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Does the Choice of Performance Measure Shape the Appraisal of Private Equity Funds?

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Abstract

Conducting an empirical study on cash flows of 71 private equity funds, spanning the vintages 1990 to 2008, we compare the two most common performance measures, IRR and TVPI, to four proposed alternatives. We also document cash flow characteristics that complicate performance measurement. Our findings determine that funds rank differently depending on the measure we employ. However, rank correlations among all measures suggest that the differences are fairly small, and that deviations further decrease when excluding young funds. Funds identified as top quartile by one measure are likely to receive similar appraisals by other measures, but performance is neither robustly, nor fully described by only one measure. The alternative measures better align the interests between the general and limited partners, and contribute to separate skill from fortunate timing. Limited partners should therefore use several measures in the appraisal of fund performance.

Preface

This thesis was written as a part of the master program at NHH. Working with the vast literature surrounding Private Equity and performance measurement, we have gained insight into an asset class that has grown to a considerable size, but is still fairly new to Norwegian investors. We have also experienced how finance can be applied in practice through the analysis of fund level data.

One objective of this thesis has been to maintain applicability for investors in this asset class. We show how to implement different performance measures, highlight difficulties of performance measurement, and prove that performance differs depending on the measures used. The conclusions drawn from this thesis can assist investors in decision making.

We would like to thank our thesis advisor, Assistant Professor Carsten Bienz, for valuable comments and firm guidance during the process. Our deepest gratitude is also extended to the Limited Partners providing the data that form the backbone of this empirical analysis.

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1. Introduction

Historical performance is one of the most important selection criteria of private equity (PE) [1] funds. Limited partners (LPs) rely on measures that attempt to describe the true performance of funds and their general partners (GPs). The measures should therefore express performance in a consistent manner, and allow for comparison across funds. Their correct use and interpretation is essential.

The primary objective of this thesis is to provide the LPs of PE funds with the resources to analyze the financial performance of funds. More specifically, we ask: Does the choice of performance measure shape the appraisal of private equity funds? The question is investigated using cash flow data at the fund level, provided by LPs operating in the Nordic region.

Industry standards in reporting of PE fund performance concentrate on the Internal Rate of Return (IRR) and multiples of Paid-in capital. Several authors argue that the IRR misrepresents true return in a PE context, and that the multiples may fool potential investors as they do not consider the timing of cash flows. Alternative measures of performance that have been put forward include the Modified Internal Rate of Return (MIRR), Profitability Index (PI), Index Comparison Method (ICM) and Public Market equivalent (PME).

We elaborate on the arguments of using the standard measures, their associated pitfalls, and investigate whether the four mentioned alternatives would alter the appraisal of fund performance. None of the investigated measures performs any specific risk adjustment for the fund. Differences in the appraisal of funds across the performance measures are investigated through rankings of the funds.

Our findings determine that funds rank differently depending on the measure we employ, and that the alternative performance measures can offer additional insight about a fund's true performance. However, rank correlations among all measures suggest that the differences are fairly small, and further decrease when young funds are excluded.

The economic interpretation derived from these results is that a fund that has performed well according to one measure is likely to receive a similar appraisal from another measure. Nevertheless, this does not mean that fund performance will receive a robust description from only one measure. Other measures can contribute to show differences in skill and determine true top performers.

[1] A summary of definitions can be found in the appendices.

While Wang and Conner (2004) show that there is a high probability of being among top quartile funds in at least one year during their life using standard measures, we show that choosing from additional measures will greatly increase this probability. TVPI and IRR only differ in selecting two funds as top quartile, but over 40 percent of the funds in our sample are identified as top quartile by at least one measure. From this, we establish that past performance should be investigated using several measures, and confirm a weak efficiency of generic selection rules such as choosing funds of GPs whose previous funds rank as top quartile funds by only one measure. Finally, performance measures with NPV properties will provide GPs with incentives that are more aligned with the LPs interests.

The remainder of the thesis is organized as follows. In Section 2, existing literature is presented. Section 3 presents the performance measures and difficulties in measuring performance of PE funds. Section 4 to 7 comprise an empirical study where we utilize six performance measures and variations of these to describe PE fund performance, and how they differ in doing so. The dataset is presented in Section 4, while characteristics of PE that complicate performance measurement are presented in Section 5. We compare the performance measures through rankings and correlations in Section 6. In section 7 we analyze the severity of pitfalls related to the standard measures, and how the alternative performance measures improve on these pitfalls. Section 8 concludes.

2. Literature Review

There is a large and growing volume of literature studying the economics of PE. Most studies has centered on the aggregate trends of PE or the relationship between GPs and portfolio companies. The relationship between GPs and LPs has, until recently, largely been neglected. A limited availability of data may in part explain this fact, but since the turn of the century more studies have been devoted to the study of these relationships. Increased availability of data and interest from investors has spawned research into the performance of funds, their relative performance compared to public markets and the attractiveness of investing in PE funds. However, few studies investigate how performance measures differ in describing performance of PE funds.

Among works that are most closely related to this thesis is an article written by Phalippou and Gottschalg (2007), which adds to the literature of performance evaluation. Here, the authors show how the Internal Rate of Return (IRR) overstates PE fund performance and misrepresents the relative ranking of funds. They also report that using a Modified Internal Rate of Return (MIRR) results in a more accurate true return for investors. Phalippou (2008) further elaborates on the failures of IRR, the distorted incentives it creates in a PE context, and how it creates upward biased performance averages and volatility estimates. Also, he shows how MIRR can be implemented to tackle these problems. Kreuter and Gottschalg (2006) discuss similar problems and show that the efficiency of simple selection rules, such as choosing the top quartile funds, is limited compared to more comprehensive rating procedures.

Performance measurement of financial investments as a field of study was spurred by Sharpe (1966) and is covered by a vast literature, although the number of studies is significantly reduced when looking at performance measurement in PE. Goetzmann, Ingersoll, Spiegel and Welch (2004) investigate how performance measures can be manipulated, and form part of the inspiration for this thesis. The structure and objective of this thesis also resemble that of Eling and Schuhmacher (2006). Although the asset class under investigation is hedge funds and measures are different, it is linked to our study because they investigate whether the choice of performance measure influence the ranking of funds. They conclude that the choice among common performance measures hardly affects the relative performance of hedge funds. It relates to Pedersen and Rudholm-Alfvin (2003) who perform a similar study.

This thesis does not perform risk adjustments, but still share similarities with studies that do. Ick (2005) investigate risk - return relationships of PE relative to public markets, but also comment on the characteristics of IRR, the PME and excess return measures. Ljungqvist and Richardson (2003) analyze cash flows, risk and return of PE funds, for a data sample similar to ours. Gompers and Lerner (1997) carried out a study using data similar to Ljungqvist and Richardson, albeit just for one fund. Among other studies looking at risk-return relationships are Cochrane (2001), Hwang, Quigley and Woodward (2005) and Gottschalg and Phalippou (2005), who provide mixed results regarding risk adjusted performance. The latest suggest that PE funds substantially underperform on a risk adjusted basis net of fees with respect to the S&P 500.

The objective of this thesis is not decomposing the determinants of performance, but to study the relationship between the performance measures. Still, we present extensive descriptive statistics showing performance broken down by several fund characteristics. Korstvedt (2007) is one of few studies utilizing a similar dataset, but here the main issue is factors determining performance. Other studies of performance determinants are Kaplan and Schoar (2003), Gompers et al. (2006), Sorensen (2007) and Zarutskie (2007). Kaplan and Schoar calculate IRR, PME and Total Value to Paid-in capital (TVPI) for PE funds, and find strong persistence in fund returns.

Cumming and Waltz (2004) analyze PE return and disclosure. They show that systematic biases exist in the reporting of fund performance. Reported Net Asset Values (NAV) may never materialize into actual returns and may also be subject to manipulation. Blaydon and Horvath (2002) investigate valuation differences and document that an investor can receive two different valuations when investing in a company via two funds. These factors will be a potential source of bias in our data due to a high percentage of active funds.

While studies like Axelson, Stromberg and Weisbach (2008), Gompers (1996), and Kandel, Leshchinskii and Yuklea (2006), look at the incentives provided by the organizational structure of PE funds, we comment on incentives provided by the performance measures. In a recent study, Phalippou (2009) discusses how both contracts and performance measures may cause misaligned interests between GPs and LPs.

3. Performance Measurement in Private Equity

When evaluating performance of PE Funds, we need reliable measures that are able to express performance and facilitate comparison across funds. A LP makes investments decisions, among other criteria, based on financial performance measures of the different funds.

3.1 Difficulties in Measuring Performance

When an investor wants to measure relative performance among stock index funds or mutual funds, he or she will usually turn to performance measures such as Sharp's measure, Treynor's measure, Jensen's measure or the Information Ratio, depending on the investor's portfolio and investment universe (see Bodie, Kane and Marcus 2008). In order to calculate these measures one needs the standard deviation of returns or the systematic risk for the fund portfolio. With daily market values for the portfolio companies it is possible to make an inference about these parameters with a high degree of confidence. PE funds invest in unlisted companies or in listed companies they subsequently delist. The daily market values for the portfolio companies are therefore unobservable. Reported accounting values for the portfolio companies are changed infrequently, and will cause biased estimates of volatility or systematic risk of a PE fund.

This thesis compares measures that do not perform fund-specific risk adjustments. Current literature offers methods for estimating the risk of PE investments. Bilo, Christophers, Degosciu, and Zimmermann (2005) develop the LPX index based on publicly traded companies, whose business relates to PE. Ljungqvist and Richardson (2003) estimate a fund's beta by matching the individual investments in a fund to listed companies. Jones and Rhodes-Kopf (2003) use cash flow data to estimate the risk of PE funds, treating reported values of non-exited companies as unbiased estimates of market values. Driessen, Phalippou and Lin (2009) test if risk is time-varying, and compare the risk profile of different types of PE funds by using a new General Method of Moments methodology. They find a high beta, especially for venture capital funds.

There are certain features of PE investments that further complicate performance measurement of PE funds. The usual long time-span between the investments and realizations leaves the investor unable to observe performance for long periods. Time is also required for a fund to be fully invested. Ljungqvist and Richardson (2003) find that it takes six years for 90 percent of committed capital to be invested, and that it takes eight years for the IRR of the average fund to turn positive. This is part of the typical pattern of PE fund returns, known as

the J-curve pattern (Burgel 2000). At inception, and shortly after, a fund usually displays zero or negative IRRs. This is because start-up costs and management fees are paid out of the first contributions, and also because of conservative accounting rules. Revaluations of portfolio investments do not occur until major value increases has been witnessed. The information contained in early performance figures is of little value and he states that "individual funds should be assessed over periods that cover at least four years" (Burgel 2000:37). Grabenwarter and Weiding (2005) also recommend leaving out funds younger than four years when doing empirical studies of PE funds.

The long period before funds are fully invested will also create a gap between fund returns and LP returns. In order to make contributions when requested by the GP, the LP has to hold a share of the committed capital in highly liquid assets which are easily converted into cash. The expected returns on these assets are lower than that of PE. When evaluating funds this liquidity cost should be considered. However, most LPs invest in several funds over a year and separating their liquid assets into individual funds become difficult. Liquidity costs will further depend on the LPs ability to time contributions with distributions.

In addition, comparing funds across time may produce wrong conclusions about performance. General market conditions and competition among PE funds will affect a fund's ability to make profitable investments in portfolio companies (see Gompers and Lerner 2004). These factors can change significantly from one year to another and performance should therefore not be evaluated without adjustments for vintage.

The long period with unobservable performance and the difficulties related to risk-adjustments of returns induce many investors to use more simple methods when measuring performance of PE funds. Though the methodology in which the performance of a fund should be measured is not clear, a push for more uniform reporting standards is driven by associations such as the European Private Equity & Venture Capital Association (EVCA).

The EVCA issued its first Reporting Guidelines in 2000 (EVCA 2009). They have been widely adopted across the PE industry, as is also true for the valuation guidelines (Mathonet and Monjanel 2006). In order for a fund to claim compliance with the Guidelines some requirements must be applied and some recommendations may be adopted at the discretion of the fund manager (EVCA 2006). The introduction of uniform reporting standards makes comparison among funds easier, but access to reports is still limited, as it is governed by strict policies of non-disclosure to other than LPs.

3.2 Standard Performance Measures

The EVCA regards IRR and the multiples Distributed to Paid-in capital (DPI), Residual Value to Paid-in capital (RVPI) and Total Value to Paid-in capital (TVPI) as "the most appropriate performance indicators" (EVCA 2006: 25). The presentation of these performance measures, net of fees and carried interest, are required for funds older than two years in order to claim compliance with the EVCA Reporting Guidelines. However, both IRR and the multiples have several pitfalls that may threaten the ability of the LP to make correct comparisons of fund performance.

3.2.1 IRR

The Internal Rate of Return (IRR) is a widely used capital budgeting technique for evaluating investment projects by chief financial officers (Brealey, Myers, Allen 2006). It relates to Net Present Value (NPV) in the sense that it may be defined as "the discount rate which makes the NPV equal to zero" (Brealey et al. 2006: 91). If this discount rate is higher than the opportunity cost, the investment under consideration should be accepted. The IRR is calculated using the following equation:

$$IRR = \sum_{t=0}^{T} \frac{CF_t}{(1+IRR)^t} = 0 \,, \qquad (1)$$

where CF_t is the cash flow, distribution minus contribution, at time t from inception, and T is the date of the final cash flow. Equation 1 shows that IRR depends on both the timing and the amounts of the cash flows. IRRs calculated at a point of time previous to liquidation, called interim IRRs, include the residual value of the funds as a final cash flow (Burgel 2000). Interim and final IRRs will converge as the fund matures and the residual value diminishes.

Returns are driven by several factors in the IRR formula. All else being equal, it will increase as higher capital gains are realized through divestments, requested draw-downs are smaller and the shorter the periods between contributions and distributions are (Burgel 2000). These are attractive features of a performance measure. IRR shows how time-efficient a fund has invested and returned money and, being a rate of return; IRR is also easy to interpret and allows for comparison among alternatives. For the PE investor who wants to evaluate fund performance across sizes, IRR therefore seems like a reasonable option.

However, there are several pitfalls when using IRR as a performance measure. First, the iterative procedure that is used to find the IRR may return zero or several solutions. Second, the IRR may misinterpret the investor's cash flows and return a positive IRR even though

more capital is invested than returned. This is known as the "Lending versus Borrowing Problem" (Brealey et al. 2006: 93), and can happen if a fund makes a large distribution in its early years, while continuing to draw down capital which later is written off. Third, IRR assumes that all distributions are reinvested at the IRR rate. If the assumption holds, then IRR equals the effective rate of return. However, if the assumption does not hold, then IRR will exaggerate performance positively for funds with high IRRs and negatively for funds with low IRRs. As a consequence, the performance of funds will appear more dispersed than they truly are (Phalippou 2008). Fourth, IRR, which is a time-weighted, amount-weighted rate of return, cannot be compared to the time-weighted rate of return we observe from public market indices, because the influence on average overall return increases along with increased investments (see Bodie et. al. 2008: 852).

According to Phalippou (2008), the most important issue with IRR as a performance measure is the incentives it provides the GPs with. IRR may not rank projects correctly according to other methods preferred in Corporate Finance text books such as the NPV, often due to differences in projects' scales and durations. A typical buyout fund invests in about 15 companies, while a typical venture fund invests in about 30 companies (Ljunggvist and Richardson 2003). Measuring these investments by IRR will create incentives for the PE fund to make short term investments which yield high IRRs but perhaps a lower NPV than longer lived alternatives.

