three comparators are effectively zero for funds until 1992, below or equal 5% for funds until 1996, and less than half of those from TVE for funds from 1997-99. These are significant differences.

Table IV counts the number of funds per vintage year that still have residual values of more than 0%, 10%, 20% and 50% relative to paid-in capital, as well as calculating average and median RVPI ratios for these funds. The number of affected funds within the TVE sample is large. With respect to the 99 buyout funds from the 1980s, over 50% carry residual values 20-30 years after their inception (see Panel A). A total of 30 (27, 16) of these funds have net asset values that still exceed 10% (20%, 50%) of initially paid-in capital. Out of 122 funds from 1990-96, a total of 62 funds carry residual values of over 10%, with 49 and 29 funds having RVPIs of more than 20% and 50%, respectively. The

⁹ Public reporting institutions include CalPERS, Washington State Board and University of California, which are the only institutions that have consistently published their private equity holdings under the Freedom of Information Act since 2003.

average residual value of these funds is significant. The 51 funds from 1980-89 have an average RVPI of 37.3%; the 62 funds from 1990-96 have an average RVPI of 56.8% (as of Dec 2009). Figures for U.S. venture capital are qualitatively very similar (see Panel B).

3.2. *Missing updates within the TVE data*

The immediate conjecture is that a number of funds in the TVE sample are not up-to-date, i.e., have stopped being updated since a certain point during their active lifetime. If the interim NAVs of such funds were then carried forward at their most recent level, this would explain the pattern of high RVPIs for old funds. In such a case one should expect to find NAVs of these funds to be constant in recent years, as well as no more cash flow activity to be recorded.

To test this hypothesis, I check whether the funds identified above have indeed constant residual values for two or more years prior to December 2009, as well as no more cash flow activity during this period. Using TVE's Ranked Statistics function, I check each fund's individual 5-tuple "DPI, RVPI, TVPI, PICC, DCC" from December 2009 for identical values over the previous quarters and years, controlling for the 3-tuple "fund year, fund stage, fund size range" (see Table V for an example on Ranked Statistics of RVPIs).¹⁰ I limit the analysis to funds with at least 10% in residual values to focus only on NAVs that are economically meaningful. At the same time, I extend the analysis to funds with vintage years up to 2005, as I still seek to explain the systematically lower performance of the TVE benchmark as a whole, which has been remarkable for post-1999 vintage years.

Table VI presents my findings. Out of 488 buyout funds with 1980-2005 vintage years, a total of 211 funds (43%) have constant NAVs and no more cash flow activity for at least two years prior to December 2009 (see Panel A). The fractions of funds per vintage year that show this pattern range between 11-40% for the 1980s, 33-65% for the 1990s, and up to 59% thereafter. Constant residual values average to 62.0% of paid-in capital for funds from the 1980s, 65.0% for funds from the 1990s, and 78.6% for the 53 funds from 2000-05.

¹⁰ The combination "Distributed to Paid-In capital" (DPI), "Residual Value to Paid-In capital" (RVPI), "Total Value to Paid-In capital" (TVPI), "Paid-In to Committed Capital" (PICC), and "Distributed to Committed Capital" (DCC) at any point of a fund's lifetime is as unique as a fingerprint.

Since there have been only a few funds in the history of U.S. private equity that broke-up during their active lifetime and had to stop operating¹¹ (rather than 211 and more by number, not to mention an estimated 43% of the entire population), the only possible explanation of these unusually high and constant residual values is funds that are no more up-to-date, i.e., TVE has kept (and keeps) funds in their database for which they do not receive any further updates.¹²

Not surprisingly, almost all of these funds have not been updated for a much longer time (rather than just 2 years). Table VI further presents the average and median year in which funds from each vintage year received their last update, as well as the age of these funds when updates ceased. For example, the 9 out of 24 funds from 1989 stopped being updated in 1997 (on average), i.e., just before their 8th anniversary. From 27 buyout funds with a 2001 vintage year, a total of 16 funds stopped being updated prior to 2008, on average just after 3.5 years into their operations. Figures for U.S. venture capital are qualitatively very similar, as shown in Panel B.

Figure III shows the cumulative relative distribution of ages at which these 211 funds received their last update (see Chart A). A total of 47% of the funds do not show any further activity from prior to their 6th anniversary, i.e., while they were only in their investment period. Another 24% of these funds do not show any more activity prior to their 8th anniversary, i.e., since the middle of their divestment period. The overall pattern follows an equal distribution rather than a fading away of updates at the end of a fund's lifetime. This observation underscores the evidence that a certain fraction of the sample funds simply stopped receiving further updates at a point during their (very) active lifetime.

As an example, Figure IV visualizes two funds with constant NAVs. For illustrative purposes I show cumulative capital values for each point in time. The fund in Chart A starts drawing down capital from LPs in 1989, and distributing capital by 1990. NAVs change every quarter until the end of 1996. From thereon no further cash flows are recorded and the NAV is carried forward at its most recent level. Chart B shows a 1994 fund that does

¹¹ Information based on personal discussions with some of the most senior LP individuals, all of which started investing in private equity between the late-1970s and mid-1980s.

¹² As the 2001 sample that Kaplan and Schoar (2005) used was larger by about 50 U.S. buyout and 30 U.S. venture capital funds, TVE may have removed some (assumably incomplete) funds from their database.

not receive any further updates by mid-1996. In both cases, substantial amounts of interim NAVs never turn into cash distributions. As a result, IRRs and money multiples for these funds (as calculated by TVE) are highly unlikely to match their true outcomes.

4. Bias of the TVE fund performance data

The critical question is to what extent the identified inconsistencies result in a bias of the TVE performance benchmark, or whether they only increase noise. Important in this context is whether the 211 funds with missing updates represent a random drawing from the 488 U.S. buyout funds in the TVE sample, or whether they share certain attributes relevant to their performance. In a first step, I analyze the 211 funds for characteristic patterns with respect to their interim performance, their size and the time of their last update. Afterwards, I discuss implications of incomplete time-series data for a possible performance bias and provide empirical evidence on an individual and aggregated basis.

4.1. Patterns of incomplete funds

Although TVE does not disclose details of collecting fund performance data, it is widely believed that these come directly from GPs rather than LPs.¹³ Consequently, one might assume that ceasing updates are the result of fund managers who stopped sharing their performance data with TVE for certain (possibly strategic) reasons.

The general advantages, disadvantages and incentives of voluntary reporting of performance data by GPs have been discussed in the past. For example, Kaplan and Schoar (2005) believe that worse performing fund managers have an incentive not to share their performance data with TVE. However, one might argue that GPs with worse performing funds have, at least, a joint interest to share their performance data to avoid a positive selection bias of the benchmark, which would hit them particularly hard. At the same time, one could argue the other way around. To quote a well-known GP: “We don’t provide our data because: Why should we want to raise the average?” Consequently, it is questionable

¹³ In the past, the NVCA has encouraged its members to report their performance data to TVE. In the performance yearbooks of the EVCA TVE exclusively acknowledges the support from GPs.

whether GPs systematically stopped reporting data of their exceptionally worse (or maybe better?) performing funds. Although this might have been the case for the one or the other fund manager, it seems very unlikely that this explains a shortfall of 43% of the sample.

Empirical evidence that supports the case of no (or very few) strategically motivated break-ups of individual GPs comes from an analysis of the funds' interim performance. At the time of their last update, almost none of the 211 buyout funds showed a significantly low or high performance in general, nor relative to the contemporaneous performance of their vintage year peers in particular. As Table VII documents, the number of funds that were ranked first, second, third or fourth quartile with respect to their interim IRRs and interim money multiples is almost equally distributed (for both, U.S. buyout and U.S. venture capital funds). Similarly, the distribution in size is almost identical between the whole sample and the subset of incomplete funds, as shown in Table VIII.¹⁴

As incomplete funds do not seem to differ with respect to their interim performance and size, i.e., observable endogenous factors, I next switch to an external perspective. Figure V illustrates the distribution in time when funds stopped being updated. With respect to U.S. buyout funds (Chart A), the 1990s show a level of ceasing updates for up to 4 funds per quarter. The third quarter of 1997 is the only exception with a peak of 12 funds that stopped receiving updates. By 2001/02 the number of shortfalls changes to disproportionately higher levels. Chart B shows the distribution for U.S. venture capital funds. The pattern is similar to U.S. buyouts funds; only the magnitude differs due to the larger number of funds in the sample. Regular shortfalls started in the later 1980s, continued throughout the 1990s (with the same peak in 1997), and remained at ongoing high quarterly levels afterwards.¹⁵

This systematic pattern is striking. The non-random distribution of ceasing updates in time, together with the fact that funds of all ages, performances and sizes are equally affected, gives indication that other factors are causing incomplete data. Absent options for further investigation, any hypothesis would be too speculative at this point. Nonetheless,

¹⁴ Large buyout funds have regularly been able to employ higher levels of leverage in their LBOs compared to the small and mid-market, thus, are subject to a different risk-and-return profile.

¹⁵ Since the number of (assumedly incomplete) funds was higher in the TVE samples from 2001 and 2003, there might have been many more ceasing updates throughout the 1980s or 1990s.

the reader might be interested in the study of Ljungqvist, Malloy and Marston (2009) who document technical problems as the reasons for ex-post changes to, and inconsistencies within, the Thomson IBES analyst stock recommendation database.

4.2. Interim performance measures

Since I could not find any indication that funds with certain performance characteristics stopped being updated, I assume in the following that incomplete funds represent a random drawing from the full sample. This reduces a potential bias to the time-sensitivity of the applied performance measure, as well as to the extent to which interim NAVs have been representative for future cash distributions.¹⁶

With respect to a fund's IRR the expected impact of ceasing updates is predictable, as the IRR is a discounted cash flow measure. Since net asset values represent the terminal value of any (interim) IRR calculation, and the NAV of a fund's last update is carried forward and increasingly matures (rather than turning into cash distributions), one should expect a downward bias of subsequent performances.

With respect to money multiples it is less obvious whether to expect a bias or just noise, since money multiples are not sensitive to the timing of distributions (and drawdowns). Therefore, it depends on whether interim NAVs are a good predictor of future cash distributions. On the one hand, investments held at cost in early years or conservative fund accounting might result in a downward bias of money multiples in case of future (successful) realizations. On the other hand, potentially inflated NAVs during follow-on fundraising periods or future carried interest payments might overstate the interim net-to-LP value of actual investments. In addition to this, macro-economic trends such as steadily increasing equity and enterprise values since the early 1980s are likely to have an exogenous impact as well.

Beside these considerations it matters, of course, whether the so far identified inconsistencies in the data are the only ones, or whether further shortfalls exist within the

¹⁶ Of course, these considerations are only relevant for funds that have at least invested most of their capital and mark their investments to market. For example, the final outcome of the 19-29% buyout funds that stopped being updated before their third or fourth anniversary (see Figure III) is very unpredictable.

TVE fund performance data, e.g., missing updates in the middle of a fund's active lifetime or maybe even missing first quarters – either of these are more likely to affect cash inflows into a fund, cause a too low cost basis, and result in an overstatement of the fund's interim performance.

4.3. Resulting bias and evidence

To provide empirical evidence on the actual performance differences of incomplete funds, I do a comparison between the funds' reported performance numbers within TVE and their true outcomes in reality. Essential part of this analysis is a large sample of U.S. private equity funds with quarterly cash flow and valuation data that I have collected from a number of LPs over the past four years ('LP sample'), some of which are among the largest and oldest investors in the industry.