Also, the more weight put on IRR as a performance measure, the stronger the incentives are for the GPs to strategically time their cash flows in order to achieve high IRRs. We know that a shorter period between contributions and distributions increases IRR. In order to lock in a high IRR, GPs can pay out early distributions, even though doing so may reduce the total NPV of the fund. A typical scenario would be an investment that created a high IRR in the first couple of years, with the prospects of making more normalized returns in the next three. Although the expected normalized returns are above a given cost of capital, it can be rational for the fund manager to exit the investment after year two because keeping the investment will reduce the IRR towards more average returns. To make a quick exit, the PE fund may have to sell the investment at a discount, i.e. a price below the present value of the company, to attract potential buyers. The practice of underpricing has been documented by Lee and Wahal (2002) who show that venture capital backed IPOs are more underpriced, and Nahata and Masulius (2009) who show that when a venture capital fund is the seller of a firm in a M&A transaction the firm will be more underpriced.

The observed underpricing may also be a result of another weakness with IRR. As the interim IRR increases, the final IRR becomes less sensitive to late distributions. This is just the result of discounting the additional values at an often exaggerated cost of capital for many years. The incentives to make large distributions in order to increase the IRR will therefore weaken during a successful fund's life. GPs of a mature fund with a high interim IRR may then prefer other payoffs, such as publicity through an IPO with large first-day returns achieved through underpricing, rather than increasing their IRR marginally by selling at a higher valuation.

Although the carried interest works as an instrument to align the interests of the GPs and the LPs and reduce the distorted incentives, Phalippou (2009) illustrates how standard contracts between GPs and LPs may also cause the same conflict of interests.

3.2.2 Multiples

Along with IRR net of fees and carried interest, PE funds are obligated to report the multiples DPI, RVPI and TVPI, all net off fees and carried interest, in order to claim compliance with the EVCA Reporting Guidelines. The multiples are absolute measures and illustrate the following (EVCA 2006):

DPI – Distribution to Paid-in capital – measures all distributions made to LPs relative to all paid-in capital, and displays actual returned cash to investors. Unrealized investments do not affect this multiple.

RVPI – Residual Value to Paid-in capital – measures the unrealized value of fund investments that the LP is entitled to as a proportion of all Paid-in capital.

TVPI – Total Value to Paid-in capital – is the sum of DPI and RVPI, and is often referred to as the "Multiple".

The simple nature of the multiples makes them easy to interpret, which explains much of their popularity. It is also why multiples cannot be used without caution. Comparing funds by multiples will in many ways be like comparing apples with oranges, unless the investor accounts for fund duration and vintage. A more severe pitfall is that the multiples do not account for the time-value of money. Two funds with identical multiples and age will therefore be ranked identically, independent of the timing of contributions and distributions.

By ignoring the time-value of money, the simple multiples can either understate or overstate the performance of a PE fund, depending on the timing of the cash flows and assumptions about the cost of capital. For example, an investment that yields a multiple of two in five

years, with no interim cash flows and a cost of capital of 15 percent, has a negative NPV. The mentioned cost of capital is equal to the one that Metric (2007: 79) assumes for venture capital.

When IRR and multiples are evaluated together, some of the individual measures' pitfalls are rectified. The multiple can be used to analyze the effects of the reinvestment assumption underlying IRR. For a mature fund with a high IRR, an average TVPI indicates that the reinvestment assumption overstates the fund's true performance. Also, total return multiples will act as a counterweight to the distorted incentives provided by IRR, as they provide incentives to keep investments that will increase nominal returns, even if the risk-adjusted returns are negative. IRR, on the other hand, can be used to rank funds with equal multiples to adjust for the time-value of money.

3.3 Alternative Performance Measures

It seems odd that, given the pitfalls related to IRR and the multiples required by EVCA's Reporting Guidelines, alternative performance measures have not been more widely adopted in PE practice. Though corporate finance textbooks such as Brealey et al. (2006) recommend using NPV over IRR as a capital budgeting technique, many managers prefer IRR since the method simplifies comparison between alternatives, as it is a rate of return (Pike and Neal 1996). This argument is also one of the explanations put forward by Phalippou (2008) when describing why NPV remains out of use by PE practitioners, the second being that practitioners do not want to assume a cost of capital. Finding the cost of capital for PE funds with existing cost of capital models would probably be time-consuming and very sensitive to the assumptions used. This, combined with NPV being dependent upon scale, may cause NPV to be inappropriate or at least unpractical in a PE setting.

To overcome the obstacles with NPV as a performance measure of PE funds, modifications and alternative measures have been proposed in the literature. They all have a cost of capital component, but the rates are built on different assumptions. Their cost of capital are unlikely to reflect a fund's true cost of capital, but act as substitutes of the alternative costs of forgoing public market investments or as assumptions of the cost of capital for the asset class. None of the performance measures are meant to be used in an optimal portfolio allocation problem. However, the alternative measures are useful to the LP who wishes to improve on some of the standard performance measures' pitfalls.

3.3.1 MIRR

Phalippou (2008) recommends the use of the Modified Internal Rate of Return (MIRR) in appraisal of PE fund performance. MIRR is the least popular of seven investigated capital budgeting techniques in the US according to Ryan and Ryan (2000). Pike and Neal (1996: 144) define the MIRR as "that rate of return which, when the initial outlay is compared with the terminal value of the project's net cash flows reinvested at the cost of capital, gives an NPV of zero". It is a method that seeks to adjust the IRR so that it has the same reinvestment assumption as the NPV approach. MIRR is defined as

$$MIRR = \left(\frac{FV_{Distr.}}{PV_{Contr.}}\right)^{\frac{1}{T}} - 1 \quad (2)$$

where,

$$FV_{Distr.} = \sum_{t=0}^{T} Distr.(1+i_t)^{T-t} \quad (3)$$

and

$$PV_{Contr.} = \sum_{t=0}^{T} Contr.(1+i_t)^{-t} \quad (4)$$

The numerator in equation 2 expresses the terminal value of the distributions at time T, and the denominator the present value of contributions (at $t = 0$). We see from equation 3 and 4 that MIRR allows us to use a discount rate (reinvestment rate) of distributions that differs from the discount rate (finance rate) of contributions. In order to compare performance between funds, one can use a quasi consensus hurdle rate for PE funds or a public market index as the reinvestment and finance rates, as Phalippou (2008) suggests. He interprets common industry practice of charging carried interest with a hurdle rate of eight percent, to be a quasi consensus hurdle rate in PE.

One effect of setting an identical reinvestment rate for all funds is that the exaggerated dispersion in funds' performance caused by IRR will be reduced. Further, MIRR improves on several of IRR's pitfalls. The most obvious improvement is that MIRR gives the investor an opportunity to infer something about the reinvestment rate, and to test how sensitive a PE fund's performance is to lower reinvestment rate assumptions.

Also, IRR discounts the cash flows using one discount rate for both contributions and distributions, assuming contributions and distributions share the same systematic risk. It seems reasonable, when discussing PE investments, to question this assumption. Both LPs and GPs are restricted by contracts which specify the amount committed to a fund and the period for investing. With the timing of the contributions within the investment period as the

only uncertain element, the systematic risk of contributions could be considered reduced towards zero. The distributions are expected to vary depending on general market conditions and therefore have a stronger element of systematic risk. Ljungqvist and Richardson (2003) propose to account for the difference in risk by discounting contributions at a different and lower rate than for distributions. The use of MIRR thus enables the investor to adjust for differences in systematic risk between contributions and distributions. Further, MIRR is uniquely and always defined, removing the problem related to IRR sometimes returning zero or several solutions.

More important, MIRR better aligns the incentives and interests between the LPs and GPs (see Phalippou, 2008). While IRR may decrease by delaying the exit of an investment that earns above the cost of capital, the NPV properties of MIRR will cause MIRR to increase as long as the investment yields returns above the cost of capital. Hence, MIRR will be maximized when investments are held until the marginal return equals the marginal cost of capital.

3.3.2 Profitability Index

An investor interested in evaluating funds of different sizes by NPV can also use the Profitability Index (PI). The PI is defined as the value created in terms of NPV per unit invested (Brealey et al. 2006) and can be written as:

$$PI = \frac{NPV_{CF}}{PV_{Contr.}} \quad (5)$$

where,

$$NPV_{CF} = \sum_{t=0}^{T} Distr.(1+i_t)^{-t} - \sum_{t=0}^{T} Contr.(1+i_t)^{-t} \quad (6)$$

and

$$PV_{Contr.} = \sum_{t=0}^{T} Contr.(1+i_t)^{-t} \quad (7)$$

A PI above (below) zero indicates value creation (destruction). The scale dependency in NPV is thereby tackled without great difficulties. Further, PI improves on IRR in many ways like MIRR; the exaggerated performance caused by the reinvestment assumption in IRR will be reduced and we see from equation 4 and 5 that it allows us to use separate discount rates for contributions and distributions. Being an NPV-based measure it would punish foregoing opportunities to increase NPV, providing incentives that perhaps are more aligned between LPs and GPs.

In order to calculate a fund's true PI one has to find the fund's true cost of capital. We have briefly discussed the difficulties surrounding this task for PE investments. A simplification is offered by Ljungqvist and Richardson (2003). They benchmark the PE cash flows to a public index, using the annualized return from a fund's inception to its last reporting date. The holding period of the index investment thus matches the lifespan of the fund. The annualized rate of return from an index can be regarded as the opportunity cost of not investing in a public market during the life of the fund. Only using two data points as inputs for calculating the benchmark hurdle rate, causes a mismatch with the timing of cash flows, as contributions and distributions are made over time. The measure also becomes sensitive to short term public market fluctuations using this calculation, and might be subject to strategic timing by GPs, who are in a position to determine the point of the final cash flow.

3.3.3 The Index Comparison Method

The Index Comparison Method (ICM) was developed by Long and Nickels (1996). They wanted to measure the relative performance of a private market investment to that of a public index, put in other words; what would the performance on a total return basis have been, had they invested the net cash flows of the PE investments in a public index? In order to do so, the performance measure needed to account for the timing and amounts of the cash flows.

The ICM calculates the opportunity cost of capital for the PE funds by investing (withdrawing) the same cash flows into a public market index as those invested (distributed) by the fund. The object is to find the terminal value (TV) of the index investments, which equals the future value of all contributions minus the future value of all distributions:

$$TV_{Index} = FV_{Contr.} - FV_{Distr.}, \quad (8)$$

where the future values are calculated as (Long and Nickels 1996):

$$FV_X = \sum_{t=0}^{T} CF\ (1 + i_t)^{T-t}, \quad (9)$$

and

$$i_t = \left(\frac{Index_T - Index_t}{Index_t}\right)^{1/T-t} - 1 \quad (10)$$

$Index_T$ represents the value of the public market index at the time $T$of reporting or liquidation, and $Index_t$ represents index values at time t, where contributions (distributions) are made. The equation for the terminal value shows that a fund which greatly outperforms the index will end up with a negative terminal value, i.e. a short position in the index.

Using the terminal value of the index comparable as the fund's final cash flow, we get the index cash flows, which is identical to the fund's cash flows except for the added terminal value. From the index cash flows, we can calculate an index IRR that is comparable to the IRR of the PE fund. A PE fund IRR in excess of the index IRR represents a time-weighted, amount-weighted performance in excess of the index. The ICM can therefore offer useful insight to an investor. A fund with a negative IRR may have an excess IRR compared to the index, indicating that the poor performance is more a result of a general downturn in the economy than the fund managers' actions, and vice versa for a fund with a high IRR and a negative excess IRR.

Contributions and distributions are compounded using multiple rates that reflect the same-period return on the public index. This reduces the vulnerability to short term public market fluctuations that arises, when calculating the opportunity cost based on only two periods, in Ljungqvist and Richardson's version of PI.

The ICM assumes a beta of one for the PE fund, ignoring systematic risk. This assumption will cause the ICM to overstate (understate) the true risk-adjusted performance of the fund, given that the fund has a beta greater (less) than one. The index comparison may therefore be inappropriate, but Long and Nickels (1996: 7) defend the use of it stating: "… it is equally inappropriate for all private investments and that it is therefore a neutral factor in judging among them (or judging among managers in a particular asset class)". Another drawback with the ICM is the use of IRR. IRR has several pitfalls, one of them being that it cannot always be defined.

3.3.4 The Kaplan and Schoar Public Market Equivalent

A close relative to the ICM is the Public Market Equivalent (PME) used by Kaplan and Schoar (2003). It is simply the ratio of the future value of capital distributed by the PE fund to the future value of the capital invested into the PE fund, where both numerator and denominator are compounded at rates determined by the performance of an index from the date of the cash flow to the last reported date.

$$PME = \frac{FV_{Distr.}}{FV_{Contr.}}, \qquad (11)$$

where the future values are calculated as in equation 9 and 10.

The PME is a multiple which accounts for the time-value of money as opposed to absolute multiples such as the TVPI recommended by the EVCA. The PME does not adjust for

differences in risk between PE funds, but the performance measure has several attractive attributes. First of all, the fraction is always defined. Secondly, it complements the excess IRR from the ICM in many ways like the TVPI does with the IRR. The higher the IRR gets, the less sensitive it gets to late distributions, an effect more noticeable for mature funds. Thus, mature funds that greatly outperform the index, indicated by large negative terminal values, may not rank high on excess IRR due to their interim cash flows which are also used to find the index IRR. For these funds, the PME will better reflect their true performance.

4. Dataset

We have collected and constructed a dataset containing cash flow data from 71 funds for the purpose of studying how performance measures behave and rank funds, based on information available to LPs. The source is the records of several European PE investors operating in the Nordic region. We will refer to these investors as the "Limited Partners". Confidentiality agreements do not allow us to identify the names of the Limited Partners, the fund managers or the specific funds. The dataset contains cash flow data from funds in which the Limited Partners have made investments as well as some in which the Limited Partners have not invested.

The unique dataset allows us to precisely estimate performance of PE funds, net of fees and carried interest, for all performance measures. To our knowledge, the collected dataset is considerably larger than in previous studies from this geographical region.

4.1 Constructing the Database

Cash flow data collected from internal resources of the Limited Partners form the backbone in our analysis. The sample contains 71 funds managed by 23 fund managers. All fund managers have a locus of investments in the Nordic region. With the exception of 1992, the sample includes funds of every vintage, spanning the years from 1990 to 2008. The majority of funds are still active.

Different currencies constitute a problem. In order to use the same cash flows when performing the analyses, all cash flows have been converted to Euros at mid-day exchange rates[2]. Cash flows before the adaption of the Euro have been converted at the first recorded mid-day exchange rates.

The fund managers apply different time formats when reporting cash flows. Most apply the exact dates of cash flows, but some apply monthly or even quarterly cash flows. Incapable of separating these cash flows into daily cash flows, we treat them as single cash flows occurring at the specific date reported.

For our purpose we would have liked to see cash flows split into contributions, distributions and NAV. Most funds apply this format, as proposed by the EVCA. Some funds have only reported a sum of contributions and distributions, making reliable separations between them

[2] Collected from Datastream Advance 4.0

difficult. This complicates calculation of multiples and ratios that relate these cash flows to committed capital.

Cash flows and unrealized holdings in our database are as far as possible net of fees. However, because of the way some funds report cash flows and a lack of transparency in the calculation of unrealized holdings, fees remain as a potential source of upward bias when evaluating performance.