For each incomplete fund in the (anonymous) TVE sample I observe its interim performance characteristics (IRR, DPI, RVPI, TVPI, PICC, DCC) at the precise quarter when the fund received its last update, as well as the fund's vintage year and its size range in general. While the sole combination of vintage year and size range already limits potential candidates to a smaller number of funds (especially until the mid-1990s when the overall number of U.S. buyout funds per vintage year was still limited), the interim performance characteristics at the quarter of the last update is a unique identifier and sufficient to confirm two funds from both samples to be the same. Comparing all 211 incomplete TVE funds with potential candidates in the LP sample finally results in a match of 140 funds.

Figure VI presents evidence on the identified performance bias of these 140 funds. Chart A plots the scatter of IRRs and Chart B shows the pairs of money multiples. The abscissa of both graphs contains the correct fund performance values from the LP sample (upon a fund's liquidation or as of Dec 2009). The ordinate shows the corresponding values as calculated by TVE for Dec 2009. The diagonal line represents identical values, which one should expect to find in case of correct fund performance figures within TVE.

Both charts show that the very vast majority of data points are below / right of the diagonal line. These are funds for which TVE reports a lower performance than they achieved in reality. The closer a data point to the diagonal line, the less biased is its performance in the TVE sample. Some data points are actually above / left of the diagonal line. In these cases, a fund's true outcome has been worse than its performance within TVE.

Different non-parametric and parametric tests indicate that these 140 funds originate from a different population according to their performance within TVE. All tests show statistical significance at the 99% level with respect to the pairs of IRRs (95% level with respect to the pairs of money multiples). At the same time, these 140 funds show a significantly good fit with the entire sub-sample of incorrect funds, i.e., they represent a random drawing from it. Consequently, the downward bias is very likely to be the same for all incomplete funds and, hence, to significantly impact the performance of the whole TVE sample.

Figure VII provides evidence that the observed downward bias of the whole TVE performance benchmark (as shown in the introductory Figure I) is, indeed, primarily the result of these incomplete fund data. The dotted black line TVE* recalculates the median (Chart A) and average (Chart B) performance of the TVE sample after updating the biased IRR numbers of the 140 matched funds, as well as removing the remaining 71 incomplete funds from the sample. Relative to the solid black line which draws the performance of the original TVE sample, the dotted line shows a systematic upward shift over the entire two decades. Moreover, TVE* now shows a very good fit with the performance benchmarks of Cambridge and Prequin by 1994. Consequently, the significantly lower performance of the actual TVE sample is mainly the result of a substantial fraction of funds with incomplete time-series data, rather than a sample selection bias relative to Cambridge and Prequin, or even a survivorship bias and TVE being more representative for the true population of U.S. buyout funds.

5. Public Market Equivalent analysis

This section has two main objectives. After a short introduction into the PME approach, I show how incomplete fund data of the TVE sample (plus certain assumptions) have negatively impacted the results of previous PME analyses. I then use the fraction of ‘officially liquidated’ U.S. buyout funds in the TVE sample and conduct an updated PME analysis, followed by a discussion of the findings.

5.1. Background of the PME approach

The underlying rationale of the PME approach is to compare cash inflows from LPs into a private equity fund, and cash outflows back to LPs, against the changes in value of a public equity performance index. The original approach as first documented by Long and Nickels (1996) assumes buying and selling the index according to the timing and size of the cash flows between an LP and a private equity fund. This yields to an equal stream of cash flows with the index and a terminal value of the remaining index investment that is above or below the remaining NAV of the private equity fund. The result is a positive or negative spread between the IRR of the private equity fund and the IRR of its ‘public market equivalent’, depending on whether the private equity fund (net of fees and carry) has done better than the public equity index or not.

Kaplan and Schoar (2005) modified this approach by discounting cash inflows and outflows separately according to the changes in the index and comparing both present values, i.e., arriving at a ratio above or below 1 indicating an out- or underperformance of private equity. Although this method does not generate a true ‘equivalent’ to equal investments in a public equity index, the underlying idea is clearly innovative and its technical implementation is comparably simple. Due to its nature of being effectively a money multiple capitalizing nominator and denominator to the same point in time, I refer to it as the ‘S&P adjusted TVPI’ method in the following.

5.2. *Downward bias in previous PME analyses*

Figure VII shows a particular fund from 1989 that stops being updated after 7.5 years, as well as its true outcome thereafter. At the time updates cease, the fund is fully drawn down; hence, no cash inflows into the fund are missing. The fund has already distributed 11% more capital than it has drawn down (DPI ratio of 1.11), as well as carrying actual investments valued at 67% relative to all paid-in capital (RVPI ratio of 0.67). The interim money multiple (TVPI) of the fund is 1.78, and its interim IRR is 17%.

Since no further updates are recorded cash distributions of the fund stop prior to its 8th anniversary and right in the middle of its divestment period. The fund's interim NAV is carried forward at its last value until infinity. Consequently, DPI, RVPI, and TVPI ratios do not change any further and remain at the same interim level. However, as the NAV of the fund increasingly matures, the IRR decreases constantly from its interim level of 17% down to 9% by the end of 2009.

In reality, however, the fund continues realizing investments and distributing capital over the following 6.5 years. As investments are exited, the NAV continues decreasing and its interim value of 0.67 turns into cash distributions of 0.85. Hence, the final money multiple reaches 1.96 which is a 23% higher return on invested capital than suggested by the interim multiple. Obviously, the fund's interim NAV at the time of its last update was understating subsequent distributions, which is likely to be the result of the exponential growth in enterprise and equity values towards the end of the 1990s. At the time of the fund's liquidation, its true IRR turns out to be 18%, which is 50% above its 2001/03 level of 12%, and twice as high as the 9% presented for the end of 2009.

Calculating the fund's true PME value via the S&P adjusted TVPI method results in 1.04, indicating that the fund has performed slightly better than the S&P 500. Kaplan and Schoar (2005), who built their sample with only funds that did not have a cash inflow or outflow for at least 6 quarters (as the authors' proxy for 'officially liquidated' or 'unchanged returns'), would have calculated a PME value of 0.92 for the end of 2001. Interpreting the 67% NAV of this fund as 'living dead investments' and writing them off to zero, Phalippou and Gottschalg (2009) would have calculated a PME value of 0.84.

5.3. *Updated PME analysis*

The immediate question that arises is about the PME value of the ‘unbiased’ TVE sample, i.e., after removing – at least – all those incomplete funds that stopped being updated before having liquidated most of their investments. For example, a viable scenario could be to restrict the TVE sample to only those funds that are either officially liquidated or have an NAV of less than 10% of invested capital. Although such a step would remove more than 50% of the sample funds for mature vintage years (as of Dec 2001), it will ensure that the remaining sample fulfills minimum requirements as to being usable.¹⁷

Without having access to the original TVE cash flow and NAV data from either of the two aforementioned studies it is not possible to replicate their results, but without incomplete and doubtful funds involved. However, TVE provides the option to limit any output of their web-based fund performance module to only those funds that are ‘officially liquidated’ within their database (as of a particular date). Applied to the TVE Cashflow Summary function, which allows a user to download aggregated funds cash flows for a single or multiple vintage years, this provides the opportunity to repeat a PME analysis for the sub-sample of fully liquidated funds on a pooled cash flow, i.e., capital-weighted basis.

As of 2009 there are 198 U.S. buyout funds with vintage years from 1980-95 in the TVE database. Although this number appears to have decreased from a total of 250 U.S. buyout funds that Kaplan and Schoar (2005) report for their Dec 2001 sample, it seems implausible that TVE has removed any of the correct and liquidated funds from their database. Consequently, restricting TVE’s Cashflow Summary output to officially liquidated funds as of Dec 2001 should result in the same (or very similar) sub-sample of officially liquidated funds that Kaplan and Schoar (2005) kept as part of their working sample of individual TVE fund data. To maintain the focus on U.S. buyout funds, I won’t revisit Kaplan and Schoar’s (2005) PME analysis of venture capital funds as part of this study, nor the overall PME analysis of Phalippou and Gottschalg (2009) who merge venture capital and buyout funds.

¹⁷ Nonetheless, further plausibility tests would be recommended, such as screening for funds with constant NAVs and missing cash flows for, e.g., four or more consecutive quarters during their active lifetime, unreasonably low or high PICC ratios, etc.

The results of my updated PME analysis with TVE's officially liquidated U.S. buyout funds are presented in Table IX. Panel A calculates PME values based on the S&P adjusted TVPI method to compare with the findings of Kaplan and Schoar (2005). Column 2 and 3 show the total number of U.S. buyout funds for 1980-95 vintage years that were part of Kaplan and Schoar's (2005) TVE sample as of Dec 2001, as well as the number of U.S. buyout funds that were part of the TVE database as of Dec 2009. Column 4 shows the distribution of the 169 funds that Kaplan and Schoar (2005) selected for their "liquidated sample"; these are funds that were either marked as officially liquidated by TVE or that did not have any more cash flow activity since mid-2000. Columns 5 and 6 show those U.S. buyout funds from the TVE database in 2009 that are marked as officially liquidated as of Dec 2001 or Dec 2009, respectively. The 64 funds in column 5 are most likely the subset of officially liquidated funds from the 169 funds in column 4.

Columns 7 to 9 present PME values relative to the S&P 500 performance index. Column 7 shows the PME values of Kaplan and Schoar (2005). Columns 8 and 9 show the PME values as calculated in this study by using the aggregated cash flows from the TVE database for funds liquidated as of Dec 2001 or Dec 2009. 'n/a' refers to values that are not available per individual vintage year. With respect to column 7 because the authors decided not to report values for less than three observations. With respect to columns 8 and 9 because TVE does not generate an output of aggregated cash flows in case of less than three constituents. However, these funds are part of the PME values calculated for all vintage years as presented in the final row.

In total, the 64 U.S. buyout funds in the TVE sample that were liquidated as of 2001 show an overall PME value of 1.09, i.e., they substantially outperformed the S&P 500. Early vintage years from 1983-85 show remarkably higher values that decrease in the later-1980s. Funds from the vintage year 1987 show a substantial underperformance, 1989 funds show only a slight underperformance. For the years 1990/91 and 1993/94 TVE has less than three observations per year so I cannot download and calculate individual PME values for these vintage years. For the five funds in 1992 the PME value is as low as 0.79.

The 92 funds that were finally liquidated as of 2009 show a total PME value of 1.10 and closely confirm the observed outperformance for the overall period. PME values from

1983-87 are identical with the 2001 values, while 1988 turns into another underperforming vintage year for the later 1980s. However, 1989 turns from 0.97 into 1.44 following only a slight increase in the number of liquidated funds. The period 1990-95 shows a mixed pattern of out- and underperformance.

Compared to the time-series PME values of Kaplan and Schoar (2005), my figures are higher for almost every vintage year. Especially the overall values of 1.09 and 1.10 point in the opposite direction as their PME value of 0.93 does, and indicate a substantial outperformance of the subset of ‘officially liquidated’ funds. Since incomplete funds did not differ with respect to their interim performance, the distribution of their outcome is likely to be similarly positive (if complete data was available for them).

Panel B follows the original PME approach, which yields a spread between the IRR of a private equity fund and the IRR of its index equivalent. Columns 3 and 7 show the vintage year and overall IRRs for the TVE funds that were liquidated as of Dec 2001 or Dec 2009. Columns 4 and 8 calculate the corresponding IRRs for equal investments into, and divestments from, the S&P. Columns 5 and 9 present the spread between such IRRs.

For the 64 funds that were liquidated as of Dec 2001 the overall IRR is 18.8% for the period 1980-94. Vintage year IRRs from 1983-85 are above 25% in each year, and those funds are likely to having substantially shaped the unofficial performance goal of 25% annual net-returns that the asset class has claimed and aimed to deliver ever since. The equivalent investments in the S&P 500 yield to an overall IRR of 16.7%. The resulting spread between the IRRs of the U.S. buyout funds and the IRRs of their index equivalents are 209 bps per annum. While the spreads within these 14 vintage years vary widely, the pattern is (almost) the same as for the S&P adjusted TVPI values.