4.2 Variable Description

When possible, cash flows from each fund are separated into capital calls, distributions and NAV. The sum of these amounts to total cash flows. Realized cash flows are total cash flows less NAV. We have characterized each fund by certain variables; sequence number, age, vintage year, stage, status, and committed capital. A fund's sequence number is the order in which the fund has been raised by the manager. We define vintage as the year in which the fund's first cash flow appear. A fund's status is deemed to be liquidated if reported liquidated by the GP or it satisfies both of the following criteria; its age is above 10 years and NAV constitutes less than 10 percent of committed capital. According to this definition of fund status, 53 funds are deemed active, while 18 are liquidated.

Our dataset has been augmented by data from Thomson VentureXpert (2009). Committed capital has been found by matching the funds to this database. Some funds also report these figures. They generally match the VentureXpert data to a great degree. However, because we were able to find committed capital for all funds except for one in the VentureXpert database, we chose to use VentureXpert as a source for committed capital to promote uniformity.

Stage represents the stage of development of the companies in which the fund makes the majority of its investments. These data are also gathered from VentureXpert. The dataset contains funds investing in the following stage categories; Development, Early Stage, Expansion, Later Stage, Balanced Stage, Generalist and Buyouts. However, once we separate funds by vintages we get few observations and having seven stages becomes unpractical. Since the VentureXpert categories Development and Early Stage share similar characteristics we will in our analyses group these stages together as Early Stage. For the same reason we group Expansion and Later Stage into Later Stage, even though Expansion may include buyout investments.

4.3 Descriptive Statistics

Descriptive statistics for the sample, including the distribution of vintages, stage and committed capital, is presented in Table 1 and Table 2. Our dataset contains funds that are fairly dispersed when looking at fund vintages. The funds invest in companies in different stages of development, and the sample contains both venture and buyout funds.

The combined commitments of the investigated funds amount to more than 22 billion Euros. Early stage funds account for 23.9 percent of the sample and 5.9 percent of committed capital. Later stage funds account for 16.9 percent of funds and 6.3 percent of commitments. Balanced stage and Generalist funds account for 12.7 and 9.9 percent of funds, and have similar average commitments that combine to just over 5 percent of the total. Buyout funds are considerably larger than the other funds, where 36.6 percent of the funds have commitments that account for 82.8 percent of the total. The average committed capital increases with vintage, even though the stage composition remains fairly unchanged. This is consistent with a general growth of the PE industry.

Funds in our sample span from first time funds to funds with a sequence number of eight. We have been able to identify the sequence of all but one fund. The number of first time funds represents 18.3 percent of the sample. 23.9 are follow-on funds, 15.5 are third sequence and 15.5 percent are fourth sequence funds. 22.5 percent are later sequence funds (Table 3). More obviously, the mean sequence number increases with the increase in vintage year. This development is natural, as the universe of later sequence funds increases. A LP may also increase the access to later sequence funds after having invested in an earlier sequence fund. The increase in later sequence funds over time may also contribute to explain the previously noted increase in average committed capital, as successful funds generally are able to raise more capital for follow-on funds (see Kaplan and Schoar 2003).

Representativeness of the sample to the investment universe is not the main focus of this thesis, but rather how different performance measures compare funds. In spite of this, we will comment briefly on the subject. Whether the sample is representative for the Nordic PE market depends on the investment strategy of the Limited Partners. The Limited Partners may also possess inferior/superior skill in selecting funds or access to funds compared to other investors. However, our sample is not restricted to specific sequences and has a dispersed investment focus. Using only the stage categories we employ (Table 2), a comparison with all Northern European funds from 1990 to 2008 in the VentureXpert database reveals that

buyouts account for 22.8 percent of funds and 61.7 percent of committed capital. Thus, compared to the larger VentureXpert sample, Buyouts are overrepresented, while Early Stage, Balanced Stage and Generalist are underrepresented. Later Stage is overrepresented in terms of the number of funds, but only slightly in terms of committed capital.

5. Presence of Difficulties in Performance Measurement

In section 3.1, we described difficulties related to performance measurement of PE funds. Now, we investigate the presence of these issues in our dataset. The primary performance measure we use to describe the difficulties of performance measurement in this section is the total IRR, which includes reported NAV as a final distribution, but the investigated issues are not restricted to this measure.

5.1 Mean Performance and Benchmarking

The full sample has a mean IRR of 16.43 percent and a median IRR of 8.60 percent (Table 4), implying that fund returns are right skewed or simply reflecting that we have a large number of young funds in our sample. Referring to the J-curve pattern, the mean performance of all funds is a dire description of PE performance since the inclusion of a large number of young funds will cause downward biased estimates of final performance of the funds. The only final IRRs are the ones reported for liquidated funds, which show a considerably higher mean than the active funds. For liquidated funds we find a mean IRR of 36.3 percent and a median IRR of 24.0 percent, while active funds have a mean IRR of 9.68 percent and a median IRR of 7.36 percent. This indicates that PE fund returns in fact are right skewed, and that relatively few funds create a larger mass of returns.

Mean IRRs are not a good description of industry performance, as it does not take into account the size of investments. To circumvent this problem and also take into account the time period in which the cash flows occur, we have calculated the pooled IRR of each vintage. This is a better benchmark for a fund of a specific vintage than the mean. The pooled IRR of all funds shows the IRR the LP would have achieved if he or she had invested an equal share of committed capital in all funds. It reveals an IRR close to 27 percent, which is higher than the full sample mean.

5.2 Market Conditions and Return across Time

As noted, comparing funds across time may produce wrong conclusions about performance. General market conditions and competition among PE funds will affect a fund's ability to make profitable investments in portfolio companies. These variables are different from one year to another.

Table 4 shows the IRR of PE funds in our sample broken down by vintage year and panels separating active from liquidated funds. Comparing the mean and median IRRs of the 98-00

vintages and 01-03 vintages, we see that the latter group of funds has performed considerably better. Knowing that IRRs usually increase with age, we can infer that the two groups of funds have faced different market conditions when making portfolio investments. Yet, this table highlights a difficulty in comparing fund performance; once the sample is broken down by vintage, the sample size becomes very small.

The problem of comparing fund performance across time also manifests itself when looking at performance of funds sorted by age. We see from Table 5 that the youngest funds in our sample display negative mean IRRs, and that the mean IRRs increase with age. From Figure 1 we see that this is consistent with the J-curve pattern. The early interim IRRs are not good indicators of final performance, and comparisons across young funds are made difficult because of few realizations.

Table 6 shows cumulative contributions and distributions made by the funds in relation to committed capital, sorted by fund age. It supports the line of argument against comparing performance of young funds. The cash flows into the fund, contributions, approach committed capital in a fairly even rate across funds sorted by age, and are generally close to committed capital for funds of age above four. Distributions are zero for the youngest funds, and we see that there is a large shift between four and five year old funds. When funds have reached this age, they have distributed cash, and the interim IRRs will be a better indicator of performance.

Those funds that have reached an age above 10, although few, display high distributions, suggesting that funds continue to distribute capital even though a fund has reached 10 years of age. Table 5 shows that these funds have a mean IRR of 36.89 percent and a median IRR of 27.57 percent, which is noticeably higher than the mean and median IRR of 6.38 and 5.57 percent for funds between the age of seven and 10 years. The large difference is reduced when comparing against funds aged between five and 10, which have a mean IRR of 18.81 percent and a median IRR of 11.66 percent, indicating that other factors, such as market conditions, could be part of the explanation.

5.3 Differences in Sequence and Stage

Expecting that GP performance increases with experience, we should see that later sequence funds have higher returns than early sequence funds. Since most LPs gain access to later sequence funds by investing in some of the early funds of the same GP, it is important that the

they do not reject fund managers solely on the basis of their first fund returning less than a benchmark that includes higher sequence funds.

Table 7 is an expansion of Table 6, and shows the distributions also broken down by sequence. Comparing the groups of early and follow-on funds to higher sequence funds, we are unable to detect any systematic differences between the two groups. In a similar way, Table 8 is an expansion of Table 5, showing fund IRR also broken down by sequence. The apparent trend of decreasing IRRs with increasing vintages is an implication of the J-curve pattern and that the early sequence funds are older. Thus, in our data the mean IRR of all early sequence funds cannot be directly compared to mean IRR of all higher sequence funds.

Table 9 shows performance broken down by investment stage. In our sample, funds classified as generalist or buyouts perform better than the other stages. Again, these figures should be interpreted with caution. Differences may in part be attributed to differences in the distribution of fund age, but buyouts still seem to outperform early stage funds when comparing funds across different age groups. The difference in performance between stages could also be caused by differences in risk characteristics or leverage, and if so, evaluating performance across stages without adjusting for risk will in rising markets favor those stages with higher systematic risk or leverage. Given the option-like payoff structure for GPs, measures that do not perform risk-adjustments will provide incentives for GPs to increase risk. Controlling for sequence or differences in systematic risk by making subdivisions by sequence or stage will, as when controlling for vintage, reduce the sample size.

Possible determinants of performance should be investigated through regression analysis, and conclusions should not be drawn based on only one variable. This is highlighted by Table 10, showing fund performance by Committed Capital. It shows an apparent decreasing IRR with fund size, but this is not the only possible determinant of performance. We have already seen that commitments generally increase with vintage and that IRR decreases with vintage in our sample. Doing an extensive regression analysis, Kaplan and Schoar (2003) in fact find that performance increases with fund size.

6. Comparing Performance Measures

In section 4, we presented several performance measures applied by either practitioners or academics when evaluating PE performance. We described the pitfalls related to the standard performance measures IRR and the multiple TVPI, and suggested the alternative performance measures, MIRR, PI, ICM and PME, that correct for some of these pitfalls. In the following two sections, we use our data to study the relationship between the performance measures, the severity of the pitfalls related to IRR and TVPI, and the improvements of the alternative performance measures.

6.1 Ranked Statistics for the Full Sample

This subsection presents how our sample of funds rank according to the seven performance measures IRR, TVPI, MIRR, PI, PME, ICM Excess IRR and ICM Excess MIRR. Due to the high percentage of funds that are still active, we choose to include the NAV as a final cash flow for all funds when calculating the performance measures. Three different specifications of the MIRR formula are applied, using hurdle rates of zero, eight and 12 percent. For the PI we use the annualized total return on the Morgan Stanley Capital International Nordic Index (MSNORDL - denoted MSCI Nordic) and the 10 year German Government Bond Index[3] (BMBD10Y), from the initial cash flow to last reporting date, as the respective risky and risk-free alternative[4]. The future values used in PME, ICM Excess IRR and ICM Excess MIRR are all found by compounding the funds' cash flows at rates determined by the performance of the MSCI Nordic from the dates of the cash flows to the last reported date.

Among the sample of 71 funds, there are 10 funds where TVPI cannot be computed, for which we use a proxy[5] based on the net cash flows. There are eight funds in our sample for which ICM Excess IRR cannot be calculated. Instances where ICM Excess IRR cannot be calculated normally coincide with good performance, and the funds missing ICM Excess IRR are all among the top 19 funds ranked by PME and the top 34 ranked by total IRR. This complicates the interpretation of rank correlation coefficients, since it is calculated on a different sample. However, comparisons with the other correlation coefficients still describe

[3] In lack of government bond indices covering the Nordics during the investigated period.
[4] Collected from Datastream Advance 4.0
[5] The proxy is found by running a regression with TVPI as dependent variable and a new multiple calculated as the sum of all net positive cash flows divided by the sum all net negative cash flows as the independent variable. The intercept and coefficient of the new multiple from the regression are then used to find the point estimates of TVPI as an equation of the new multiple.

the general properties of the measure. Due to the unobserved ICM Excess IRRs, we introduce the ICM Excess MIRR assuming a reinvestment rate of eight percent.

For the alternative performance measures, MIRR, PI, PME and ICM, we use the same cost of capital for all funds, but the cost of capital varies between the measures. Given the differences in stage focus and leverage between funds, the use of one cost of capital across all funds will most likely either over- or understate the performance of the funds, depending on their systematic risk. We use a different cost of capital between the methods because we want to remain in line with the original articles from where we found the performance measures. Our intention is not to analyze the performance of the individual funds, but to analyze the relationship between the performance measures, and finding the true risk adjusted performance of a fund consequently becomes less relevant.

6.1.1 Rank Correlation

Table 11a shows the Spearman rank correlation coefficients between the performance measures for the 71 funds in our sample. The rank correlation coefficients for IRR vary between 0.64 (ICM Excess IRR) and 0.97 (MIRR), with a mean of 0.86. The rank correlation coefficient between IRR and TVPI is 0.94, indicating that ranking funds by the standard performance measures would yield almost identical results. We find a lower rank correlation between the alternative performance measures. The lowest rank correlation coefficients come from ICM Excess IRR, which has a mean rank correlation of 0.70. Comparing the rank correlations between the MIRRs with different hurdle rates, we find a correlation very close to one. From this, we can establish that the different assumptions regarding hurdle rates hardly affect the ranking of funds by MIRR.

We use Fisher's z transformation[6] to calculate the 99 percent confidence intervals for the rank correlation coefficients (Table 12). The lowest 99 percent confidence interval for the rank correlation coefficients is between the ICM Excess IRR and MIRR_12% (0.41 – 0.79). We therefore reject the hypothesis of independence of the two related rankings for all correlation coefficients.

The rank correlations between IRR and the PI, PME, ICM Excess IRR and ICM Excess MIRR measures are noticeably smaller than for the TVPI and MIRR. An important difference between these groups of performance measures is that, while IRR, TVPI and MIRR measure

[6] In order to convert Spearman's rank correlations to a normally distributed variable.

absolute performance, PI, PME, ICM Excess IRR and ICM Excess MIRR measure the relative performance of a fund to a benchmark.

The implications of using absolute performance measures instead of relative performance measures are illustrated by comparing the rank correlations between the performance measures and the MSCI Nordic, where the MSCI Nordic is the annualized return on the same index from the funds' first cash flow to their last reporting date. We see that the absolute performance measures have considerably higher rank correlation coefficients than the relative performance measures. The rank correlation coefficients between the absolute performance measures and the MSCI Nordic range between 0.41 (TVPI) and 0.44 (MIRR_12%), while the rank correlation coefficients range from -0.15 (ICM Excess IRR) to 0.06 (ICM Excess MIRR) for the relative performance measures. Thus, it seems as the relative measures, although with high rank correlation coefficients to the absolute measures, to some degree adjust for the market conditions a fund operates in. The relative measures are therefore valuable tools for an investor who wants to evaluate performance of funds operating in different periods of time, which often is necessary due to lack of data.

Correlations between the performance measures generally yield smaller coefficients (see Table 13a), than the ranked correlation. The correlation between IRR and TVPI is 0.64 in our sample consisting of 71 active and liquidated funds. This is comparable to Ljungqvist and Richardson's (2003) result, when they find a correlation coefficient between the same measures of 0.59 for a sample of 73 mature funds. They conclude that the ranking of funds thus would be different.

6.1.2 Ranked Performance

Even though the rank correlation suggest small differences in how the funds rank by the performance measures IRR, TVPI and MIRR, Table 14a shows that they do not rank fund performance consistently, and a choice between the top five funds on the basis of the different performance measures would include different funds. The deviations are perhaps bigger than expected based on rank correlations. The two highest ranking funds by IRR are ranked as nine and 29 by TVPI. The large spread in the rankings of these funds illustrate some of the pitfalls related to IRR and TVPI; the reinvestment assumption could cause IRR to overstate the true performance, the TVPI could fail to adjust for the time-value and age of the fund, or it can be a combination of both. Normally, high IRRs together with low TVPIs indicate that returns were made over short periods. This is also the case here, where both funds are younger than

three years. The discrepancy between multiples and rate of return measures for young funds also appear among the alternative performance measures. We see that while MIRR and ICM Excess MIRR rank the same funds as IRR as top two, but in opposite order, PI and PME rank these funds in the range from five to 16.