The 92 funds that were liquidated as of Dec 2009 have an overall IRR of 17.3% for the vintage years 1980-95. Equivalent investments with the S&P 500 had returned an IRR of 14.8%, resulting in a positive spread for U.S. buyout funds of 248 bps.

5.4. *Discussion of findings*

My results indicate that TVE's officially liquidated (i.e., complete and assumingly correct) U.S. buyout funds with vintage years from 1980-95 have substantially outperformed the total returns of the S&P 500 for the whole observation period. While equally timed and sized investments in the S&P 500 delivered investors an IRR of 14.8%, funds focusing on leveraged buyouts achieved a pooled IRR of 17.3%, translating into additional 248 bps per annum (the S&P adjusted TVPI is 1.10). However, I find substantial variation in vintage year returns and the performance relative to the S&P 500 index.

6. Conclusion

In this paper I identify and trace major inconsistencies and errors in the data that underlie the most widely used private equity performance benchmark. I provide evidence that the reason for these shortfalls are ceasing data updates during the active lifetime of about 40% of all private equity and venture capital funds. Consequently, cash flows of these incomplete funds are missing (mainly on the distribution side), and carried-forward interim NAVs become increasingly meaningless as time goes by. The result is a significant downward bias of the private equity benchmark.

Previous studies that use TVE's fund performance data and statistics are inevitably impacted by these shortfalls. Especially studies that compare the returns of private equity to those of public equity suffer directly from these data errors.

Using TVE's Cashflow Summary data for the sub-sample of 'officially liquidated' funds, I find substantial outperformance of U.S. buyout funds relative to the S&P 500, especially for vintage years prior to 1986. This observation is consistent with the observed wealth effects to most early investors and the increasing popularity of the asset class during that period.

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Table I - Overview on related research

This table lists research studies that involve individual fund performance data of TVE or were directly based on such results.

Author	Title	Year	Journal
Kaplan, Schoar	Private equity performance: Returns, persistence, and capital flows	2005	Journal of Finance
Gottschalg, Phalippou	Truth about private equity performance	2007	Harvard Business Review
Driessen, Lin, Phalippou	A new method to estimate risk and return of non-traded assets from cash flows: The case of private equity funds	2008	NBER Working Paper
		2011	Journal of Financial and Quantitative Analysis
Phalippou, Gottschalg	The performance of private equity funds	2009	Review of Financial Studies
Phalippou	Beware of venturing into private equity	2009	Journal of Economic Perspectives
Phalippou	Venture capital funds: Flow-performance relationship and performance persistence	2010	Journal of Banking and Finance

Source: Phalippou (2010), own literature review.

Table II - Annual and total cash flows and NAVs

This table documents annual and total cash flows and net asset value figures for U.S. buyout funds with a vintage year of 1994 as reported by TVE for December 2009. “Annual drawdowns” refers to annual cash flows into all sample funds by their Limited Partners. “Annual distributions” refers to annual cash flows from all funds back to LPs. “Net asset values” represent the aggregated values of actual investments of all funds at the end of each year. The final row adds-up all annual drawdowns and distributions, and repeats the final year’s NAV. All capital values are in USD millions.

Period	Sample size	Sample capitalization	Annual drawdowns	Annual distributions	End-of-year net asset values
1994	26	11,303	2,830	80	2,750
1995	26	11,303	2,067	321	4,864
1996	26	11,303	1,741	1,499	6,062
1997	26	11,303	1,425	1,585	7,155
1998	26	11,303	1,190	1,678	7,571
1999	26	11,303	937	2,241	8,841
2000	26	11,303	374	634	7,105
2001	26	11,303	98	628	6,130
2002	26	11,303	45	524	5,602
2003	26	11,303	11	621	6,065
2004	26	11,303	3	615	5,880
2005	26	11,303	6	1,160	4,934
2006	26	11,303	4	627	4,278
2007	26	11,303	0	91	4,155
2008	26	11,303	0	0	4,167
2009	26	11,303	0	152	3,983
Total			10,732	12,456	3,983

Source: TVE Cashflow Summary.

Table III - Comparison of vintage year RVPIs from different data sources

This table presents residual value to paid-in capital ratios for U.S. buyout funds with 1980-99 vintage years as of December 2009 for Thomson VentureXpert (TVE), Prequin, Cambridge Associates (CA), and major public reporting institutions (PRI). Public reporting institutions include CalPERS, Washington State Board and University of California, which are the only institutions that have consistently published their private equity holdings under the Freedom of Information Act since 2003. The table starts in 1980 as this is the first year for which TVE and Prequin provide data (Cambridge does not go back beyond 1986). It ends in 1999 as these funds are at least 10 years old as of December 2009.

Vintage year	Sample size				RVPI (avg)				RVPI (wtd-avg)			
	TVE	Prequin	CA	PRI	TVE	Prequin	CA	PRI	TVE	Prequin	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: TVE Cumulative Returns, Prequin / Cambridge Associates / PRI reports.

Table IV - Funds with positive NAVs in the TVE sample

This table presents numbers on U.S. buyout funds (Panel A) and U.S. venture capital funds (Panel B) from the TVE sample that have positive RVPI ratios as of December 2009. Numbers of funds with RVPI magnitudes that are not necessarily unusual for a given vintage year (relative to other data providers, compare Table III) are presented in grey. “RVPI of fraction” refers to all 267 (622) funds with positive RVPIs. The table ends in 1999 as these funds are at least 10 years old as of December 2009.

Panel A: U.S. Buyout funds.

Vintage year	TVE sample	Funds with RVPI				RVPI of fraction			
		> 0%	> 10%	> 20%	> 50%	Avg	Stdev	Wtd-avg	Med
1980-83	9	1	1	1	0	.28	-	.28	.28
1984	7	2	2	1	1	.65	.72	.31	.65
1985	7	4	1	1	1	.29	.57	.03	.02
1986	10	7	4	4	2	.46	.63	.39	.28
1987	25	14	8	7	5	.30	.31	.19	.22
1988	17	10	5	4	1	.18	.22	.16	.09
1989	24	13	9	9	6	.54	.47	.20	.40
1990	9	7	5	3	2	.34	.35	.17	.18
1991	5	3	3	3	2	1.13	.80	1.13	.98
1992	15	10	6	4	4	.33	.36	.42	.16
1993	21	14	7	5	3	.37	.54	.36	.12
1994	26	21	13	12	5	.34	.35	.43	.21
1995	23	20	12	8	4	.24	.25	.16	.14
1996	23	20	16	14	9	.51	.48	.37	.49
1997	40	34	23	19	11	.38	.38	.37	.27
1998	53	49	37	30	16	.40	.34	.34	.31
1999	38	38	31	30	16	.66	1.21	.66	.43
Total	352	267	183	155	88				

Table IV (continued)

Panel B: U.S. Venture Capital funds.

Vintage year	TVE sample	Funds with RVPI				RVPI of fraction			
		> 0%	> 10%	> 20%	> 50%	Avg	Stdev	Wtd-avg	Med
1969-74	13	4	4	4	4	1.37	1.01	.42	1.00
1975-79	18	6	4	4	4	.69	.49	.13	1.00
1980	18	7	5	2	1	.20	.24	.01	.13
1981	22	11	5	4	4	.39	.49	.08	.04
1982	28	9	5	5	4	.47	.47	.05	.33
1983	58	24	13	9	8	.36	.42	.07	.12
1984	63	28	17	14	10	.42	.43	.14	.20
1985	46	23	15	11	5	.28	.29	.11	.17
1986	41	21	10	6	5	.24	.34	.07	.10
1987	64	27	20	15	9	.42	.43	.10	.25
1988	44	24	12	9	6	.27	.32	.08	.11
1989	50	27	17	14	11	.34	.31	.12	.21
1990	21	16	12	8	6	.44	.42	.19	.22
1991	18	13	8	5	5	.52	.65	.43	.15
1992	27	16	8	6	4	.26	.36	.13	.09
1993	40	29	18	17	12	.43	.40	.16	.28
1994	37	31	22	16	11	.63	.98	.42	.27
1995	49	41	28	23	14	.47	.57	.28	.24
1996	36	30	21	18	11	.73	1.15	.57	.29
1997	64	60	42	27	16	.40	.60	.29	.18
1998	78	73	64	49	22	.63	1.21	.45	.24
1999	107	102	83	64	21	.40	.60	.30	.30
Total	942	622	433	330	193				

Source: TVE Ranked Statistics.

Table V - TVE Ranked Statistics of RVPI ratios

This table shows an output from the TVE Ranked Statistics function for RVPI ratios as of December 2009 (limited to the top-50 and bottom-5 funds by the author). Panel A shows U.S. buyout funds and Panel B shows U.S. venture capital funds. Vintage years span from 1980-95.

Panel A: U.S. Buyout funds.

Rank	Fund Year	Fund Stage	Fund Size Range (USD Mil)	Internal Rate of Return (IRR)	Distributions to Paid In Capital (DPI)	Residual Value to Paid In Capital (RVPI)	Total Value to Paid In Capital (TVPI)	Paid In Capital to Committed Capital (PICC)	Distributions to Committed Capital (DCC)
1	1991	Small Buyouts	100.1 - 300 Mil	3.93	0.01	2.00	2.01	0.15	-
2	1993	Large Buyouts	500.1 - 1000 Mil	6.81	0.45	1.68	2.13	1.00	0.45
3	1986	Small Buyouts	100.1 - 300 Mil	14.71	1.73	1.67	3.39	1.00	1.73
4	1989	Small Buyouts	30.1 - 50 Mil	22.76	2.16	1.35	3.51	1.00	2.16
5	1989	Small Buyouts	50.1 - 100 Mil	21.88	2.40	1.35	3.76	1.00	2.40
6	1993	Small Buyouts	100.1 - 300 Mil	1.39	-	1.25	1.25	1.00	-
7	1984	Small Buyouts	30.1 - 50 Mil	124.74	8.27	1.15	9.42	0.41	3.39
8	1985	Small Buyouts	0 - 30 Mil	3.71	0.48	1.15	1.62	1.00	0.47
9	1994	Small Buyouts	100.1 - 300 Mil	0.37	0.03	1.02	1.05	1.02	0.03
10	1992	Mega Buyouts	1000.1 Mil+	11.87	1.21	1.02	2.22	0.87	1.05
11	1993	Medium Buyouts	300.1 - 500 Mil	0.14	0.01	1.01	1.02	0.74	0.01
12	1986	Small Buyouts	30.1 - 50 Mil	1.74	0.34	0.99	1.34	1.00	0.34
13	1991	Small Buyouts	100.1 - 300 Mil	-0.13	-	0.98	0.98	1.00	-
14	1994	Mega Buyouts	1000.1 Mil+	0.07	0.09	0.92	1.01	1.00	0.09
15	1989	Small Buyouts	100.1 - 300 Mil	29.68	2.68	0.89	3.57	1.00	2.68
16	1994	Small Buyouts	50.1 - 100 Mil	1.81	0.31	0.89	1.19	0.50	0.15
17	1987	Small Buyouts	50.1 - 100 Mil	9.23	1.30	0.87	2.17	0.80	1.04
18	1990	Small Buyouts	100.1 - 300 Mil	-0.64	0.03	0.86	0.89	0.08	-
19	1994	Mega Buyouts	1000.1 Mil+	16.19	1.14	0.86	2.00	1.05	1.20
20	1995	Small Buyouts	100.1 - 300 Mil	12.44	1.00	0.84	1.85	1.26	1.26
21	1989	Small Buyouts	50.1 - 100 Mil	-0.59	0.07	0.83	0.90	0.92	0.07
22	1994	Small Buyouts	100.1 - 300 Mil	18.11	1.58	0.77	2.35	1.01	1.60
23	1990	Small Buyouts	30.1 - 50 Mil	-1.72	0.04	0.71	0.76	1.00	0.04
24	1988	Medium Buyouts	100.1 - 300 Mil	0.03	0.31	0.70	1.00	0.70	0.22
25	1987	Small Buyouts	100.1 - 300 Mil	29.91	4.24	0.68	4.92	0.92	3.90
26	1989	Medium Buyouts	100.1 - 300 Mil	9.69	1.11	0.67	1.78	0.81	0.90
27	1987	Small Buyouts	50.1 - 100 Mil	4.63	0.87	0.67	1.53	0.99	0.86
28	1995	Large Buyouts	500.1 - 1000 Mil	-1.40	0.22	0.67	0.89	1.28	0.28
29	1992	Small Buyouts	0 - 30 Mil	48.59	4.28	0.66	4.93	0.97	4.14
30	1989	Small Buyouts	0 - 30 Mil	13.80	1.64	0.65	2.29	0.90	1.47
31	1992	Small Buyouts	30.1 - 50 Mil	-2.90	0.01	0.63	0.64	1.00	-
32	1987	Small Buyouts	50.1 - 100 Mil	6.57	0.97	0.61	1.58	0.96	0.94
33	1995	Medium Buyouts	100.1 - 300 Mil	-2.29	0.21	0.59	0.80	1.32	0.27
34	1995	Medium Buyouts	300.1 - 500 Mil	4.88	0.73	0.58	1.31	0.96	0.71
35	1987	Small Buyouts	30.1 - 50 Mil	4.49	0.95	0.56	1.51	1.00	0.95
36	1992	Small Buyouts	50.1 - 100 Mil	7.96	0.99	0.53	1.52	0.92	0.91
37	1990	Medium Buyouts	300.1 - 500 Mil	11.73	1.48	0.50	1.98	1.02	1.50
38	1994	Medium Buyouts	100.1 - 300 Mil	-1.94	0.34	0.49	0.83	0.79	0.27
39	1995	Small Buyouts	100.1 - 300 Mil	6.85	0.86	0.44	1.29	0.84	0.72
40	1988	Mega Buyouts	1000.1 Mil+	7.74	1.13	0.44	1.57	0.98	1.10
41	1991	Small Buyouts	100.1 - 300 Mil	13.90	1.49	0.42	1.91	1.02	1.52
42	1989	Small Buyouts	100.1 - 300 Mil	3.67	0.85	0.40	1.24	1.11	0.94
43	1995	Small Buyouts	30.1 - 50 Mil	25.33	2.20	0.38	2.58	0.99	2.18
44	1993	Mega Buyouts	1000.1 Mil+	34.24	1.76	0.37	2.13	0.96	1.69
45	1989	Small Buyouts	50.1 - 100 Mil	11.25	1.36	0.37	1.73	1.00	1.36
46	1994	Small Buyouts	100.1 - 300 Mil	5.62	0.89	0.37	1.26	1.00	0.90
47	1989	Small Buyouts	30.1 - 50 Mil	6.28	1.33	0.34	1.67	0.99	1.31
48	1994	Mega Buyouts	1000.1 Mil+	-2.47	0.45	0.34	0.78	1.02	0.46
49	1993	Small Buyouts	50.1 - 100 Mil	1.56	0.77	0.32	1.09	0.97	0.74
50	1987	Mega Buyouts	1000.1 Mil+	8.39	1.43	0.31	1.73	1.10	1.57
...
194	1992	Small Buyouts	100.1 - 300 Mil	-23.45	0.59	0.00	0.59	0.69	0.40
195	1984	Small Buyouts	30.1 - 50 Mil	15.76	1.61	0.00	1.61	0.90	1.45
196	1988	Small Buyouts	50.1 - 100 Mil	9.84	1.70	0.00	1.70	1.00	1.70
197	1983	Small Buyouts	0 - 30 Mil	32.17	4.73	0.00	4.73	1.00	4.72
198	1988	Small Buyouts	50.1 - 100 Mil	13.13	1.69	0.00	1.69	0.93	1.56

Table V (continued)

Panel B: U.S. Venture Capital funds.

Rank	Fund Year	Fund Stage	Fund Size Range (USD Mil)	Internal Rate of Return (IRR)	Distributions to Paid In Capital (DPI)	Residual Value to Paid In Capital (RVPI)	Total Value to Paid In Capital (TVPI)	Paid In Capital to Committed Capital (PICC)	Distributions to Committed Capital (DCC)
1	1994	Early Stage	100.1 - 300 Mil	74.70	4.10	3.84	7.95	0.80	3.28
2	1994	Balanced Stage	30.1 - 50 Mil	13.25	0.53	3.41	3.94	0.69	0.37
3	1994	Early Stage	50.1 - 100 Mil	8.65	0.19	2.76	2.96	0.43	0.08
4	1995	Later Stage	50.1 - 100 Mil	9.51	0.32	2.29	2.61	1.00	0.32
5	1995	Later Stage	30.1 - 50 Mil	9.80	0.33	2.25	2.58	1.00	0.33
6	1991	Balanced Stage	0 - 30 Mil	5.50	0.24	2.02	2.26	1.00	0.24
7	1987	Balanced Stage	0 - 30 Mil	3.58	0.22	1.62	1.84	1.00	0.22
8	1995	Balanced Stage	50.1 - 100 Mil	4.85	0.22	1.48	1.69	0.95	0.21
9	1991	Balanced Stage	30.1 - 50 Mil	1.95	-	1.41	1.41	1.01	-
10	1990	Early Stage	30.1 - 50 Mil	18.59	1.53	1.34	2.87	1.00	1.53
11	1992	Early Stage	0 - 30 Mil	1.92	0.00	1.33	1.33	0.90	-
12	1993	Early Stage	50.1 - 100 Mil	11.48	1.01	1.28	2.29	0.99	1.00
13	1984	Later Stage	50.1 - 100 Mil	1.29	0.10	1.25	1.35	1.00	0.10
14	1986	Later Stage	50.1 - 100 Mil	0.88	-	1.23	1.23	1.00	-
15	1984	Early Stage	0 - 30 Mil	0.88	-	1.23	1.23	0.99	-
16	1994	Early Stage	0 - 30 Mil	42.15	3.51	1.22	4.72	0.48	1.70
17	1994	Early Stage	100.1 - 300 Mil	12.37	0.94	1.20	2.13	0.94	0.88
18	1987	Balanced Stage	0 - 30 Mil	3.37	0.46	1.19	1.65	1.00	0.46
19	1983	Balanced Stage	30.1 - 50 Mil	1.32	0.17	1.15	1.32	1.00	0.17
20	1995	Early Stage	0 - 30 Mil	6.85	0.70	1.13	1.84	0.99	0.70
21	1990	Later Stage	30.1 - 50 Mil	0.44	-	1.09	1.09	0.29	-
22	1995	Later Stage	100.1 - 300 Mil	12.74	0.73	1.07	1.80	1.16	0.85
23	1995	Later Stage	0 - 30 Mil	0.30	-	1.04	1.04	0.93	-
24	1993	Balanced Stage	0 - 30 Mil	3.62	0.37	1.04	1.41	0.61	0.23
25	1994	Later Stage	100.1 - 300 Mil	2.81	0.29	1.03	1.32	1.00	0.29
26	1981	Balanced Stage	0 - 30 Mil	12.79	2.00	1.00	3.00	0.79	1.59
27	1982	Balanced Stage	0 - 30 Mil	2.39	0.51	1.00	1.51	0.12	0.06
28	1983	Balanced Stage	0 - 30 Mil	0.52	0.12	1.00	1.12	1.00	0.12
29	1984	Balanced Stage	0 - 30 Mil	2.52	0.49	1.00	1.49	1.01	0.49
30	1981	Early Stage	0 - 30 Mil	5.89	0.94	1.00	1.94	1.00	0.94
31	1981	Early Stage	0 - 30 Mil	4.59	0.76	1.00	1.76	0.75	0.57
32	1981	Early Stage	0 - 30 Mil	0.02	0.00	1.00	1.00	1.00	-
33	1982	Early Stage	0 - 30 Mil	11.60	1.63	1.00	2.63	1.00	1.63
34	1983	Early Stage	30.1 - 50 Mil	5.06	0.83	1.00	1.83	0.86	0.71
35	1983	Early Stage	0 - 30 Mil	3.47	0.55	1.00	1.55	0.80	0.44
36	1984	Early Stage	0 - 30 Mil	0.30	0.07	1.00	1.07	0.03	-
37	1988	Early Stage	0 - 30 Mil	1.63	0.28	1.00	1.28	1.15	0.33
38	1984	Later Stage	0 - 30 Mil	0.81	0.18	1.00	1.18	0.42	0.08
39	1988	Early Stage	0 - 30 Mil	2.91	0.43	1.00	1.43	0.72	0.31
40	1987	Balanced Stage	0 - 30 Mil	0.62	0.13	1.00	1.13	0.99	0.13
41	1993	Balanced Stage	50.1 - 100 Mil	-0.23	-	0.97	0.97	0.45	-
42	1987	Balanced Stage	30.1 - 50 Mil	0.61	0.17	0.96	1.12	0.99	0.16
43	1995	Balanced Stage	30.1 - 50 Mil	-0.36	-	0.95	0.95	1.00	-
44	1985	Early Stage	30.1 - 50 Mil	7.90	1.22	0.95	2.17	1.01	1.22
45	1985	Balanced Stage	0 - 30 Mil	-0.11	0.03	0.95	0.98	1.18	0.03
46	1993	Balanced Stage	0 - 30 Mil	-0.36	-	0.94	0.94	1.00	-
47	1987	Balanced Stage	0 - 30 Mil	-0.03	0.05	0.94	0.99	0.99	0.05
48	1989	Early Stage	50.1 - 100 Mil	16.82	1.64	0.94	2.58	0.90	1.48
49	1993	Balanced Stage	50.1 - 100 Mil	0.93	0.18	0.94	1.12	0.57	0.10
50	1995	Early Stage	50.1 - 100 Mil	45.04	4.57	0.94	5.51	0.18	0.84
...
622	1981	Balanced Stage	50.1 - 100 Mil	10.73	1.86	0.00	1.86	0.76	1.40
623	1990	Early Stage	50.1 - 100 Mil	13.67	1.58	0.00	1.58	0.36	0.56
624	1984	Balanced Stage	50.1 - 100 Mil	2.39	1.15	0.00	1.15	0.78	0.90
625	1989	Early Stage	0 - 30 Mil	-35.86	0.03	0.00	0.03	0.52	0.01
626	1983	Seed Stage	0 - 30 Mil	-9.80	0.45	0.00	0.45	0.87	0.39

Source: TVE Ranked Statistics.

Table VI - Funds with missing updates in the TVE sample

This table presents numbers on U.S. buyout funds (Panel A) and U.S. venture capital funds (Panel B) from the TVE sample that have a constant RVPI larger than 10% and no more cash flow activity for two or more years prior to December 2009. For each vintage year, the table further shows the average and median year in which funds stopped being updated, as well as the average and median age of a fund when updates ceased.

Panel A: U.S. Buyout funds.