The rank correlations between the performance measures indicated a weaker relation between absolute measures and relative measures than between measures within these groups. A low rank correlation between relative performance measures and the MSCI Nordic further suggested that these measures to some degree control for the general market conditions a fund operates in. From table 14a we see examples of funds where part of the performance can be attributed to external factors as much as the GPs' actions. One of these funds ranks as 29 by TVPI, but as six and five by the relative performance measures PI and PME, indicating a difficult investment environment. On the opposite side, the fund ranked as five by IRR is ranked as 18 by ICM Excess IRR, and fund performance is perhaps more a result of fortunate timing than the GP's abilities. Not accounting for general market conditions, the absolute performance measures will have a tendency to overstate the performance of funds operating under favorable conditions, while punishing funds facing a difficult investment environment.

6.2 Ranked Statistics for Funds Older than Four Years

During the early years of a fund's life, distributions are small and stale valuation may affect the NAV. Looking at funds with a short life may also cause the market related measures to produce results that are of little value when evaluating fund performance. To correct for this, we have excluded funds that are younger than four years. The cut-off value of four years reduces the sample to 44 funds.

Table 11b shows the Spearman rank correlation coefficients for the reduced sample. Nine missing TVPIs are replaced by point estimates and there are seven funds for which we cannot compute ICM Excess IRR.

In the reduced sample, the rank correlation between IRR and TVPI is increased to 0.98, while the coefficients against MIRR decrease and now range between 0.93 and 0.95. The decrease related to MIRR can be explained by an increased importance of the reinvestment assumption and that we in fact use Isolated MIRR[7]. Using Isolated MIRR, we expect high correlation between IRR and MIRR for young funds since the reinvestment rate do not affect young

[7] Phalippou (2008) denotes the MIRR we apply Isolated MIRR, which is the MIRR calculated between inception and date of reporting.

funds to the same degree. PI, PME and the ICM measures show increased rank correlation coefficients against the IRR. They also generally show higher coefficients in relation to each other and the other measures.

The rank correlation coefficients against MSCI Nordic are reduced for all absolute measures, and now range between 0.02 (MIRR_0%) and 0.11(MIRR_12%). For the relative measures the same rank correlation coefficients become negative, varying between -0.30 (PI) and -0.09 (ICM Excess MIRR). A problem with the MSCI Nordic is, however, that it is calculated as the annualized return between the inception and the reporting date of a fund, and therefore does not track the timing of the cash flows. The current turbulence following the financial crisis in 2007 – 2008 acts as an example of how this can cause problems when interpreting our results. Between the end of 2007 and the end of 2008 the MSCI Nordic fell by 46 percent, causing the annualized return on the MSCI Nordic to drop by several percentage points for many funds that are still active. Mature funds which realized the majority of their investments prior to the turmoil, will then rank low by their corresponding MSCI Nordic returns. At the same time, we know that investments prior to the stock market crash are associated with high returns resulting in high rankings by the absolute performance measures.

The ranking of funds in the reduced sample is presented in Table 14b. 18 funds are shown, which correspond to just over 40 percent of the sample, and the top quartile consists of the first 11 funds. From the table we see that although the rank correlations are increased, the deviations in ranking between the performance measures are considerable for some funds.

6.3 Consistency

Based on the ranking of funds we see that the different measures often appraise the funds' performance inconsistently. However, depending on the density of funds performing within a certain range, small deviations in performance between funds could cause large spreads in rank. When moving along the return distribution, the densities of funds within a specified range often change (see Figure 2). In our sample, the difference between the top performer, measured in terms of IRR, and the fund indicating the upper quartile is 154 percentage points, while the spread between the median and upper quartile is only 23 percentage points. In other words, there are larger differences in performance between funds along the tails of the return distribution.

In this subsection, we investigate the consistency of performance measures with the latter in mind. The means by which we do this is to compare how performance measures differ in the

ranking of funds after separating funds into quartiles by IRR. Table 15 shows how the other measures deviate from IRR in ranking funds that belong to these quartiles. We see a general picture of more consistency in ranking across measures among funds in the top and bottom quartile, compared to funds that are closer to the median. A practical implication of this is that a fund classified as a top performer by one measure is more likely to receive a similar rank by another measure, than when it belongs to the middle quartiles.

MIRR seems to deviate from this general picture. The cause of this deviation is that when IRR is close to the reinvestment rate used in MIRR, the two performance measures will yield almost identical results. We assumed a reinvestment rate of eight percent, and funds with IRRs close to this reinvestment rate are placed in the second quartile. This is also the quartile were we experience the lowest deviations.

GPs often claim that their fund is a top quartile fund, but at a given point of time, only 25 percent of funds can actually claim to be just that. Wang and Conner (2004), who unlike us have access to data that contain historical NAVs, determine the probability of a fund being in the top quartile in at least one year during its life by either IRR or TVPI, to be over 60 percent. Table 16 shows the overlap in funds, at our investigated point of time, according to a larger number of performance measures, and elaborates on ranked performance. None of the measures includes the exact same funds in the top quartile and the lowest agreement between two measures is 11 out of 18 funds. The total amount of funds that is defined as top quartile by at least one of the measures is as high as 29, representing over 40 percent of the total sample. This means that the probability of being defined as top quartile at some point of time will increase to an even higher rate, and shows the weak efficiency of generic selection rules like choosing top quartile funds based on only one measure. From this we can establish that appraisal of fund performance should include the use of several performance measures.

In order to account for differences related to age, we also investigate consistency among performance measures when describing a fund's performance relative to the median vintage performance. In Table 17a, we list the ratios in which two different measures at the same time determine that funds have performed either better or worse than their corresponding vintage medians, denoted Consistency Ratio (CR). Vintages with only one fund are left out of the analysis. A weakness of this procedure is that once we separate funds by vintage, the number of funds in each vintage becomes very small and that a bigger sample might produce different results.

We find that 54 out of 68 funds are evaluated consistently across all measures. CRs for the pairwise comparisons are close 0.90, indicating that on average nine out of 10 funds receive similar appraisals by the two measures with respect to the median. Both the highest and lowest ratios are related to PME. The highest ratio, 0.96, is between PME and PI, and the lowest, 0.85, is between PME and MIRR_8%. Consistency Ratios between two measures generally increase as we restrict the sample to funds above four years of age, and they are all above 0.90 (Table 17 b). These results indicate that when we account for vintage, some of the inconsistency across performance measure will be reduced, and the overlap of top quartile funds will increase.

7. Investigating Pitfalls Related to Performance Measures

In this section we analyze the severity of pitfalls related to performance measures, with an emphasis on the standard measures IRR and TVPI. We also discuss the degree in which the alternative performance measures improve on these pitfalls.

7.1 Calculation Issues

In our sample we are able to find the IRR for all funds when we include NAV as a final cash flow. However, NAVs are reported accounting values and not observed market values, and therefore a potential source of bias in our performance estimates. Realized IRR, which excludes NAV, are unidentified for 25 out 71 funds. The problem is normally limited to young funds, indicated by a mean age for these funds of 2.5 years. ICM Excess IRRs are unidentified for eight funds, for which seven are older than four years. The common factor for these funds is a large negative cash flow related to the terminal value of the index investment at the end of the reporting period.

Statistical software such as Excel allows for suggestions of the sign in front of IRR. And by doing so, one should be able to minimize the "Lending versus Borrowing" problem. When held together with Gross Return[8] we find no funds with opposite signs between Gross Return and Total IRR, indicating that IRR interprets the cash flows correctly in our sample of funds.

7.2 Reinvestment Assumption

IRR will not equal the effective rate of return unless all distributions are reinvested at the IRR rate. A consequence of this is that IRR will exaggerate fund performance when IRR becomes very high or very low. To test how the IRR exaggerates the funds' performance in our sample, we have calculated the funds' TVPIs, had all distributions been reinvested at the funds' IRRs. The changes in TVPI are listed in Table 18 together with the mean IRR, and sorted by age. We see that the effect of the reinvestment rate increases with age and IRR. For the 17 year old fund with an IRR of 70 percent, the change in TVPI is 3 238. The table also shows that the median change is of small economic significance. This is consistent with IRR exaggerating fund performance for extreme observations. IRRs close to the median are more likely to resemble the effective rate of return. The main emphasis of this table should therefore be put on the max and minimum observations.

[8] Gross Return equals distributions plus net asset value minus contributions

MIRR effectively reduces the noise in fund performance caused by the underlying reinvestment assumption in IRR. By setting a more realistic reinvestment rate, dispersion in fund returns will be reduced and the rate of return is more likely to reflect the effective rate of return achieved by the fund. Table 19 shows how MIRR improves on IRR regarding the reinvestment assumption. MIRR with three different reinvestment rate assumptions (zero, eight and 12 percent) are displayed. The spread between the third and first quartile for MIRR, assuming a 12 percent reinvestment rate, is 17.8 percentage points, more than 20 percentage points lower than that of IRR (38.94).

The large dispersion in fund returns, together with the documented persistence in fund performance (Kaplan and Schoar 2004), separates PE from other asset classes such as mutual funds, where persistence, if detected, is usually driven by underperformance. The same authors find that on average, Leveraged Buyout funds return slightly less than S&P 500 net of fees, while VC fund returns are lower on an equal-weighted basis, but higher on a capital weighted basis. These results, however, do not explicitly adjust for differences in systematic risk or liquidity risk. Performing risk-adjustments, Gottschalg and Phalippou (2005) find that PE funds substantially underperform net-of fees with respect to the S&P 500.

Most investors are aware of the weak aggregated performance, but invest in PE because of the documented persistence. Though aggregated performance is weak, top quartile funds usually display excess returns to the public markets, at least when systematic risk is unaccounted for. This is also true for our data where the third quartile PME is 1.64. Given the persistence, all the investor has to do is to identify the GPs of top quartile funds and invest in these fund managers' consecutive funds. Kreuter and Gottschalg (2006) test the efficiency of possible selection criteria. They find that the generic rule of investing only in funds of GPs whose most recent fund ranks in the top quartile would increase the weighted average IRR by just above three percentage points relative to a random selection of funds. This seems low compared to the IRR spreads we observe between the third quartile funds and the median funds for each vintage year in table 4.

The small gain achieved by following the generic rule of backing the top quartile GPs, could be a result of several factors. We have shown that fund performance to some degree varies between the different performance measures. A top quartile fund by IRR may not be a top quartile fund by PME or ICM Excess IRR. Further, the dispersion in fund returns is decreased

when more realistic reinvestment rates are assumed in MIRR. Variation in GPs' abilities could therefore be exaggerated by different measures.

There are also some concerns related to the documented persistence by Kaplan and Schoar (2004). One of these is that overlapping investments and time periods across funds can induce persistence. The authors are aware of this, and conduct robustness checks indicating that the persistent results are not caused by either investment overlap or time period overlap. However, the authors are using historical performance to test for persistence ex post, using information investors do not have when the investment decision is being made. When testing possible selection criteria and their efficiency, Kreuter and Gottshalg (2006) only use information available to the investor at the time of investing. They then compare the result of investing in funds based on the information an investor has at the time of the investment to the ex post results. As mentioned, the generic rule of investing only in funds of GPs whose most recent fund ranks in the top quartile, gave an excess return of three percentage points compared to that of random selection. By altering the criteria to account for all of the GPs previous funds, the spread in IRR between the generic rule and the random selection increases to 4.5 percentage points.

The "low" excess returns accrued is consistent with the findings of Wang and Chenner (2004), who show that 62 percent of the funds in their sample was either ranked top quartile by IRR or TVPI at some point during their lifetime. In addition, funds ranked as top quartile after five years have a likelihood of ending up in the top quartile just above 50 percent. Thus, even if persistence in fund performance exists, the information available to the investor at the time of investing may not be a good indicator about future performance. Unfortunately, our data is not sufficient to further investigate persistence in fund returns, or test if it is possible to predict fund returns by information available to the investors at the time of the investment.

7.3 Neglecting Time-Value of Money

Multiples illustrate the value returned per unit invested, and are practical measures for an investor who wants to get a quick impression of a fund's performance. However, since they neglect the time-value of money, evaluating funds solely on these multiples may lead to wrong conclusions. Using the quasi consensus hurdle rate of 8 percent as an effective rate of return, would yield a multiple of 2.16 after 10 years if all capital was invested at inception and paid out at the end. A fund that doubles the investors' money may therefore have a negative NPV, depending on the timing and amounts of the cash flows and assumptions about the cost

of capital. The easiest way to achieve a multiple that accounts for the time-value of money is to assume a cost of capital and divide the NPV of cash flows by the PV of contributions, which is what the PI does. In the following, we use the PI to test whether a TVPI multiple of two, which Phalippou (2007) notes that LPs seem satisfied with, should be considered satisfactory.

Unobservable TVPIs are replaced with point estimates as explained in Section 6.1. Further, we assume the 15 percent cost of capital suggested by Metrick (2007: 79) for venture capital and find the new PI (PI 15%) for each fund. Ranking funds from high to low based on TVPI, we want to find the lowest ranking fund that has a positive PI, and from which all funds above it have positive PIs. From Table 20 we see that this cut-off fund is 10 years old, has a TVPI of 1.99 and is ranked as number 23. The age of the 23 highest ranking funds vary between two and 17 with a mean of 8.1. The cut-off fund only marks the lowest TVPI multiple from which all funds above have positive PIs. In fact, eight funds with lower TVPIs have positive PIs. The age of these funds vary between two and 14 with a mean of 5.5.

In relation to the eight percent effective rate of return multiple of 2.16, it is interesting to observe that, even with a cost of capital of 15 percent, three funds aged above 10 and with multiples below 2.16 have positive PIs. The mismatch can be explained by the cash flow characteristics of PE investments. The eight percent effective rate of return multiple assumes that all capital is invested at the inception of the fund and returned after 10 years. Table 6 shows that this assumption poorly describes the cash flow characteristics of PE funds. On average, they invest in fairly even rates during the first years with contributed capital approaching committed capital after four years. Distributions are in general made from year three, and become larger than committed capital from year five. Thus, the effective investment periods are shorter than the funds' age, and comparing the simplified effective rate of return multiples to TVPI will underestimate the performance of funds.

In order to find a TVPI that corresponds to a positive PI 15%, given the age of the fund and the cash flow characteristics of PE investments, we run an OLS regression with PI 15% as the dependent variable and age and TVPI as independent variables. The regression coefficients of age and TVPI are -0.0422 and 0.618 with an intercept of -0.655. Based on the regression coefficients, we find the TVPIs that return PIs equal to zero, given the age of the fund. For 10 year old funds, the required TVPI becomes 1.74, which is lower than the 1.99 TVPI of the cut-off fund. Comparing the observed TVPIs to the estimates of required TVPIs, given the

age of the funds, we find that the residuals give the same qualitative interpretation as the observed PIs for 66 funds. Three funds with positive residuals have negative PIs, and two funds with negative residuals have positive PIs.

The simple regression above suggests that funds younger than 14 years returning a TVPI above two have positive PIs assuming a cost of capital of 15 percent. Together with the observation of all funds with TVPIs above 1.99 having positive PIs, a TVPI of two could be considered satisfactory. However, this is meant as rule of thumb, and all funds should be evaluated separately by PI or other performance measures.

7.4 Strategic Timing and Sensitivity to Additional Distributions

When evaluating fund performance, measures that align the interests of LPs and GPs should be used in order to prevent opportunistic behavior from the GP. To illustrate the potential severity of these issues, we study how the performance measures behave when an additional distribution is offered at two different points in a fund's life. In our first scenario the additional distribution is paid out three years after the funds first cash flow, representing an attempt of strategic timing of the cash flow. In the second scenario, the additional cash flow is offered as a final cash flow 10 years after inception, to see how sensitive the different performance measures are to late distributions.