Vintage year	Sample size	Funds w/o updates	Fraction of sample	RVPI of fraction	Missing updates since		Age of incomplete funds		
					Avg	Med	Avg	Stdev	Med
1980-83	9	1	.11	.28	1991	1991	9.8	-	9.8
1984	7	2	.29	.65	1991	1991	7.4	1.9	7.4
1985	7	1	.14	1.15	1992	1992	7.8	-	7.8
1986	10	4	.40	.80	1995	1992	8.8	5.7	6.4
1987	25	8	.32	.52	1999	1999	11.5	3.3	9.6
1988	17	5	.29	.33	1996	1997	7.9	2.5	9.0
1989	24	9	.38	.76	1997	1997	7.8	0.8	8.0
1990	9	5	.56	.48	1998	1997	7.8	5.3	6.8
1991	5	3	.60	1.13	1994	1992	3.5	3.9	1.8
1992	15	6	.40	.52	2000	1999	7.5	2.1	6.9
1993	21	7	.33	.71	2001	2002	8.3	4.1	9.5
1994	26	13	.50	.50	2001	2001	6.7	2.9	7.0
1995	23	11	.48	.38	2004	2003	9.3	2.1	8.8
1996	23	15	.65	.66	2002	2004	6.1	3.4	7.3
1997	40	20	.50	.60	2003	2004	6.3	3.1	7.3
1998	53	26	.49	.56	2004	2004	6.3	2.1	6.6
1999	38	22	.58	.97	2004	2003	4.9	2.1	4.3
2000	46	24	.52	.79	2004	2004	4.2	1.7	3.8
2001	27	16	.59	.73	2005	2004	3.5	1.8	3.4
2002	15	4	.27	.81	2004	2004	2.0	1.3	1.9
2003	11	4	.36	.89	2005	2005	1.9	1.3	1.8
2004	17	4	.24	.82	2005	2005	1.2	1.1	1.3
2005	20	1	.05	.98	2008	2008	2.8	-	2.8
Total	488	211	.43						

Table VI (continued)

Panel B: U.S. Venture Capital funds.

Vintage year	Sample size	Funds w/o updates	Fraction of sample	RVPI of fraction	Missing updates since		Age of incomplete funds		
					Avg	Med	Avg	Stdev	Med
1969-74	13	4	.31	1.37	1988	1986	15.9	13.4	6.8
1975-79	18	4	.22	1.00	1988	1988	9.9	9.8	0.9
1980	18	5	.28	.27	1997	1997	17.6	18.0	2.9
1981	22	5	.23	.83	1990	1989	9.8	8.3	4.7
1982	28	5	.18	.82	1991	1990	9.9	8.5	3.4
1983	58	13	.22	.63	1994	1993	11.3	11.0	4.6
1984	63	17	.27	.66	1993	1991	9.2	8.0	4.0
1985	46	15	.33	.41	1997	1997	12.1	12.8	3.4
1986	41	9	.22	.51	1995	1997	9.4	11.8	3.9
1987	64	20	.31	.56	1997	1997	10.5	11.0	3.0
1988	44	12	.27	.51	1999	1997	11.2	9.9	2.6
1989	50	17	.34	.50	1999	1998	10.7	9.8	3.1
1990	21	12	.57	.57	1997	1997	7.9	7.8	4.0
1991	18	8	.44	.82	1999	2000	8.3	9.4	3.8
1992	27	7	.26	.55	2000	1999	8.7	7.8	3.1
1993	40	18	.45	.67	2000	2000	7.5	7.8	3.1
1994	37	21	.57	.91	2002	2002	8.8	8.8	3.9
1995	49	22	.45	.77	2001	2001	6.8	7.0	3.0
1996	36	18	.50	1.17	2002	2002	6.7	6.9	3.1
1997	64	31	.48	.63	2004	2004	7.2	7.8	2.9
1998	78	37	.47	1.06	2003	2003	5.5	5.5	2.5
1999	107	55	.51	.56	2004	2004	5.8	5.5	2.1
2000	122	64	.52	.72	2004	2004	4.9	4.8	2.2
2001	59	20	.34	.86	2004	2004	3.6	3.8	2.0
2002	20	10	.50	.91	2005	2004	3.2	2.8	1.7
2003	17	2	.12	1.06	2006	2006	3.8	3.8	1.1
2004	23	4	.17	.85	2006	2006	2.6	2.8	1.2
2005	21	3	.14	.86	2006	2006	1.2	1.0	0.5
Total	1,204	458	.38						

Source: TVE Ranked Statistics.

Table VII - Interim performance of incomplete funds

This table presents a clustering of U.S. buyout funds (Panel A) and U.S. venture capital funds (Panel B) from the TVE sample into quartiles according to their interim performance when updates ceased. The quartile position is determined relative to the interim performance of each fund's vintage year peers with respect to the funds' IRRs and money multiples (TVPI).

Panel A: U.S. Buyout funds.

		Interim IRR			Interim TVPI		
		# of funds	Fraction	Cumulative	# of funds	Fraction	Cumulative
4 th	Quartile (top)	57	.27	.27	59	.28	.28
3 rd	Quartile	51	.24	.51	48	.23	.51
2 nd	Quartile	46	.22	.73	49	.23	.74
1 st	Quartile (bottom)	57	.27	1.00	55	.26	1.00
		211	1.00		211	1.00	

Panel B: U.S. Venture Capital funds.

		Interim IRR			Interim TVPI		
		# of funds	Fraction	Cumulative	# of funds	Fraction	Cumulative
4 th	Quartile (top)	115	.25	.25	124	.27	.27
3 rd	Quartile	115	.25	.50	116	.25	.52
2 nd	Quartile	105	.23	.73	96	.21	.73
1 st	Quartile (bottom)	123	.27	1.00	122	.27	1.00
		458	1.00		458	1.00	

Source: TVE Ranked Statistics.

Table VIII - Size of incomplete funds

This table groups U.S. buyout funds (Panel A) and U.S. venture capital funds (Panel B) from the full TVE sample, and the TVE sub-sample of incomplete funds, into seven different categories of size.

Panel A: U.S. Buyout funds.

	All funds			Incomplete funds		
	# of funds	Fraction	Cumulative	# of funds	Fraction	Cumulative
0 - 30 Mil	22	.05	.05	8	.04	.04
30.1 - 50 Mil	16	.03	.08	10	.05	.09
50.1 - 100 Mil	49	.10	.18	26	.12	.21
100.1 - 300 Mil	130	.27	.44	62	.29	.50
300.1 - 500 Mil	78	.16	.60	34	.16	.66
500.1 - 1000 Mil	89	.18	.79	32	.15	.82
1000.1 Mil+	104	.21	1.00	39	.18	1.00
	488	1.00		211	1.00	

Panel B: U.S. Venture Capital funds.

	All funds			Incomplete funds		
	# of funds	Fraction	Cumulative	# of funds	Fraction	Cumulative
0 - 30 Mil	337	.28	.28	132	.29	.29
30.1 - 50 Mil	175	.15	.43	64	.14	.43
50.1 - 100 Mil	216	.18	.60	82	.18	.61
100.1 - 300 Mil	293	.24	.85	112	.24	.85
300.1 - 500 Mil	95	.08	.93	36	.08	.93
500.1 - 1000 Mil	63	.05	.98	26	.06	.99
1000.1 Mil+	25	.02	1.00	6	.01	1.00
	1,204	1.00		458	1.00	

Source: TVE Ranked Statistics.

Table IX - Public market equivalent analysis

Panel A of this table shows the number of U.S. buyout funds in the overall TVE database as of 2001 (Column 2) and 2009 (Column 3), the number of ‘liquidated’ U.S. buyout funds that Kaplan and Schoar (2005) identified for their working sample as of 2001 (Column 4), the number of ‘officially liquidated’ U.S. buyout funds in the TVE database as of 2001 (Column 5) and 2009 (Column 6), as well as capital-weighted S&P 500 PME values for each of these three sets of liquidated U.S. buyout funds in Column 7, 8, and 9. Panel B presents IRRs for the ‘officially liquidated’ U.S. buyout funds in the TVE sample (as of 2001 and 2009), the IRRs of their S&P 500 PME, as well as the spreads between these IRRs. ‘n/a’ indicates values that are not available individually, but are part of the values for the entire observation period.

Panel A: PME analysis with S&P 500 adjusted TVPIs as of Kaplan and Schoar (2005).

Vintage Year	TVE U.S. Buyout Sample		KS Liquidated by Dec ‘01	Officially Liquidated in TVE		PME with S&P 500		
	in 2001	in 2009		by Dec ‘01	by Dec ‘09	KS Liquidated	Liquidated ‘01	Liquidated ‘09
1980	2	2	1	1	2	n/a	n/a	n/a
1981	1	1	0	0	0			
1982	1	1	2*	1	1	n/a	n/a	n/a
1983	6	5	6	5	5	1.06	1.53	1.53
1984	6	7	6	7	7	1.30	1.45	1.45
1985	12	7	12	5	5	1.00	1.37	1.37
1986	16	10	16	7	7	1.13	1.14	1.14
1987	29	25	22	11	13	0.84	0.85	0.85
1988	23	17	21	3	7	0.79	1.09	0.91
1989	25	24	22	11	13	1.00	0.97	1.44
1990	18	9	14	2	3	1.05	n/a	1.01
1991	6	5	6	2	3	0.87	n/a	0.91
1992	24	15	17	5	8	0.79	0.78	0.87
1993	28	21	11	2	7	0.84	n/a	1.49
1994	26	26	6	2	7	0.89	n/a	1.00
1995	27	23	7	0	4	0.62		0.86
1980-95	250	198	169	64	92	0.93	1.09	1.10

* The larger number of funds in Kaplan and Schoar’s liquidated sample (compared to their full sample of TVE funds) is directly inherited from Table V of their study.

Table IX (continued)

Panel B: Original PME analysis with S&P 500 as of Long and Nickels (1996).

Vintage year	TVE U.S. Buyout Liquidated 2001				TVE U.S. Buyout Liquidated 2009			
	# of Funds	PE IRR (%)	S&P 500 PME (%)	Spread (bps)	# of Funds	PE IRR (%)	S&P 500 PME (%)	Spread (bps)
1980	1	n/a	n/a	n/a	2	n/a	n/a	n/a
1981	0				0			
1982	1	n/a	n/a	n/a	1	n/a	n/a	n/a
1983	5	40.5	19.7	2,078	5	40.5	19.7	2,078
1984	7	25.9	17.9	798	7	25.9	17.9	798
1985	5	25.2	12.1	1,315	5	25.2	12.1	1,315
1986	7	16.6	12.3	421	7	16.6	12.3	421
1987	11	8.5	13.2	-470	13	9.0	11.5	-253
1988	3	18.3	15.4	288	7	12.8	13.9	-103
1989	11	13.6	14.2	-65	13	23.7	11.5	1,222
1990	2	n/a	n/a	n/a	3	19.8	19.5	27
1991	2	n/a	n/a	n/a	3	18.7	19.1	-47
1992	5	9.8	16.5	-667	8	13.7	15.1	-144
1993	2	n/a	n/a	n/a	7	36.3	25.8	1,050
1994	2	n/a	n/a	n/a	7	21.1	21.2	-5
1995	0				4	5.7	8.3	-257
1980-95	64	18.8	16.7	209	92	17.3	14.8	248

Source: TVE Cashflow Summary, Kaplan and Schoar (2005), S&P's Index Service, own calculations.

Figure I - Comparison of fund performance benchmarks

This figure presents 3-years rolling IRRs for the median (Chart A) and average (Chart B) U.S. buyout fund from 1986-2005 for Thomson VentureXpert (TVE), Cambridge Associates (CA) and Preqin (as of December 2009). I choose rolling IRRs since vintage year classifications can differ by +/- 1 year between the three data providers. Non-rolling, i.e., single vintage year charts are qualitatively very similar, as shown in Harris, Jenkinson and Stucke (2010).

Chart A: Median returns, U.S. Buyout (percent).

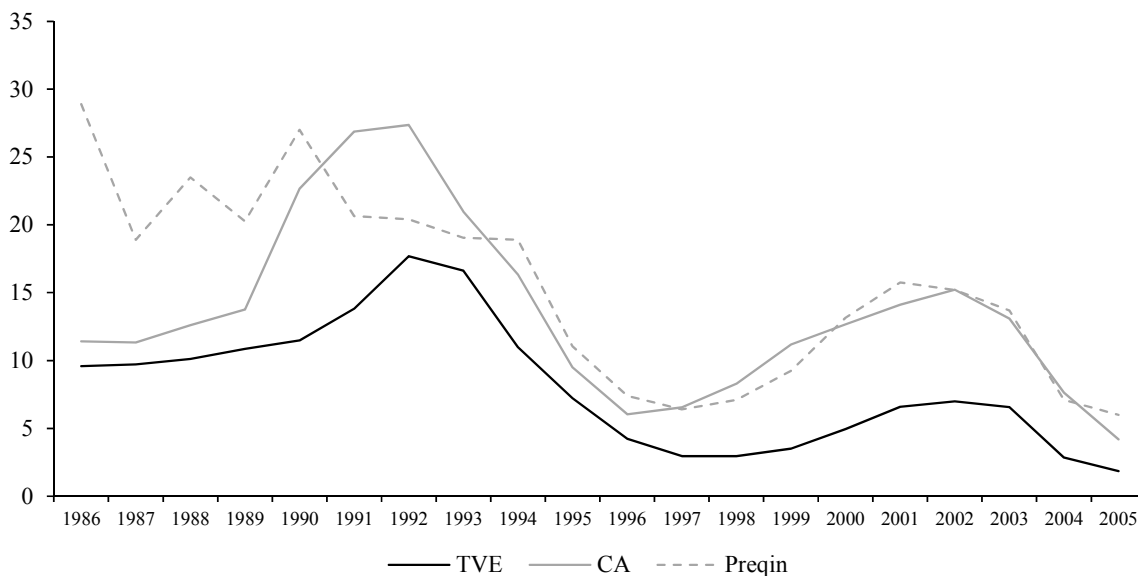
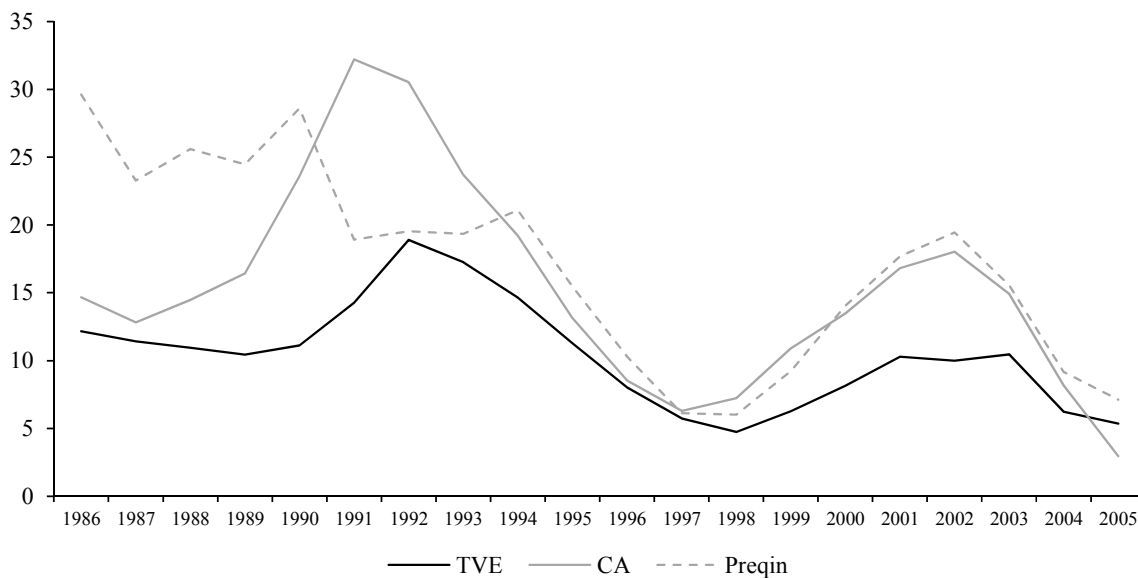


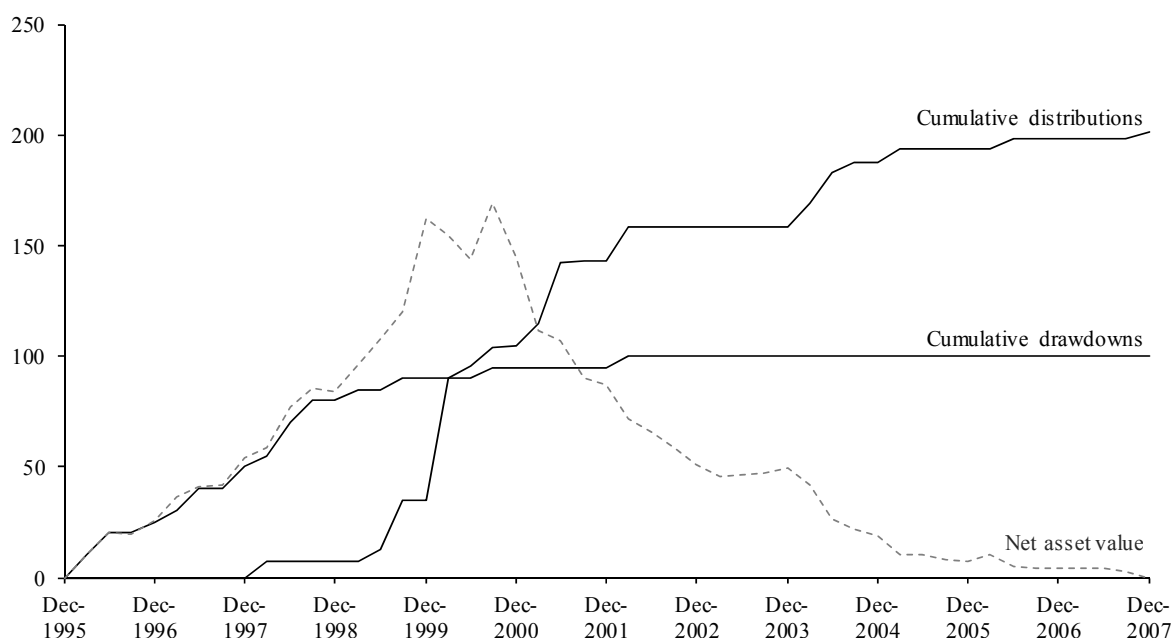
Chart B: Average returns, U.S. Buyout (percent).



Source: TVE Cumulative Returns, Cambridge Associates and Preqin data, own calculations and illustration.

Figure II - Illustration of a private equity fund's cash flow and valuation pattern

This figure illustrates the typical cash flow and valuation patterns of an average private equity fund with a 1995 vintage year. “Cumulative drawdowns” sum up the cash inflows from the LPs into the fund over time. This line remains constant by the end of a fund’s investment period (in this example by the end of 2001). “Cumulative distributions” sum up the cash outflows from the fund to its LPs. Distributions are the results from (partly) exited investments and continue until a fund is fully liquidated. “Net asset values” represent the aggregated value of actual investments held by the fund. NAVs typically increase during the first years when the fund invests in companies and decrease in later years when the fund starts exiting its investments until they finally reach zero. NAVs are recalculated by the fund manager on a quarterly basis.¹⁹



MM	1.03	1.08	1.14	2.19	2.62	2.42	2.10	2.10	2.10	2.00	2.00	2.00
IRR	4.6%	7.6%	9.4%	40.2%	40.2%	32.5%	27.2%	25.8%	25.0%	24.4%	24.4%	24.3%
PICC	0.25	0.50	0.80	0.90	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
DPI	0.00	0.00	0.09	0.39	1.10	1.51	1.59	1.59	1.88	1.93	1.99	2.01
RVPI	1.03	1.08	1.05	1.80	1.52	0.91	0.51	0.49	0.19	0.07	0.04	0.00
TVPI	1.03	1.08	1.14	2.19	2.62	2.42	2.10	2.10	2.10	2.00	2.00	2.00

MM: Money multiple (= TVPI), IRR: Internal rate of returns

PICC: Paid-in to committed capital, DPI: Distribution to paid-in capital, RVPI: Residual value to paid-in capital, TVPI: Total value to paid-in capital

Source: LP sample data, own calculations and illustration.

¹⁹ The NAV does not necessarily decrease between two quarters when a fund distributes cash (or distributes more cash than it draws down). E.g., in mid-1999 the fund distributes cash from an exited investment, however, the NAV increases at the same time. The reason is that the increase in value of the remaining investments during this quarter has over-compensated the value of the exited investment.

Figure III - Age of funds that stopped receiving updates

This figure shows the relative cumulative distribution of incomplete U.S. buyout funds (Chart A) and U.S. venture capital funds (Chart B) from the TVE sample with respect to the age at which they received their last update.

Chart A: U.S. Buyout funds.

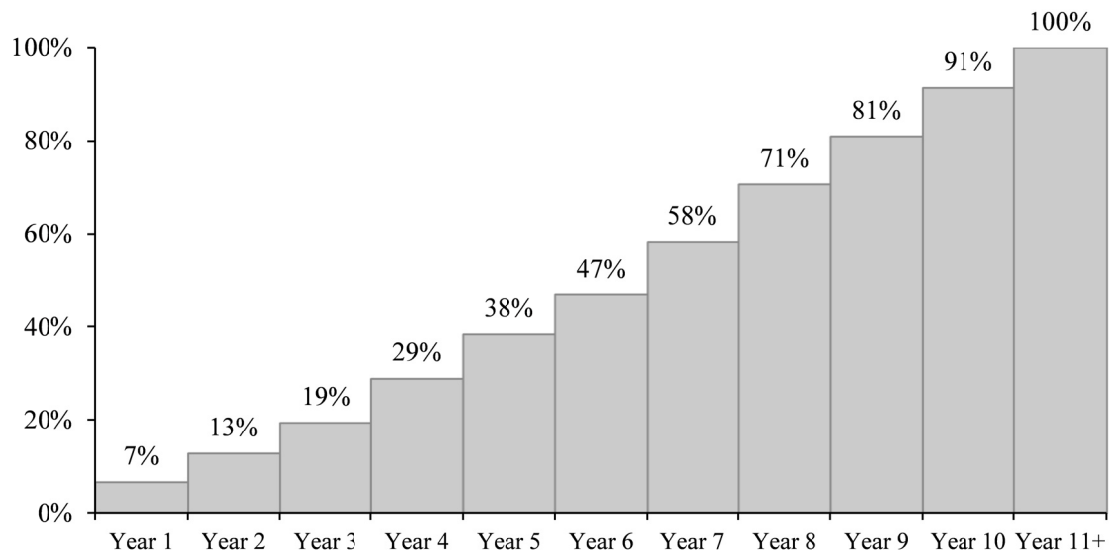
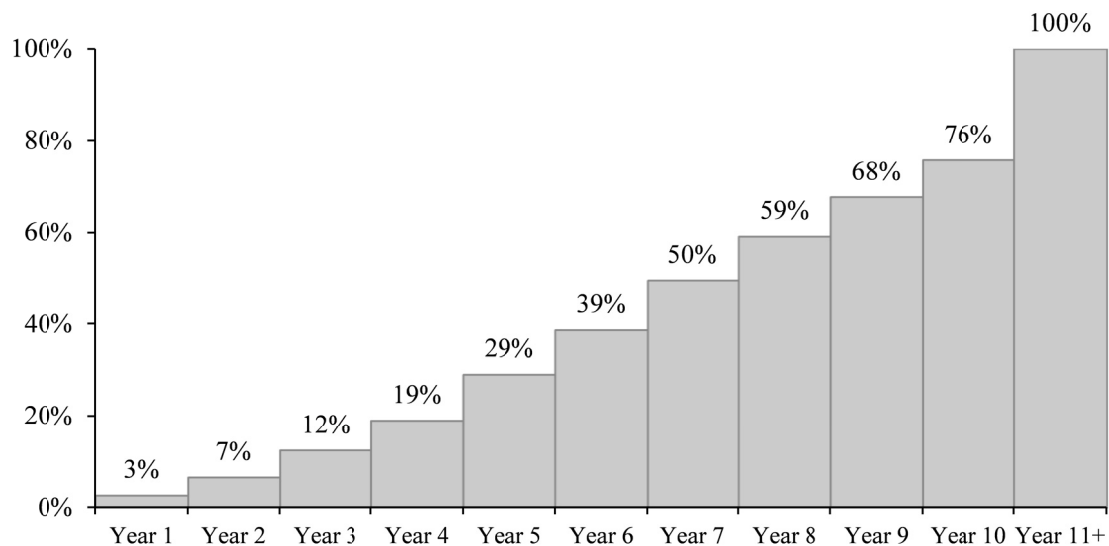


Chart B: U.S. Venture Capital funds.