The funds we use are both 1998 vintages and have IRRs of 17 and 31 percent which roughly represents the full sample mean and the upper quartile. Table 21 displays the funds' observed performance together with the performance following the additional distribution after three or 10 years. The additional distribution varies from 11 to 91 percent of committed capital. The table also relates the NPV of the distribution in year 10 to the distribution in year three, after assuming a cost of capital of 12 percent. For example, a distribution of 51 percent of committed capital 10 years from inception has a NPV equal to 23 percent of committed capital paid out in year three.

From the table, we see that IRR is highly sensitive to the timing of the cash flows. In the first scenario, the IRR almost doubles for fund A, and more than doubles for fund B, following a distribution of 91 percent of committed capital. The same distribution will only increase the IRRs with 10 and 26 percent respectively, if it is paid out after 10 years. The NPV of the late distribution is 0.41 percent of committed capital, less than half of the NPV, if it is paid out in year three. The reduced increases in the IRRs are therefore partly a reflection of the reduced NPV. However, we see that IRRs following an early distribution of 23 percent of committed

capital are equal to or higher than those of the late distribution of 91 percent of committed capital for both funds. Based on IRR, GPs in these funds will therefore prefer the distribution of 23 percent of committed capital in year three, even though it means giving up a NPV equal to 18 percent of committed capital.

In contrast to IRR, which can induce GPs to exit investments too early, TVPI can cause GPs to exit investments too late. TVPI is maximized when investments are held until absolute returns become negative, regardless of the time-value of money. We see from the table that, while going from a 51 percent of committed capital distribution in year three to a 91 percent of committed capital distribution in year 10 reduces the NPV by 10 percent of committed capital, TVPI increases with nine percent for fund A and 13 percent for fund B.

Though complementing IRR with TVPI as performance measures may provide the GPs with incentives more aligned with the interests of the LPs, the fact that none of them assumes a cost of capital ex ante calls for the use of alternative performance measures. Table 21 shows that all of the alternative performance measures favor the highest NPV solution, but to varying degrees. MIRR with a reinvestment rate of 12 percent shows only marginally higher values, choosing the late 0.91 alternative over the 0.23 pay-out after three years.

Table 21 also shows the weakness of IRR in providing incentives as funds reach a mature age. An additional distribution of 91 percent of committed capital will increase IRR from 31 to 34 percent for fund A, and from 17 to 21 percent for fund B. This corresponds to the 10 and 26 percent increases mentioned earlier. Comparing these percentage increases to those of the alternative performance measures, we see that except for MIRR, all of the alternative performance measures have higher percentage increases than IRR, indicating a higher sensitivity to late distributions. Table 22 displays the mean percentage change in performance for mature funds with IRRs higher than 10 percent, following a distribution of one percent of committed capital at the reporting date. Although the mean percentage change for IRR is higher than some of the alternative performance measures, we confirm that the alternative measures do have higher sensitivity to late distribution by comparing the minimum and median changes, which are higher than IRR for all measures

Even if the alternative performance measures favor the highest NPV solution and in general show a higher sensitivity to late distributions, Table 21 illustrates issues that need to be addressed. PI, PME and the ICM Excess measures are all linked to the return on the MSCI Nordic index. This link will in some situations lead to misguided performance appraisals. For

example, we see that the PI for fund B is more than twice as large as that of fund A in spite of fund A having a higher IRR and TVPI than fund B. Only nine months separate the funds initial cash flows, and using an index return as the cost of capital seems fair. However, fund A has last reporting date at the end of 2007, while fund B has last reporting date at the end of 2008. Between these reporting dates the MSCI Nordic plummeted by 46 percent, causing the discount rate for distributions to fall from 11.5 to 3.5 percent. The turbulence also caused the discount rate for contributions to increase from 4.9 to 5.3 percent. The higher PI for fund B is therefore a result of more favorable discount rates. Both PME and ICM Excess MIRR evaluate the performance of fund A to be greater than fund B. The difference between the PI, the PME and the ICM measures is that the last two control for the timing of the cash flows, while PI only uses the inception date and reporting date as reference points when finding the opportunity cost of not investing in a public market. The conflicting results, together with the lower rank correlations for PI, illustrate the importance of having benchmarks that control for the timing of the cash flows.

Although PME and ICM Excess IRR consider the timing of the cash flows, we see that these measures are also capable of misinterpreting performance. For fund B, these measures show a higher response to a late distribution than an early distribution, despite the early distribution having a NPV more than twice as large as the late distribution. The controversial response is a consequence of the late distribution coming after the plunge in the MSCI Nordic, thereby having a relatively larger effect on the terminal value of the index portfolio.

MIRR is calculated independently of market returns and even though it does not improve much on IRR concerning late distributions, it provides the GPs with the incentives to keep investments until the marginal return equals the assumed cost of capital. However, in contrast to IRR, MIRR also show small changes following an early distribution. While an early distribution of 91 percent of committed capital increases IRR by almost 30 percentage points for fund A, MIRR increases by only 4 percentage points. Further, deferring the distribution seven years and losing more than half of the NPV, only reduces the MIRR by 2 percentage points. Unless LPs realize that small increases in MIRR imply significant value enhancement, good performance will not be properly appreciated. As a consequence, MIRR may not provide the adequate incentives for the GP, who might feel incapable of affecting the performance.

8. Conclusion

Based on a unique dataset of PE funds raised between 1990 and 2008, we analyze how the choice of performance measures shape the appraisal of fund performance. Having cash flows with exact dates, net of fees and carried interest, we are able to compare the standard performance measures, IRR and TVPI, to the alternative performance measures MIRR, PI, ICM and PME, from a LP perspective. The cash flows also enable us to document characteristics of PE investments which complicate appraisal of fund performance.

In general it takes four years for funds to be fully invested, while distributions are paid out from year three throughout the fund's life, making performance measurement difficult by any measure until the fund reaches a mature age. Furthermore, we document large variation in vintage performance, and some differences in performance between investment stage, suggesting that fund performance should be evaluated on a same vintage and stage basis. This often reduces the number of comparable funds for the limited partner.

We document high rank correlations coefficients between the six performance measures, indicating that ranking the funds by the different performance measures would yield almost identical results. However, the rank correlation against the MSCI Nordic illustrates an important difference between the performance measures. While the absolute performance measures IRR, TVPI and MIRR have rank correlations close to 0.4, the relative performance measures PI, ICM and PME have rank correlation coefficients closer to zero, showing their attempt at explaining performance in the relation to a public index.

Although rank correlations among the different performance measures are high, we see that different funds are included in a portfolio of top quartile funds. The appraisal of fund performance is thus different. Leaving out young funds, whose performance is difficult to measure because of the cash flow characteristics of PE, will increase correlation between the performance measures and also increase rank correlation slightly. This specification leads to a generally higher degree of consistency in choosing top performers between the measures. Even so, the fact that the performance measures are not fully consistent when ranking funds, leads to more than 40 percent of the funds in our sample qualifying as top quartile fund by at least one of the performance measures. This can in part explain the weak efficiency of the generic selection rule of investing in funds of GPs, whose previous funds rank as top quartile.

Finally, we illustrate how the reinvestment rate assumption underlying IRR causes fund performance to appear more dispersed than they truly are. The alternative measures improve

on IRR in providing incentives to keep investments that return above the cost of capital. However, the relative performance measures introduce new difficulties related to the benchmark, which under certain circumstances yields misguided performance appraisal.

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Figures and Tables

Table 1

Table 1. Descriptive Statistics - Stage and Committed Capital

The dataset contains cash flow data from 71 private equity funds, raised between 1990 and 2008, managed by 23 fund managers. The source is the records of the Limited Partners. The table shows the sample broken down by vintage year and fund investment stage. 23.9 % of the funds are classified as Early Stage funds, 16.9 % as Later Stage, 12.7 % as Balanced Stage, 9.9 % as Generalist, and 36.6% Buyouts. The classifications are the ones reported by VentureXpert, except that Early Stage also includes the VentureXpert category Development and that Later Stage also includes the VentureXpert category Expansion. Vintage year is determined by the first reported cash flow. The table also shows total committed capital by limited partners in the funds, as reported by VentureXpert, for each Vintage. All monetary numbers are in nominal Euros. To protect the identy of funds, committed capital is not listed when the fund is the only one in its vintage (*) and total, mean and median committed capital for each vintage are rounded to the closest five.

		Stage Breakdown - No of funds					Funds	Committed Capital (MEUR Nominal)		
Vintage Year	Sample Size	Early Stage	Later Stage	Balanced Stage	Gener-alist	Buyouts	with CC data	Total	Mean	Median
1990	5			2	1	2	5	100	20	10
1991	1			1			1	*	*	*
1993	2	1				1	1	*	*	*
1994	1				1		1	*	*	*
1995	1			1			1	*	*	*
1996	3		1	1	1		3	90	30	25
1997	4	2			1	1	4	220	55	50
1998	10	2	3		1	4	10	1 400	140	65
1999	2	1			1		2	270	135	135
2000	3	1	1			1	3	900	300	55
2001	5	1	2			2	5	250	50	45
2002	4	1	1			2	4	700	175	170
2003	4	2				2	4	2 200	550	375
2004	3	2	1				3	135	45	45
2005	6	1		1	1	3	6	1 170	195	155
2006	9		2	2		5	9	9 405	1 045	405
2007	4	1	1	1		1	4	520	130	100
2008	4	2				2	4	5 000	1 250	315
Total	71	17	12	9	7	26	70	22 467.9	321.0	79.5
%	*100 %*	*23.9 %*	*16.9 %*	*12.7 %*	*9.9 %*	*36.6 %*	*98.6 %*			

Table 2

Table 2. Descriptive Statistics - Stage and Committed Capital

Table 2 shows Committed Capital broken down by investment stage for the total sample. We were not able to find Committed Capital for one of the Early Stage funds, causing the size of the category to be slightly understated. Combined commitments are approx. 22 billion Euros, of which 5.6 % are Early Stage, 6.3 % Later Stage, 2.8% Balanced Stage, 2.3% Generalist and 83.0 % Buyout stage investments. Also stated are numbers for all Northern European funds of the same categories for the vintages 1990-2008, collected from VentureXpert. The classifications are the ones reported by VentureXpert, except that Early Stage also includes the VentureXpert category Development and that Later Stage also includes the VentureXpert category Expansion. Compared to this, Buyouts and Later Stage are overrepresented, while Early Stage, Balanced Stage and Generalist are underrepresented in our sample.

Total Sample Size: 71			**Stage Breakdown - Committed Capital (MEUR Nominal)**									
	All Stages		**Early Stage**		**Later Stage**		**Balanced Stage**		**Generalist**		**Buyouts**	
	Mean	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**	**Mean**	**Median**
Committed Cap. (CC)	321.0	79.5	78.8	52.0	117.9	66.9	68.8	15.3	74.4	48.0	717.4	248.4
Total CC	22 467.9		1 261.4		1 414.3		619.1		521.1		18 652.0	
Funds	70		16		12		9		7		26	
% of funds	*98.6 %*		*22.5 %*		*16.9 %*		*12.7 %*		*9.9 %*		*36.6 %*	
% of CC	*100.0 %*		*5.6 %*		*6.3 %*		*2.8 %*		*2.3 %*		*83.0 %*	
% of funds. VX. N. Eur	*100.0 %*		*41.5 %*		*7.2 %*		*21.0 %*		*7.5 %*		*22.8 %*	
% of CC. VX. N. Eur	*100.0 %*		*11.9 %*		*5.6 %*		*12.4 %*		*8.4 %*		*61.7 %*	

Table 3

Table 3. Descriptive Statistics - Fund Status and Sequence Number

Table 3 shows the sample broken down by vintage year, fund status and sequence. A fund's status is deemed to be liquidated if reported liquidated by the general partner or if it satisfies both of the following criteria; age is above 10 years and unrealized holdings constitute less than 10 per cent of committed capital. 53 funds are active, while 18 are deemed liquidated. The funds in our sample span from first time funds to funds with a sequence number of 8. One fund has an undefined sequence number, 18.3% are first time funds, 23.9% are follow-on funds, 15.5 % are third sequence, 15.5% are fourth sequence funds and 22.5% are later-sequence funds.

		Fund Status		Sequence No.						
Vintage Year	Sample Size	Active	Liquidated	N/A	1	2	3	4	S>4	Mean Sequence No.
1990	5		5		4	1				1.2
1991	1		1				1			3.0
1993	2		2		1	1				1.5
1994	1		1			1				2.0
1995	1		1	1						-
1996	3	1	2		1		1	1		2.7
1997	4	2	2		1	1		1	1	3.0
1998	10	6	4		3	4	1	1	1	2.4
1999	2	2					1		1	4.0
2000	3	3					1	1	1	4.7
2001	5	5			2	1	2			2.0
2002	4	4					2		2	5.3
2003	4	4			1			2	1	3.5
2004	3	3				2		1		2.7
2005	6	6				2		2	2	4.2
2006	9	9				3	2	1	3	3.6
2007	4	4				1	1		2	4.0
2008	4	4					1	1	2	4.8
Total	71	53	18	1	13	17	13	11	16	3.2
%	*100 %*	*74.6 %*	*25.4 %*	*1.4 %*	*18.3 %*	*23.9 %*	*18.3 %*	*15.5 %*	*22.5 %*	

Table 4

Table 4. Fund Performance by Vintage Year

The table shows fund performance measured by the Internal Rate of Return (IRR), net of fees, sorted by vintage year. IRRs are calculated from the date of the first recorded cash flow to the end of the fund's life or last reporting date. Incapable of separating montly or quarterly cash flows reported by some managers into daily cash flows, we treat them as single cash flows occurring at the specific date reported. Vintage year is determined by the first reported cash flow. Pooled vintage performance is shown for the total sample, and is calculated using end-of month cash flows. The total sample displays a mean IRR of 16.43 %, while liquidated funds display a mean of 36.30 %.