Source: TVE Ranked Statistics, own calculations and illustration.

Figure IV - Illustration of two funds with constant NAVs

This figure illustrates two funds that do not receive any further updates by a certain point in time. Cumulative drawdowns refer to cash inflows into the fund by its LPs. Cumulative distributions refer to cash returns from the fund back to LPs. The fund in Chart A does not record any further cash flows by the end of 1996. The fund in Chart B does not record any further cash flows after its second year in mid-1996. Net asset values remain constant from thereon and are carried forward at their most recent level.

Chart A: Fund with 1989 vintage year.

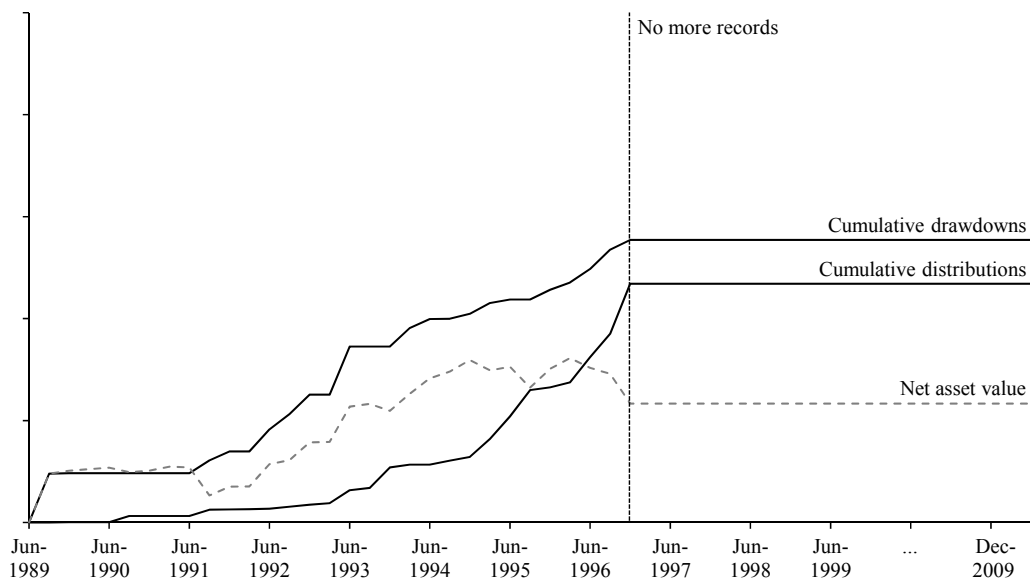
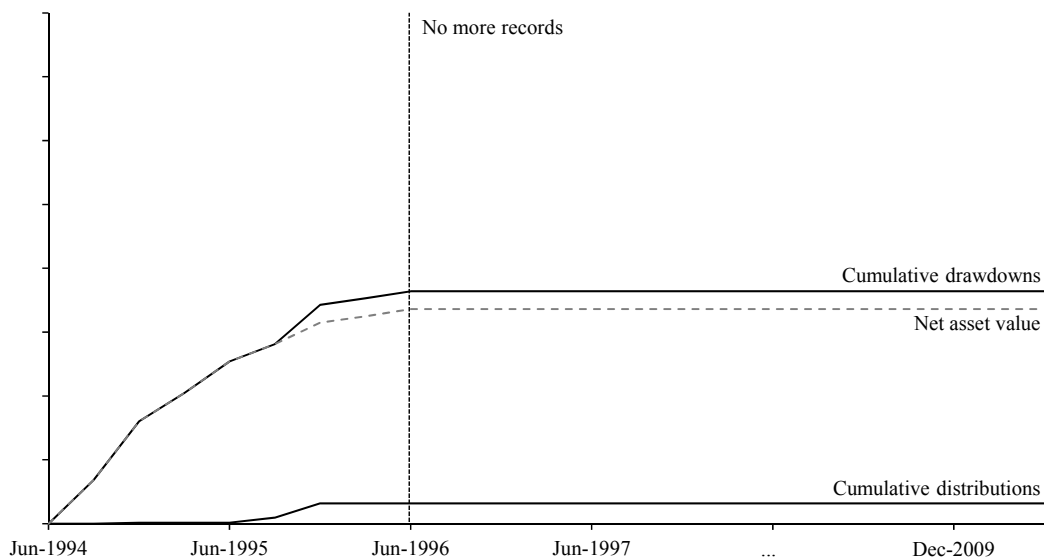


Chart B: Fund with 1994 vintage year.



Source: Own sample data, calculations and illustration.

Figure V - Quarterly distribution of final updates

This figure shows the distribution in time when U.S. buyout funds (Chart A) and U.S. venture capital funds (Chart B) received their last update. The columns show the number of funds which received their last update in any particular quarter.

Chart A: U.S. Buyout funds.

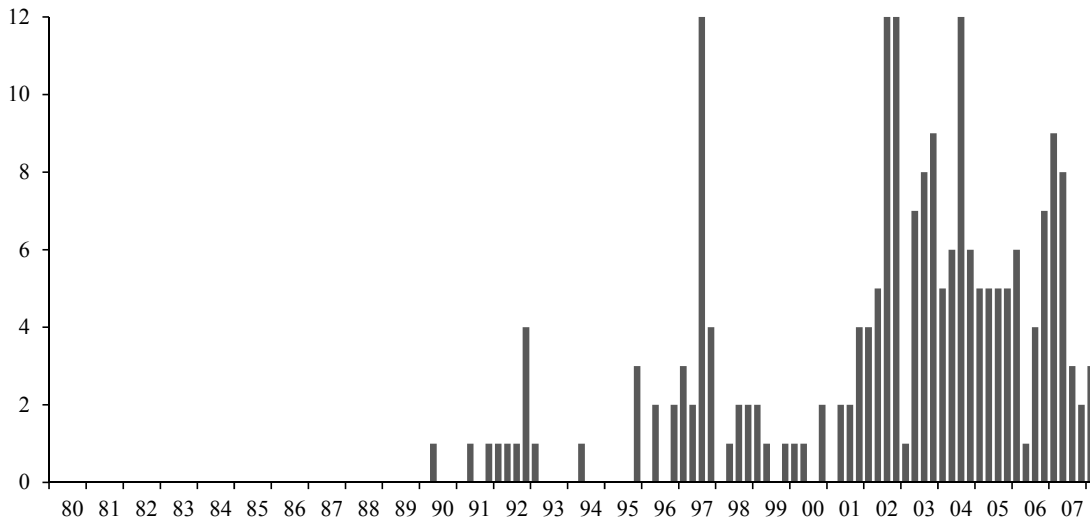
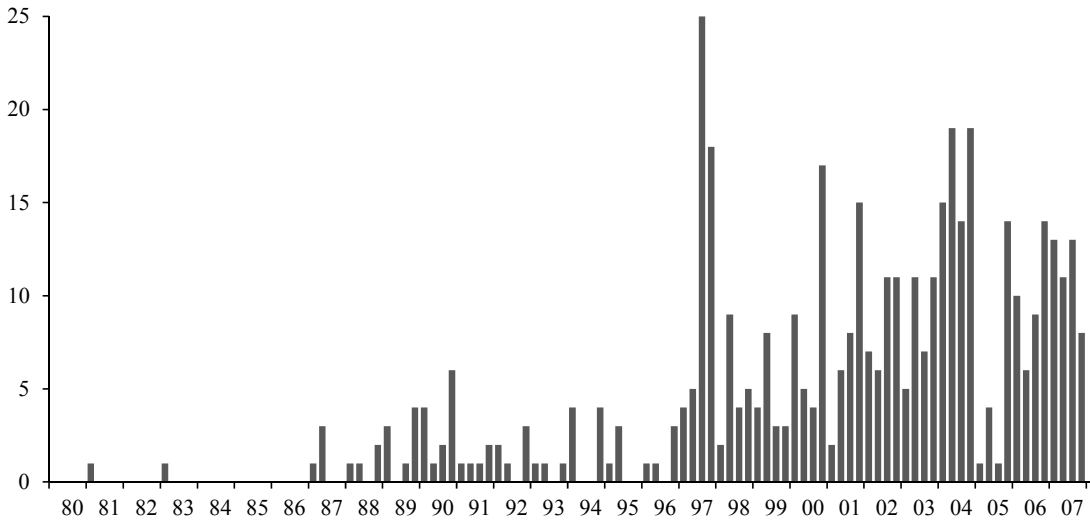


Chart B: U.S. Venture Capital funds.



Source: TVE Ranked Statistics, own illustration.

Figure VI - Comparison of the TVE sample with correct performance data

This figure compares the IRRs (Chart A) and money multiples (Chart B) of incomplete U.S. buyout funds from the TVE sample with correct performance data from LPs. The abscissa contains the (correct) values of the LP data. The ordinate contains the corresponding values presented by TVE. The scale of the axes is limited to -20% and +40% (Chart A), and to money multiples of up to 3.0 (Chart B).

Chart A: Internal rate of returns (IRR).

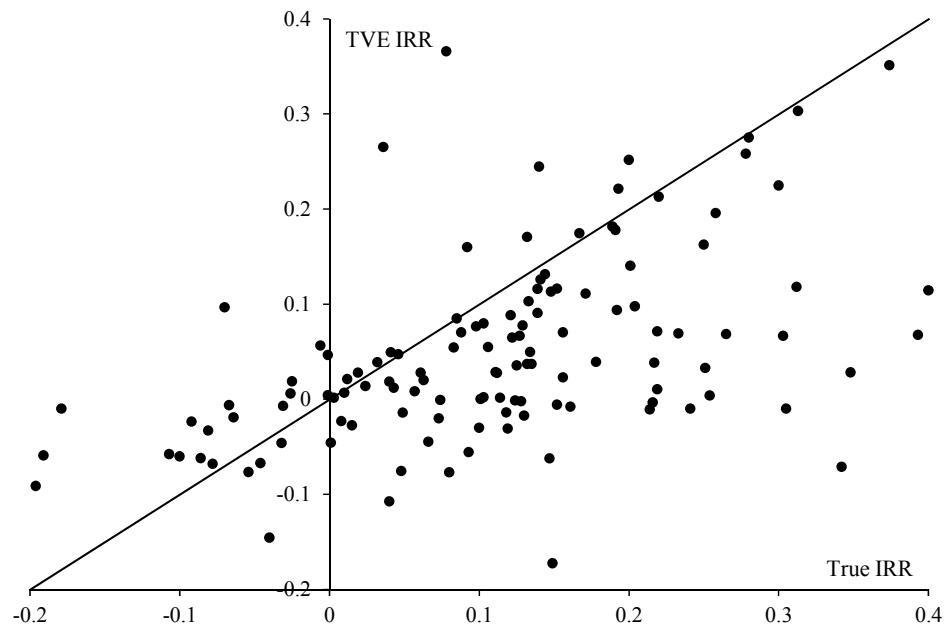
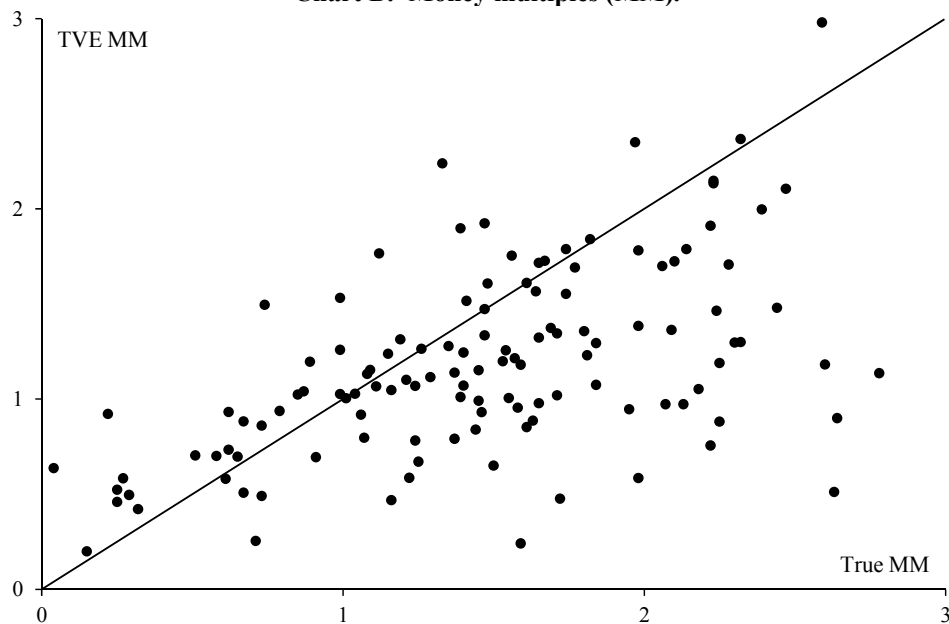


Chart B: Money multiples (MM).



Source: TVE Ranked Statistics, own sample data, calculations and illustration.

Figure VII - Comparison of fund performance benchmarks

This figure presents 3-years rolling IRRs for the median (Chart A) and average (Chart B) U.S. buyout fund from 1986-2005 for Thomson VentureXpert (TVE), Cambridge Associates (CA) and Preqin (as of December 2009). It further contains TVE*, which is the TVE sample without all those funds that had an RVPI ratio of more than 10% but constant residual values and no cash flow activity for two or more years prior to 2009; TVE* further contains the corrected IRR values for two-thirds of such removed funds. I present rolling IRRs since vintage year classifications can differ by +/- 1 year between the three data providers.

Chart A: Median returns, U.S. Buyout (percent).

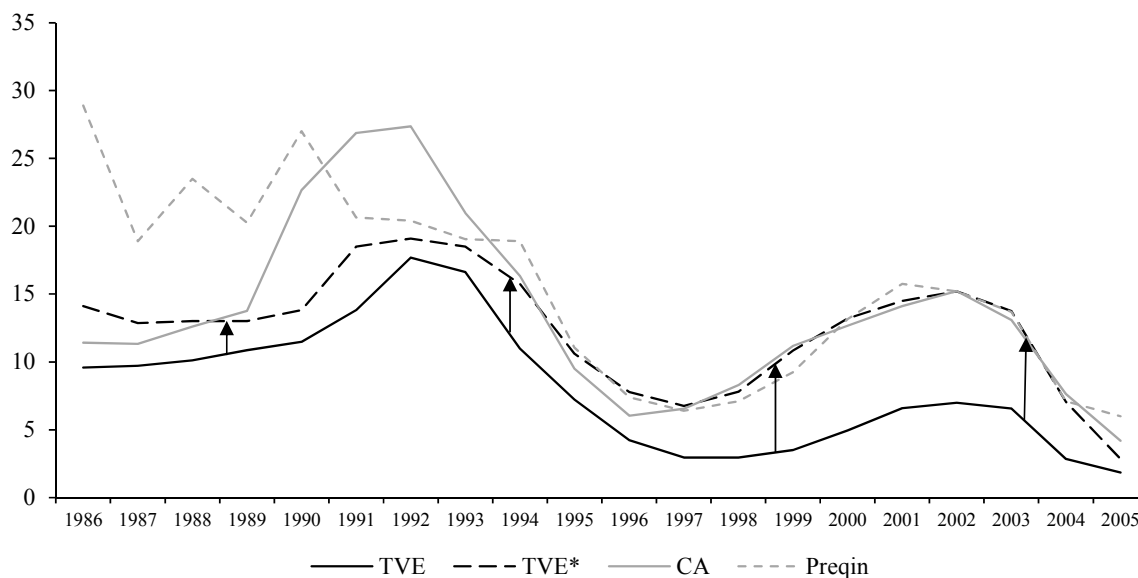
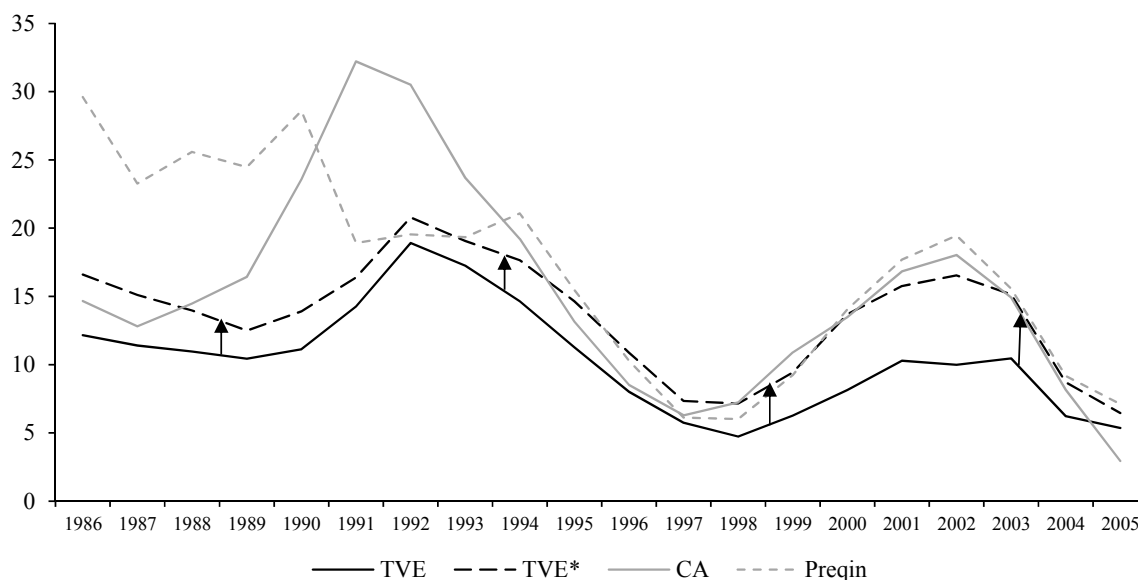


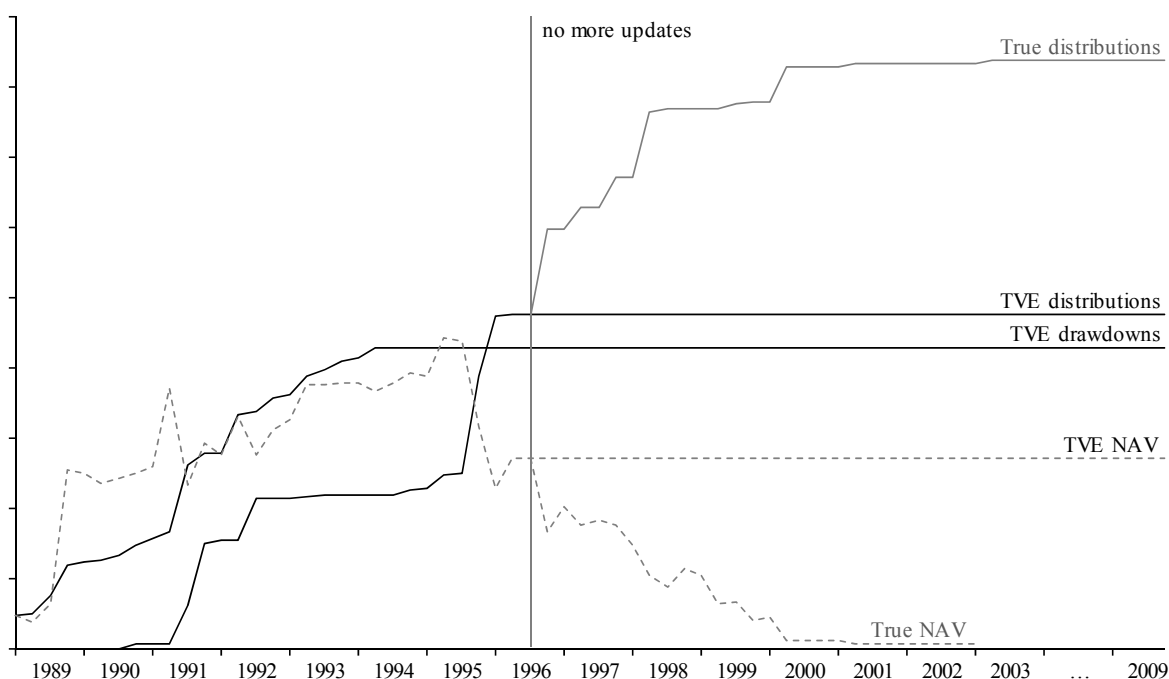
Chart B: Average returns, U.S. Buyout (percent).



Source: TVE Ranked Statistics, Cambridge Associates and Preqin reports, own sample data, calculations and illustration.

Figure VIII - Illustration of an incomplete fund's true outcome

This figure illustrates a private equity fund with a 1989 vintage year that stopped being updated in 1996, and its true outcome in the years afterwards, i.e. ongoing (higher) distributions and declining net asset values. The table below lists DPI, RVPI, TVPI and IRR values for the incomplete fund as within TVE and its true outcome as within my LP sample. It further presents PME values according to Kaplan and Schoar (2005), Phalippou and Gottschalg (2009), as well as the true PME outcome.



TVE DPI	0.54	0.60	0.53	0.52	0.90	1.11	1.11	1.11	1.11	1.11	1.11	1.11	1.11	...	1.11
True DPI	0.54	0.60	0.53	0.52	0.90	1.11	1.57	1.80	1.81	1.93	1.94	1.94	1.96	...	1.96
TVE RVPI	1.06	0.87	0.92	0.92	0.74	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	...	0.67
True RVPI	1.06	0.87	0.92	0.92	0.74	0.67	0.41	0.27	0.09	0.03	0.01	0.01	0.00	...	0.00
TVE TVPI	1.60	1.47	1.46	1.44	1.64	1.78	1.78	1.78	1.78	1.78	1.78	1.78	1.78	...	1.78
True TVPI	1.60	1.47	1.46	1.44	1.64	1.78	1.97	2.06	1.91	1.96	1.96	1.96	1.96	...	1.96
TVE IRR	40%	27%	21%	16%	17%	17%	16%	15%	14%	13%	13%	12%	12%	...	9%
True IRR	40%	27%	21%	16%	17%	17%	19%	20%	18%	18%	18%	18%	18%	...	18%
TVE PME (Kaplan/Schoar)					...	1.05	0.99	0.95	0.92	0.90	0.92	0.96	0.94	...	0.92
TVE PME (Phalippou/Gottschalg)					...	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	...	0.84
True PME	1.52	1.24	1.23	1.11	1.08	1.05	1.05	1.06	1.03	1.04	1.04	1.04	1.04	...	1.04

Source: Own sample data, calculations and illustration.