			Internal Rate of Return (In Percent)								
Vintage	Sample Size	Funds with IRR data	Mean	SE Mean	StDev	Min.	First quartile	Median	Third quartile	Max.	Pooled
Panel A: Whole Sample											
1990	5	5	26.90	19.40	43.40	-32.70	-10.00	15.40	69.60	70.00	38.80
1991	1	1	-6.39	-	-	-6.39	-	-6.39	-	-6.39	-6.38
1993	2	2	57.20	26.10	37.00	31.00	-	57.20	-	83.30	53.42
1994	1	1	55.79	-	-	-	-	55.79	-	55.79	55.83
1995	1	1	185.76	-	-	-	-	185.76	-	185.76	187.66
1996	3	3	41.80	17.40	30.10	7.40	7.40	54.90	63.10	63.10	36.48
1997	4	4	45.20	29.20	58.30	-7.50	-5.60	38.20	102.80	111.60	19.84
1998	10	10	5.31	5.30	16.76	-24.92	-6.59	6.19	18.84	30.70	20.34
1999	2	2	6.77	8.49	12.00	-1.71	-	6.77	-	15.26	9.90
2000	3	3	9.07	7.32	12.68	-3.06	-3.06	8.05	22.23	22.23	20.49
2001	5	5	35.99	9.87	22.06	11.66	15.46	31.52	58.77	61.67	35.81
2002	4	4	37.10	17.00	34.00	-2.10	4.80	36.10	70.40	78.40	37.77
2003	4	4	34.00	14.80	29.50	-1.20	4.90	35.00	62.00	67.20	33.10
2004	3	3	0.53	6.34	10.98	-12.08	-12.08	5.70	7.96	7.96	2.07
2005	6	6	12.80	14.60	35.70	-13.20	-11.50	-3.60	41.80	78.10	6.20
2006	9	9	17.00	15.00	45.00	-23.30	-9.30	7.40	23.10	129.30	5.13
2007	4	4	-43.70	9.79	19.58	-66.52	-62.39	-44.12	-24.59	-20.04	-43.43
2008	4	4	-59.30	16.20	32.50	-93.20	-87.00	-64.40	-26.60	-15.40	-24.58
Total	71	71	16.43	5.37	45.29	-93.17	-7.42	8.60	31.52	185.76	26.98
%	*100 %*	*100.0 %*									
Panel B: Liquidated Funds											
1990	5	5	26.90	19.40	43.40	-32.70	-10.00	15.40	69.60	70.00	
1991	1	1	-6.39	-	-	-6.39	-	-6.39	-	-6.39	
1993	2	2	57.20	26.10	37.00	31.00	-	57.20	-	83.30	
1994	1	1	55.79	-	-	55.79	-	55.79	-	55.79	
1995	1	1	185.76	-	-	185.76	-	185.76	-	185.76	
1996	2	2	59.01	4.08	5.76	54.94	-	59.01	-	63.09	
1997	2	2	34.50	41.90	59.30	-7.50	-	34.50	-	76.40	
1998	4	4	-4.28	8.57	17.13	-24.92	-20.12	-4.59	11.86	16.97	
Total	18	18	36.30	12.40	52.50	-32.70	-5.90	24.00	69.30	185.80	
%	*25.4 %*	*25.4 %*									
Panel C: Active Funds											
1996	1	1	7.36	-	-	7.36	-	7.36	-	7.36	
1997	2	2	55.90	55.80	78.90	0.10	-	55.90	-	111.60	
1998	6	6	11.70	5.87	14.38	-9.22	0.53	10.26	26.01	30.70	
1999	2	2	6.77	8.49	12.00	-1.71	-	6.77	-	15.26	
2000	3	3	9.07	7.32	12.68	-3.06	-3.06	8.05	22.23	22.23	
2001	5	5	35.99	9.87	22.06	11.66	15.46	31.52	58.77	61.67	
2002	4	4	37.10	17.00	34.00	-2.10	4.80	36.10	70.40	78.40	
2003	4	4	34.00	14.80	29.50	-1.20	4.90	35.00	62.00	67.20	
2004	3	3	0.53	6.34	10.98	-12.08	-12.08	5.70	7.96	7.96	
2005	6	6	12.80	14.60	35.70	-13.20	-11.50	-3.60	41.80	78.10	
2006	9	9	17.00	15.00	45.00	-23.30	-9.30	7.40	23.10	129.30	
2007	4	4	-43.70	9.79	19.58	-66.52	-62.39	-44.12	-24.59	-20.04	
2008	4	4	-59.30	16.20	32.50	-93.20	-87.00	-64.40	-26.60	-15.40	
Total	53	53	9.68	5.63	40.95	-93.17	-10.09	7.36	25.39	129.34	
%	*74.6 %*	*74.6 %*									

Table 5

Table 5. Fund Performance by Fund Age

The table shows fund performance measured by the Internal Rate of Return (IRR), net of fees and carried interest, sorted by age. IRRs are calculated in the same manner as in table 4. Fund Age is calculated from the first to last reported cash flow, and is subsequently rounded. Subdivisons by Age are based on an age variable that is not rounded. The pattern of Mean IRR's is consistent with the J-curve, showing negative IRRs of young funds and increasing IRRs with age.

			Internal Rate of Return (In Percent)							
Fund Age	Sample Size	Funds with IRR data	Mean	SE Mean	StDev	Min.	First quartile	Median	Third quartile	Max.
0	2	2	-54.30	38.90	55.00	-93.20	-	-54.30	-	-15.40
1	4	4	-53.80	11.40	22.80	-68.40	-67.90	-63.50	-30.10	-20.00
2	8	8	18.50	21.00	59.30	-50.00	-29.50	5.80	63.80	129.30
3	9	9	19.80	21.60	64.90	-23.30	-14.20	-7.40	27.50	185.80
4	6	6	9.45	6.45	15.79	-12.08	-2.86	6.83	25.44	31.52
5	5	5	54.26	3.78	8.45	46.62	46.65	54.94	61.52	67.18
6	6	6	19.10	12.50	30.60	-3.10	-2.40	9.00	38.20	76.40
7	8	8	31.40	11.60	32.80	-3.50	4.90	16.90	67.30	78.40
8	3	3	-9.70	13.10	22.70	-32.70	-32.70	-9.20	12.60	12.60
9	6	6	-2.86	5.63	13.79	-24.92	-11.83	-3.71	9.34	15.26
10	7	7	12.33	4.93	13.04	-6.39	0.06	11.92	24.45	30.70
11	1	1	111.64	-	-	111.64	-	111.64	-	111.64
12	1	1	63.09	-	-	63.09	-	63.09	-	63.09
13	1	1	83.32	-	-	83.32	-	83.32	-	83.32
14	2	2	43.40	12.40	17.50	31.00	-	43.40	-	55.80
16	1	1	15.36	-	-	15.36	-	15.36	-	15.36
17	1	1	69.98	-	-	69.98	-	69.98	-	69.98
Total	71	71	16.43	5.37	45.29	-93.17	-7.42	8.60	31.52	185.76
%	*100 %*	*100.0 %*								
Subdivisons by Age										
5-10 years	27	27	18.81	5.89	30.59	-32.67	-3.06	11.66	46.69	78.36
% of total	*38.0 %*									
7-10 years	14	14	6.38	6.23	23.30	-32.67	-6.15	5.57	17.00	61.67
% of total	*19.7 %*									
Above 10 y	14	14	36.89	9.27	34.67	-6.39	11.09	27.57	64.81	111.64
% of total	*19.7 %*									

Table 6

Table 6. Cumulative Contributions and Distributions by Fund Age

The table shows cumulative contributions and distributions in relation to committed capital. The general partner calls on predetermined capital committed by the limited partners as portfolio investments are made. The youngest funds are far from being fully invested, but cumulative contributions approach committed capital at four years of age. Distributions from the liquidation of portfolio investments start to appear after the funds have existed for a few years. A major increase in distributions is apparent in funds older than 4.5 years (Fund Age is rounded) . There are 10 funds for which we cannot calculate Contributions/Distributions and one fund for which we did not find committed apital.

			Mean	
Fund Age	Sample Size	Funds with Contr./Distr./ CC Data	Cumulative Contributions / Committed Capital	Cumulative Distributions / Committed Capital
0	2	2	0.10	0.00
1	4	4	0.26	0.00
2	8	8	0.46	0.04
3	9	8	0.69	0.56
4	6	6	0.93	0.12
5	5	5	0.79	1.43
6	6	5	0.98	1.68
7	8	7	0.66	1.10
8	3	3	0.91	0.98
9	6	5	0.86	0.62
10	7	5	1.20	1.81
11	1	0	-	-
12	1	0	-	-
13	1	1	1.12	4.15
14	2	0	-	-
16	1	0	-	-
17	1	1	0.79	4.85
Total	71	60	0.74	0.88
%	*100 %*	*84.5 %*		

Table 7

Table 7. Cumulative Distributions by Age and Sequence Number

The table shows distributions in relation to committed capital, broken down by age and sequence. Fund Age is a rounded variable. First and second sequence funds are grouped to show differences against later sequence funds. There is no obvious difference between early and higher sequence funds in distributions of capital.

		Funds with Contr./		Mean Cumulative Distributions / Commited Capital by Sequence No.							
Fund Age	Sample Size	Distr./CC. Data		N/A	S = 1	S= 2	S = 3	S = 4	S > 4	S = 1 & 2	S > 2
0	2	2						0.00	0.00		0.00
1	4	4					0.00		0.00		0.00
2	8	8				0.02	0.03	0.21	0.01	0.02	0.05
3	9	8		3.97		0.02	0.00	0.00	0.16	0.02	0.08
4	6	6				0.03	0.04	0.00	0.58	0.03	0.21
5	5	5			0.96	0.43	0.91	2.42		0.70	1.92
6	6	5			3.78			0.34	0.25	3.78	0.28
7	8	7			1.47	0.62	1.06	1.81		0.91	1.25
8	3	3			0.56	2.09			0.29	1.33	0.29
9	6	5			0.52	0.76	0.69		0.61	0.60	0.65
10	7	5			2.72	0.73	2.45	-		1.39	2.45
11	1	0						-			
12	1	0					-				
13	1	1				4.15				4.15	
14	2	0			-	-					
16	1	0			-						
17	1	1			4.85					4.85	
Total	71	60		3.97	2.13	0.69	0.81	0.80	0.18	1.23	0.56
%	*100 %*	*84.5 %*	*N*	*1*	*9*	*15*	*12*	*9*	*14*	*24*	*35*

Table 8

Table 8. IRR by Age and Sequence Number

The table shows mean fund IRRs, broken down by age and sequence. Fund Age is a rounded variable. First and second sequence funds are grouped to show differences against later sequence funds. The apparent trend of decreasing IRRs with increases in vintage is an implication of the J-curve pattern and that the early sequence funds are older. There is no easily detectable difference in performance between early and higher sequence funds, when comparing IRRs of same age funds.

			Mean IRR by Sequence No. (In Percent)							
Fund Age	Sample Size	Funds with IRR Data	N/A	S = 1	S= 2	S = 3	S = 4	S > 4	S = 1 & 2	S > 2
0	2	2				-44.20	-93.17	-15.36		-54.30
1	4	4				1.21		-63.47		-53.80
2	8	8			37.30	-23.27	78.10	-14.30	37.30	7.30
3	9	9	185.76		-0.03	31.52	6.10	1.20	-0.03	-1.27
4	6	6			4.63	46.69	-12.08	23.41	4.63	14.30
5	5	5		46.62	55.87	32.70	61.06		51.24	56.27
6	6	6		47.80			-1.22	6.76	47.80	4.77
7	8	8		65.40	0.16	32.70	22.23		32.80	30.10
8	3	3		-32.67	12.65			-9.22	-10.00	-9.22
9	6	6		-8.80	-5.71	-1.71		3.90	-7.76	2.03
10	7	7		20.71	5.99	12.20	8.60		13.35	11.00
11	1	1					111.64			111.64
12	1	1				63.09				63.09
13	1	1			83.32				83.32	
14	2	2		31.03	55.79				43.40	
16	1	1		15.36					15.36	
17	1	1		69.98					69.98	
Total	71	71	185.76	29.28	20.00	11.70	22.60	-8.72	24.02	6.51
%	*100 %*	*100.0 %* *N*	*1*	*13*	*17*	*13*	*11*	*16*	*30*	*40*

Table 9

Table 9. Performance by Stage

The table shows mean fund IRRs broken down by investment stage, and sorted by age groups (based on an age variable that is not rounded). Funds classified as Generalist and Buyouts display higher IRRs than funds classified as investing in other stages.

Sample Size: 71

	Mean IRR (In Percent) by Stage									
Age	**Early Stage**		**Later Stage**		**Balanced Stage**		**Generalist**		**Buyouts**	
	No.		*No.*		*No.*		*No.*		*No.*	
0-2	*3*	-55.69	*3*	-13.30	*4*	24.30	*1*	78.10	*9*	2.80
3-5	*5*	9.70	*2*	18.60	*2*	27.60	-	-	*6*	32.49
6-8	*6*	13.00	*3*	25.50	*2*	-10.00	*1*	15.26	*5*	30.70
Above 9	*3*	7.30	*4*	4.52	*1*	-6.39	*5*	50.90	*6*	37.60
All funds	*17*	-1.1	*12*	9.4	*9*	14.0	*7*	49.7	*26*	23.0
% of total	*21.1 %*		*19.7 %*		*12.7 %*		*9.9 %*		*36.6 %*	

Table 10

Table 10. Performance by Committed Capital

The table shows IRRs of funds of different size. They are grouped according to committed capital (CC) in MEUR.

Sample Size: 71				
	IRR (in percent) by Committed Capital			
	0<CC<50	**50<CC<150**	**150<CC<500**	**500<CC**
Mean	25.4	15.2	10.2	7.6
StDev	46.2	53.2	36.1	29.3
Median	11.8	3.8	8.2	15.7
No. Funds	22	27	12	10
% of total	*31.0 %*	*38.0 %*	*16.9 %*	*14.1 %*

Table 11, a and b

Table 11a. Rank Correlation Based on Different Performance Measures

The table presents Spearman's rank correlation coefficients between different performance measures. MIRR is applied using three different investment-/reinvestment rates: 0%, 8 % and 12 %. PI, PME, ICM Excess IRR and ICM Excess MIRR are calculated using the same period return on the MSCI Nordic Index. Point estimates replace 10 missing observations of TVPI. The point estimates are found by running a regression with TVPI as dependent variable and a new multiple, calculated as the sum of all net positive cash flows divided by the sum of all net negative cash flows, as the independent variable. In the cases that do not contain missing values, 99,6 per cent of the variation in TVPI is explained by the independent variable. ICM Excess IRR cannot be computed for 8 funds. The table also shows the rank correlation coefficients against the ranked return on the MSCI Nordic during the fund life.

Sample Size: 71

	Rank Correlation Matrix								
Measure	**IRR**	**TVPI**	**MIRR 0%**	**MIRR 8%**	**MIRR 12%**	**PI L&R**	**PME K&S**	**ICM Excess IRR**	**ICM Excess MIRR**
IRR									
TVPI	0.94								
MIRR 0%	0.97	0.92							
MIRR 8%	0.97	0.92	0.99						
MIRR 12%	0.97	0.92	0.99	1.00					
PI L&R	0.74	0.79	0.73	0.73	0.73				
PME K&S	0.83	0.85	0.81	0.82	0.82	0.90			
ICM Excess IRR	0.64	0.60	0.65	0.64	0.64	0.71	0.82		
ICM Excess MIRR	0.79	0.77	0.80	0.80	0.80	0.83	0.91	0.93	
Mean	0.86	0.84	0.86	0.86	0.86	0.77	0.85	0.70	0.83
MSCI Nordic	0.43	0.41	0.40	0.43	0.44	-0.15	0.05	-0.15	0.06

Table 11b. Rank Correlation Based on Different Performance Measures

Several of the performance measures are not suited to analyze young funds. Distributions are small during the early years of a fund's life and stale valuation may affect NAV. Looking at funds with a short life may also cause the market related measures to produce results that are of little value when considering fund performance. To correct for this, we have excluded funds that are younger than four years. The cutoff value of four years, reduces the sample to 44 funds. The table presents Spearman's rank correlation coefficients between different performance metrics, for the reduced sample. Point estimates replace 9 missing observations of TVPI. ICM Excess IRR cannot be computed for 7 funds.

Sample Size: 44

	Rank Correlation Matrix								
Measure	**IRR**	**TVPI**	**MIRR 0%**	**MIRR 8%**	**MIRR 12%**	**PI L&R**	**PME K&S**	**ICM Excess IRR**	**ICM Excess MIRR**
IRR									
TVPI	0.96								
MIRR 0%	0.93	0.91							
MIRR 8%	0.94	0.92	0.99						
MIRR 12%	0.95	0.92	0.98	1.00					
PI L&R	0.88	0.88	0.85	0.86	0.85				
PME K&S	0.91	0.91	0.85	0.87	0.88	0.91			
ICM Excess IRR	0.81	0.76	0.83	0.82	0.81	0.78	0.84		
ICM Excess MIRR	0.93	0.91	0.94	0.94	0.94	0.90	0.95	0.90	
Mean	0.91	0.90	0.91	0.92	0.91	0.86	0.89	0.82	0.93
MSCI Nordic	0.08	0.10	0.02	0.08	0.11	-0.30	-0.13	-0.26	-0.09

Table 12, a and b

Table 12a. Rank Correlation Based on Different Performance Measures

The table presents 99 percent confidence intervals of the Spearman rank correlation coefficients in Table 11a, found using Fisher's z transformation. The transformation converts Spearman rank correlations to the normally distributed variable z, which is used to determine the confidence intervals. These intervals have been converted back to Spearman rhos. The full sample of 71 funds is used. The confidence interval for ICM Excess IRR is determined using 63 funds, as the measure cannot be computed for 8 funds. Lower and upper limits of the confidence intervals are denoted l and u, respectively.

Sample Size: 71

	Confidence Intervals															
Measure	**IRR**		**TVPI**		**MIRR 0%**		**MIRR 8%**		**MIRR 12%**		**PI L&R**		**PME K&S**		**ICM Excess IRR**	
Limit	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**
IRR																
TVPI	0.89	0.97														
MIRR 0%	0.95	0.99	0.87	0.96												
MIRR 8%	0.95	0.99	0.88	0.96	0.99	1.00										
MIRR 12%	0.95	0.99	0.87	0.96	0.98	0.99	1.00	1.00								
PI L&R	0.56	0.85	0.59	0.86	0.55	0.85	0.55	0.85	0.54	0.84						
PME K&S	0.71	0.91	0.74	0.92	0.68	0.90	0.69	0.90	0.70	0.90	0.83	0.95				
ICM Excess IRR	0.41	0.79	0.49	0.82	0.43	0.80	0.42	0.79	0.41	0.79	0.51	0.83	0.69	0.90		
ICM Excess MIRR	0.64	0.88	0.67	0.89	0.66	0.89	0.66	0.89	0.66	0.89	0.70	0.90	0.84	0.95	0.88	0.96

Table 12b. Rank Correlation Based on Different Performance Measures

The table presents 99 percent confidence intervals of the Spearman rank correlations for the reduced sample, consisting of funds older than four years. The confidence intervals are found using Fisher's z transformation. The confidence interval for ICM Excess IRR is determined using 37 funds, as the measure cannot be computed for 7 funds.

Sample Size: 44

	Confidence Intervals															
Measure	**IRR**		**TVPI**		**MIRR 0%**		**MIRR 8%**		**MIRR 12%**		**PI L&R**		**PME K&S**		**ICM Excess IRR**	
Limit	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**	**l**	**u**
IRR																
TVPI	0.89	0.97														
MIRR 0%	0.95	0.99	0.87	0.96												
MIRR 8%	0.95	0.99	0.88	0.96	0.99	1.00										
MIRR 12%	0.95	0.99	0.87	0.96	0.98	0.99	1.00	1.00								
PI L&R	0.56	0.85	0.59	0.86	0.55	0.85	0.55	0.85	0.54	0.92						
PME K&S	0.71	0.91	0.74	0.92	0.68	0.90	0.69	0.90	0.70	0.93	0.83	0.95				
ICM Excess IRR	0.41	0.79	0.49	0.82	0.43	0.80	0.42	0.79	0.41	0.89	0.51	0.83	0.69	0.90		
ICM Excess MIRR	0.64	0.88	0.67	0.89	0.66	0.89	0.66	0.89	0.66	0.97	0.70	0.90	0.84	0.95	0.88	0.96

Table 13, a and b

Table 13a. Correlation Between Different Performance Measures

The table presents correlation coefficients between different performance measures. MIRR is applied using three different investment-/reinvestment rates: 0%, 8 % and 12 %. PI, PME, ICM Excess IRR and ICM Excess MIRR are calculated using the same period return on the MSCI Nordic Index. TVPI cannot be computed for 10 funds, but these missing values are replaced by point estimates of TVPI (ref. Table 11a). ICM Excess IRR cannot be computed for 8 funds. The table also shows the correlation coefficients against the return on the MSCI Nordic during the fund life.

Sample Size: 71.

	Correlation Matrix								
Measure	**IRR**	**TVPI**	**MIRR 0%**	**MIRR 8%**	**MIRR 12%**	**PI L&R**	**PME K&S**	**ICM Excess IRR**	**ICM Excess MIRR**
IRR									
TVPI	0.64								
MIRR 0%	0.88	0.49							
MIRR 8%	0.89	0.50	1.00						
MIRR 12%	0.90	0.51	1.00	1.00					
PI L&R	0.61	0.91	0.50	0.50	0.50				
PME K&S	0.53	0.90	0.38	0.39	0.40	0.83			
ICM Excess IRR	0.66	0.23	0.60	0.60	0.60	0.37	0.61		
ICM Excess MIRR	0.85	0.50	0.83	0.83	0.83	0.58	0.50	0.90	
Mean	0.75	0.59	0.71	0.72	0.72	0.60	0.57	0.57	0.73
MSCI Nordic	0.58	0.26	0.69	0.70	0.70	0.05	0.10	-0.03	0.26

Table 13b. Correlation Between Different Performance Measures

The table presents correlation coefficients between the performance metrics for the reduced sample of 44 funds, consisting of funds older than four years. Point estimates replace 9 missing observations of TVPI. ICM Excess IRR cannot be computed for 7 funds.

Sample Size: 44.

	Correlation Matrix								
Measure	**IRR**	**TVPI**	**MIRR 0%**	**MIRR 8%**	**MIRR 12%**	**PI L&R**	**PME K&S**	**ICM Excess IRR**	**ICM Excess MIRR**
IRR									
TVPI	0.82								
MIRR 0%	0.85	0.71							
MIRR 8%	0.88	0.73	0.99						
MIRR 12%	0.89	0.73	0.98	1.00					
PI L&R	0.80	0.93	0.79	0.80	0.80				
PME K&S	0.69	0.92	0.55	0.57	0.57	0.82			
ICM Excess IRR	0.73	0.49	0.71	0.69	0.67	0.46	0.63		
ICM Excess MIRR	0.89	0.75	0.93	0.93	0.93	0.80	0.66	0.82	
Mean	0.82	0.76	0.81	0.82	0.82	0.77	0.68	0.65	0.84
MSCI Nordic	0.06	0.03	-0.02	0.03	0.05	-0.23	-0.03	-0.26	-0.11

Table 14, a and b

Table 14a. Ranked Fund Performance

The table shows the 18 top performing funds (top quartile) according to the IRR measure, and the rank these funds acheive by other measures. TVPI cannot be computed for 10 funds (*). Point estimates replace the missing values (ref Table 11a). ICM Excess IRR cannot be computed for 8 funds (-).

Sample Size: 71

Individual Fund Performance Ranked by Perfomance Metrics

IRR	TVPI	MIRR 0%	MIRR 8%	MIRR 12%	PI L&R	PME K&S	ICM Excess IRR	ICM Excess MIRR	Age
1	9	2	2	2	16	10	-	2	2.9
2	29	1	1	1	6	5	1	1	1.9
3	1*	5	5	5	1	1	-	3	10.8
4	7	21	19	18	19	8	-	20	12.6
5	4	6	6	6	3	2	18	6	6.6
6	22	4	4	4	40	26	3	8	2.2
7	2	3	3	3	2	3	28	5	6.1
8	3	20	17	16	4	4	-	14	17.0
9	10	12	12	10	9	6	-	7	6.6
10	8	7	7	7	7	9	19	10	5.0
11	5*	17	15	15	8	17	37	29	12.0
12	15*	15	14	14	5	11	22	22	7.0
13	12	11	9	8	12	16	5	12	5.3
14	6*	22	21	20	10	15	36	26	14.3
15	13	9	8	9	18	25	24	21	5.0
16	18	10	11	11	14	23	13	13	5.3
17	14	13	13	13	38	21	9	15	4.8
18	17	8	10	12	17	14	12	11	4.1

Table 14b. Ranked Fund Performance

Several of the performance measures are not suited to analyze young funds. Distributions are small during the early years of a fund's life and stale valuation may affect NAV. Looking at funds with a short life may also cause the market related measures to produce results that are of little value when considering fund performance. To correct for this, we have excluded funds that are younger than four years. The cutoff value of four years reduces the sample to 44 funds. Among these, there are 9 funds where TVPI is estimated (*) and 7 funds for which we cannot compute ICM Excess IRR (-). The 18 funds that are presented below correspond to just over 40 per cent of funds in the new sample.

Sample Size: 44

Individual Fund Performance Ranked by Perfomance Metrics

IRR	TVPI	MIRR 0%	MIRR 8%	MIRR 12%	PI L&R	PME K&S	ICM Excess IRR	ICM Excess MIRR	Age
1	1*	2	2	2	1	1	-	1	10.8
2	7	16	15	14	17	7	-	12	12.6
3	4	3	3	3	3	2	6	3	6.6
4	2	1	1	1	2	3	14	2	6.1
5	3	15	13	13	4	4	-	9	17.0
6	9	9	9	7	8	5	-	4	6.6
7	8	4	4	4	6	8	7	5	5.0
8	5*	13	12	12	7	14	22	17	12.0
9	14*	11	11	11	5	9	9	14	7.0
10	11	8	6	5	11	13	1	7	5.3
11	6*	17	16	16	9	12	21	15	14.3
12	12	6	5	6	16	21	10	13	5.0
13	17	7	8	8	13	19	5	8	5.3
14	13	10	10	10	27	17	2	10	4.8
15	16	5	7	9	15	11	4	6	4.1
16	25	30	25	23	31	25	16	25	14.0
17	15	19	18	17	22	6	-	11	9.9
18	18*	12	14	15	19	24	12	19	6.3

Table 15

Table 15. Differences in Rank across Quartiles

The table shows the absolute difference in ranking towards IRR. It is expressed by their mean differences and standard deviations, by quartiles, when ranked by IRR. The sample of funds are those above four years. The performance measures are generally more consistent in ranking funds that are in the top and bottom quartile, compared to those in the middle.

Sample Size: 44

	Difference against IRR									
	TVPI		MIRR 8%		PI L&R		PME K&S		ICM Excess MIRR	
	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev
Top Quartile	2.55	1.81	4.18	3.60	1.82	1.99	2.64	4.25	3.73	3.26
3. Quartile	3.27	3.23	4.27	2.87	6.45	3.86	6.45	5.80	5.18	3.84
2. Quartile	2.55	4.32	0.64	0.81	5.09	3.11	4.91	3.86	3.36	2.11
Bottom Quartile	1.27	1.27	3.09	2.98	3.00	2.61	3.82	3.82	2.64	1.80

Table 16

Table 16. Overlap in Top Quartile Rank

The table presents the number and percentage of funds that overlap funds defined as top quartile according to other performance measures. The total sample of 71 funds is used, and 18 funds are defined as top quartile by each measure. ICM Excess IRR is not shown, as eight funds do not have defined values. The order in which the measures are listed deviates from the other tables, in order to show additions to funds defined "top quartile in at least one measure". 30 funds are defined as top quartile by at least one measure. The figure for TVPI in this column represents the total of funds defined as top quartile by either IRR, MIRR 12%, MIRR 8 %, MIRR 0% or TVPI, and not the number of funds defined as top quartile by only IRR or TVPI (which would be 18 +2 = 20).

Sample Size: 71

	Overlap in Top Quartile Rank														Top Quatile in at least One Measure	Of Total Sample (In Percent)
Measure	IRR		MIRR 12%		MIRR 8%		MIRR 0%		TVPI		PME K&S		PI L&R			
	No	Perc	No	Perc	No	Perc	No	Perc	No	Perc	No	Perc	No	Perc		
IRR															18	25.4
MIRR 12%	17	94.4													19	26.8
MIRR 8%	16	88.9	17	94.4											20	28.2
MIRR 0%	15	83.3	16	88.9	17	94.4									21	29.6
TVPI	16	88.9	15	83.3	14	77.8	13	72.2							23	32.4
PME K&S	14	77.8	14	77.8	13	72.2	12	66.7	14	77.8					25	35.2
PI L&R	15	83.3	14	77.8	14	77.8	13	72.2	14	77.8	15	83.3			26	36.6
ICM Excess MIRR	13	72.2	14	77.8	14	77.8	13	72.2	12	66.7	12	66.7	11	61.1	29	40.8

Table 17, a and b

Table 17a. Consistency Ratio: Consistency in Relative Performance between Measures

The table displays the consistency in which the performance measures describe a fund's performance relative to the performance of its vintage. What we denote Consistency Ratio, is the ratio in which two different measures at the same time determine that a fund has performed either better or worse than their corresponding vintage medians. A ratio of 1 indicates full agreement between two measures. Vintages with only one fund are left out of the analysis, and the sample size is reduced to 68 funds. ICM Excess IRR is not displayed because it cannot be calculated for several funds. 54 out of 68 funds are evaluated consistently across all measures.

Sample Size: 68. Unchanged: 54. Total Consitency Ratio: 0.79

	Consitency Ratio towards Median Vintage Performance					
Measure	**IRR**	**TVPI**	**MIRR 8%**	**PI L&R**	**PME K&S**	**ICM Excess MIRR**
IRR						
TVPI	0.94					
MIRR 8%	0.94	0.94				
PI L&R	0.90	0.90	0.90			
PME K&S	0.88	0.88	0.85	0.96		
ICM Excess MIRR	0.91	0.91	0.88	0.93	0.94	
Mean	0.91	0.91	0.90	0.91	0.90	0.91

Table 17b. Consistency Ratio: Consistency in Relative Performance between Measures

The table shows Consitency Ratios for funds older than four years. The sample size consists of 42 funds, after removing funds that are the only one in its vintage.

Sample Size: 42. Unchanged: 35. Total Consitency Ratio: 0.83

	Consitency Ratio towards Median Vintage Performance					
Measure	**IRR**	**TVPI**	**MIRR 8%**	**PI L&R**	**PME K&S**	**ICM Excess MIRR**
IRR						
TVPI	0.93					
MIRR 8%	0.90	0.93				
PI L&R	0.95	0.93	0.95			
PME K&S	0.95	0.93	0.90	0.95		
ICM Excess MIRR	0.95	0.93	0.90	0.95	0.95	
Mean	0.94	0.93	0.92	0.95	0.94	0.94

Table 18

Table 18. Reinvestment Assumption: Distributions Reinvested at IRR

Distributions can rarely be expected to be reinvested at the IRR rate, causing the effective return to deviate from the observed IRR. Testing the consequence of falsely assuming that distributions can be invested at the IRR, we list the resulting change in TVPI following this added assumption. The mean, median, minimum and maximum change from observed TVPIs are listed below, together with the mean IRR. The full sample of 71 funds are listed and sorted according to age. Missing values of TVPI are replaced by point estimates (ref Table 11a)

Sample Size: 71

	Funds with		Absolute Change in TVPI			
Age	IRR/TVPI Data	Mean IRR (In Percent)	Mean	Min.	Median	Max.
0	2	-54.30	0.00	0.00	0.00	0.00
1	4	-53.80	0.00	0.00	0.00	0.00
2	8	18.50	0.03	-0.13	0.00	0.38
3	9	19.80	0.73	-0.02	0.00	6.05
4	6	9.45	0.03	0.00	0.00	0.14
5	5	54.26	2.57	0.07	0.86	7.48
6	6	19.10	3.01	-0.02	0.04	17.74
7	8	31.40	3.69	0.00	0.67	9.97
8	3	-9.70	-0.11	-0.69	-0.08	0.45
9	6	-2.86	0.14	-0.22	-0.04	0.78
10	7	12.33	1.12	-0.08	0.92	3.83
11	1	111.64	414.82	414.82	414.82	414.82
12	1	63.09	178.54	178.54	178.54	178.54
13	1	83.32	464.87	464.87	464.87	464.87
14	2	43.40	134.00	16.00	134.00	253.00
16	1	15.36	6.59	6.59	6.59	6.59
17	1	69.98	3238.40	3238.40	3238.40	3238.40

Table 19

Table 19. Reinvestment Assumption, Spread between Top/Bottom Quartile Funds

The table shows the mean performance of all funds in the sample, by different measures. Fund returns appear significantly less dispersed using the MIRR compared to IRR. The spread between top and bottom quartile funds is 38.94 using IRR, and 17.83 percentage points using MIRR_12%. Point estimates replace 10 missing observations of TVPI (ref Table 11a). ICM Excess IRR cannot be computed for 8 funds. Values are in percent, except for TVPI, PI and PME.

Sample Size: 71

	Values							
Measure	**Mean**	**StDev**	**Min.**	**First quartile**	**Median**	**Third quartile**	**Max.**	**3. -1. quartile**
IRR	16.43	45.29	-93.17	-7.42	8.60	31.52	185.76	38.94
TVPI	1.92	1.93	0.22	0.87	1.41	2.43	13.43	1.56
MIRR 0%	3.34	20.91	-93.17	-3.23	4.83	12.82	51.98	16.05
MIRR 8%	7.57	22.01	-93.17	0.74	8.36	17.93	58.38	17.19
MIRR 12%	9.63	22.57	-93.17	2.07	9.95	19.90	61.46	17.83
PI	0.50	1.30	-0.84	-0.20	0.19	0.77	6.67	0.97
PME	1.52	1.61	0.22	0.93	1.23	1.64	13.56	0.72
ICM Excess IRR	5.96	27.28	-47.65	-8.62	2.10	18.05	158.31	26.67
ICM Excess MIRR	4.51	14.06	-31.79	-3.10	4.42	10.57	57.90	13.67
MICM	4.74	14.39	-31.79	-2.64	4.60	10.66	67.93	13.30

Table 20

Table 20. Multiples: Comparing TVPI to PI

The table shows funds ranked according to the TVPI multiple. The fund ranked as no. 23 (in bold) is the lowest ranking fund that has a positive PI, and from which all funds above it have positive PIs, assuming a hurdle rate of 15 percent. Its age is 10 and the TVPI for this fund is 1.99. Eight funds below it (in bold italic) have positive PIs.

Sample Size: 71

Top Ten Funds by IRR

Rank TVPI	TVPI	PI 15/15	PI L&R	Age
1	13.43	6.73	6.67	11
2	8.11	3.85	6.20	6
3	6.11	2.73	2.51	17
4	4.88	2.45	3.86	7
5	4.20	1.75	1.54	12
-	-	-	-	-
20	2.16	0.18	0.49	6
21	2.13	0.10	1.00	10
22	2.01	0.58	0.01	2
23	**1.99**	**0.30**	**1.02**	**10**
24	1.92	-0.10	-0.21	8
25	1.92	-0.29	-0.06	10
26	***1.91***	***0.01***	***0.47***	***9***
27	***1.88***	***0.29***	***-0.13***	***14***
28	***1.81***	***0.20***	***0.86***	***7***
29	***1.81***	***0.94***	***1.87***	***2***
30	1.69	-0.12	-0.02	10
31	1.62	-0.12	0.69	7
32	***1.55***	***0.15***	***-0.27***	***4***
33	1.48	-0.27	0.38	7
34	***1.44***	***0.15***	***0.60***	***3***
35	1.41	-0.25	-0.27	9
36	***1.41***	***0.18***	***0.36***	***3***
37	1.27	-0.48	-0.12	7
38	***1.17***	***0.04***	***0.20***	***2***

Table 21

Table 21. Sensistivity Analysis: Effect of Additional Early and Late Distributions

The table displays the result of a sensitivity analysis conducted on two PE funds. Both are 1998 vintage, and have IRRs of 17 percent (Fund B) and 31 percent (Fund A), which roughly corresponds to the full sample mean and third quartile. Observed performance is listed at the top of the table, indicated by zero additional distribution. Hypothetical cash flows, which constitute from 11 to 91 per cent of committed capital, are added to show the effect on the performance measures, when these appear 3 and 10 years after inception of the fund. In order to relate the late distribution to the early distribution, the late distribution is discounted back to year three, assuming a cost of capital of 12 percent (denoted Late Distr. NPV/ CC). A distribution that amounts to 51 percent of committed capital in year 10 has a NPV equal to 23 percent of committed capital paid out in year three. Percentage increases in the performance measures, following the maximum distributions, are listed for both funds.

Additional Distribution		Values Following Additional Early/Late Distribution													
												ICM Excess		ICM Excess	
	Late Distr.	IRR		TVPI		MIRR 12%		PI L&R		PME K&S		IRR		MIRR	
Distr/ CC	NPV/ CC	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
Fund A															
0.00	0.00	0.31	0.31	2.48	2.48	0.18	0.18	0.41	0.41	2.46	2.46	-	-	0.11	0.11
0.11	0.05	0.34	0.31	2.55	2.55	0.19	0.18	0.47	0.44	2.51	2.50	-	-	0.11	0.11
0.23	0.10	0.37	0.32	2.63	2.63	0.19	0.19	0.53	0.47	2.56	2.54	-	-	0.11	0.11
0.51	0.23	0.45	0.32	2.81	2.81	0.20	0.19	0.69	0.54	2.69	2.64	-	-	0.12	0.11
0.74	0.34	0.54	0.33	2.95	2.95	0.21	0.20	0.81	0.60	2.79	2.72	-	-	0.12	0.12
0.91	0.41	0.60	0.34	3.06	3.06	0.22	0.20	0.90	0.64	2.87	2.78	-	-	0.13	0.12
Incr. Following Max. Distr.:		96 %	10 %	23 %	23 %	20 %	10 %	120 %	56 %	17 %	13 %	-	-	19 %	15 %
Fund B															
0.00	0.00	0.17	0.17	2.13	2.13	0.15	0.15	1.00	1.00	1.64	1.64	0.05	0.05	0.03	0.03
0.11	0.05	0.19	0.18	2.22	2.22	0.15	0.15	1.10	1.08	1.74	1.75	0.06	0.06	0.04	0.04
0.23	0.10	0.21	0.18	2.32	2.32	0.16	0.15	1.21	1.16	1.85	1.86	0.06	0.06	0.04	0.04
0.51	0.23	0.28	0.20	2.55	2.55	0.18	0.16	1.47	1.37	2.10	2.12	0.07	0.08	0.05	0.05
0.74	0.33	0.34	0.21	2.73	2.73	0.19	0.17	1.69	1.54	2.31	2.34	0.07	0.09	0.06	0.06
0.91	0.41	0.40	0.21	2.87	2.87	0.20	0.17	1.84	1.66	2.46	2.50	0.06	0.09	0.07	0.07
Incr. Following Max. Distr.:		135 %	26 %	35 %	35 %	38 %	19 %	85 %	67 %	50 %	52 %	26 %	90 %	100 %	101 %

Table 22

Table 22. Sensitivity to Late Distributions (1 % of Committed Capital)

The table shows the absolute and percentage change in the performance measures following an additional distribution equal to 1 percent of committed capital at the time of reporting. The sample of funds is restricted to those older than seven years when rounded, having IRRs above 10 percent.

Sample Size: 18

		Absolute Change					
Measure	Funds with Perf. Data	Mean	Min.	Lower quartile	Median	Upper quartile	Max.
IRR	18	0.0007	0.0000	0.0001	0.0006	0.0012	0.0026
TVPI	11	0.0128	0.0063	0.0089	0.0110	0.0191	0.0204
MIRR 0%	18	0.0006	0.0001	0.0002	0.0005	0.0008	0.0017
MIRR 8%	18	0.0005	0.0001	0.0001	0.0004	0.0007	0.0016
MIRR 12%	18	0.0005	0.0000	0.0001	0.0004	0.0007	0.0016
Total PI	18	0.0081	0.0006	0.0019	0.0069	0.0116	0.0277
PI 15%	18	0.0054	0.0009	0.0019	0.0035	0.0067	0.0244
PME	18	0.0084	0.0010	0.0025	0.0066	0.0101	0.0448
ICM Excess IRR	11	0.0007	0.0000	0.0001	0.0007	0.0008	0.0026
ICM Excess MIRR	18	0.0005	0.0000	0.0001	0.0004	0.0006	0.0017

		Change (In Percent)					
Measure	Funds with Perf. Data	Mean	Min.	Lower quartile	Median	Upper quartile	Max.
IRR	18	0.39	0.00	0.01	0.11	0.59	2.26
TVPI	11	0.53	0.21	0.25	0.48	0.68	1.18
MIRR 0%	18	0.64	0.12	0.21	0.37	0.79	2.49
MIRR 8%	18	0.35	0.03	0.09	0.22	0.49	1.60
MIRR 12%	18	0.28	0.02	0.06	0.18	0.39	1.35
Total PI	18	2.46	0.07	0.38	0.61	1.12	30.71
PI 15%	18	4.74	0.06	0.30	0.66	3.43	56.58
PME	18	0.35	0.04	0.12	0.33	0.51	1.10
ICM Excess IRR	11	4.42	0.24	0.41	0.60	1.18	33.12
ICM Excess MIRR	18	2.94	0.03	0.17	0.53	1.26	33.06

Figure 1

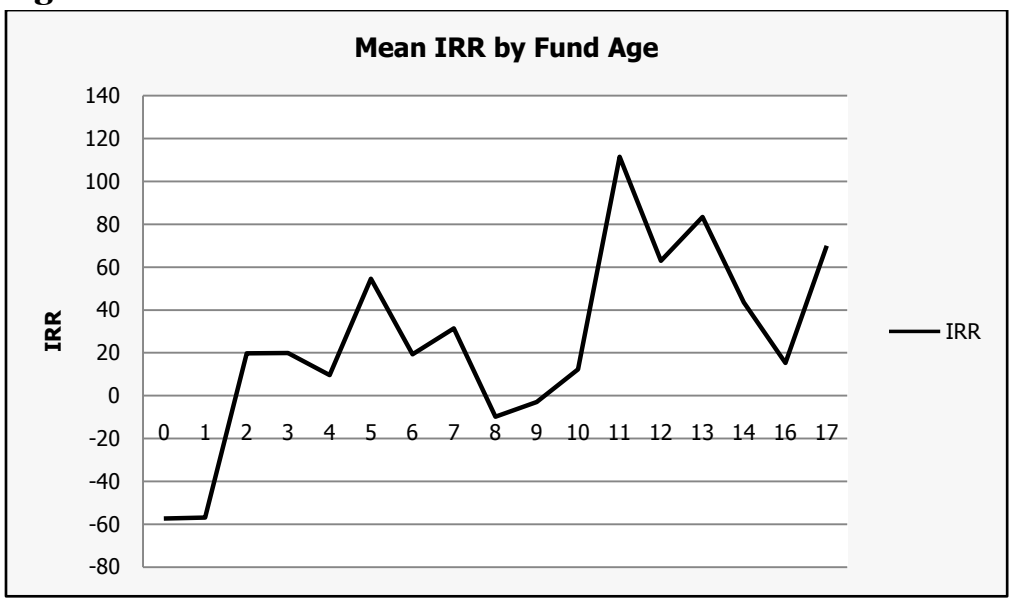
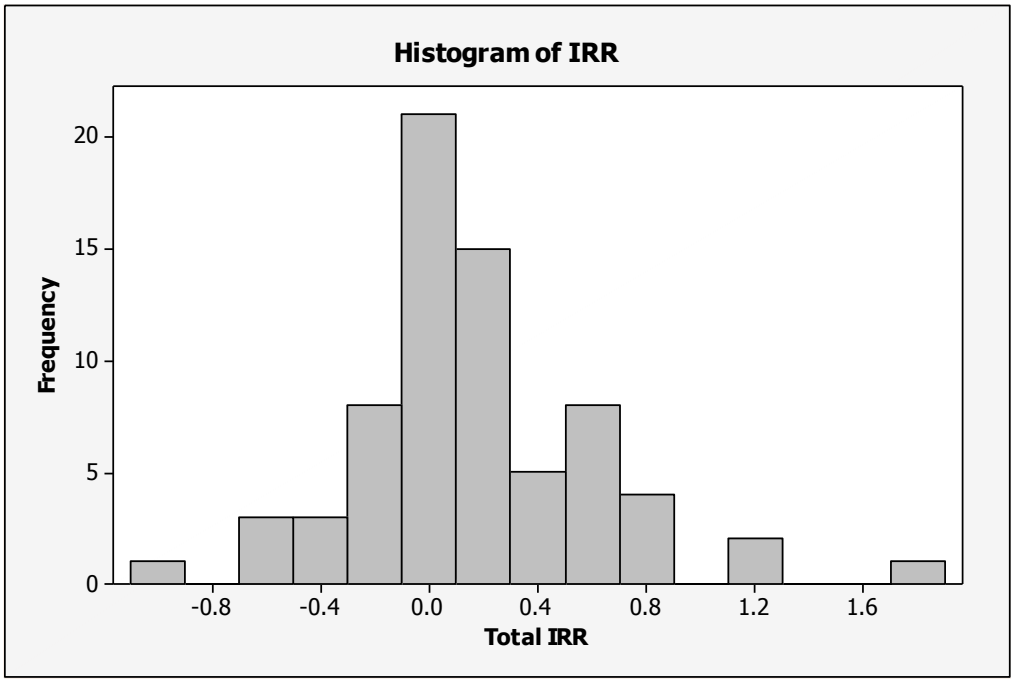


Figure 2



List of Definitions

Variable	Definition	Source
Active Fund	An Active Fund is one that is not Liquidated.	
Average (Mean) IRR	The arithmetic mean of the internal rates of return (IRRs).	EVCA Glossary
Balanced Stage Fund	This stage describes funds that make investments into portfolio companies in a variety of stages of development - Seed, Startup, Early Stage and Later Stage.	VentureXpert Glossary
Beta	A statistical measure of a security's volatility, compared to the overall market. A beta of less than 1 indicates lower volatility than the general market; a beta of 1 or more indicates higher volatility than the general market.	EVCA Glossary
Buyouts	This stage describes funds that make a leveraged buyout, management buyout or acquisition investments. These funds use debt in addition to equity to leverage the size of their investments and increase the potential return on investment. This stage would also include funds making infrastructure investments.	VentureXpert Glossary
Carried Interest	A share of the profit accruing to an investment fund management company or individual members of the fund management team, as a compensation for the own capital invested and their risk taken. Carried interest (typically up to 20 percent of the profits of the fund) becomes payable once the limited partners have achieved repayment of their original investment in the fund plus a defined hurdle rate.	EVCA Glossary
Commitment	A limited partner's obligation to provide a certain amount of capital to a private equity fund when the general partner asks for capital.	EVCA Glossary
Contributions to Commited Capital	The sum of all Contributions as a portion of Committed Capital.	

Delisting	The removal of a company from listing on an exchange.	EVCA Glossary
Development Stage Funds	Development funds make investments into portfolio companies whose primary objective is to increase investments, employment, and revenue to a regional geographic area.	VentureXpert Glossary
Distribution	The amount disbursed to the limited partners in a private equity fund.	EVCA Glossary
Contributions/ Drawdowns	When investors commit themselves to back a private equity fund, all the funding may not be needed at once. Some is used and some is drawn down later. The amount that is drawn down is defined as contributed capital.	EVCA Glossary
Early Stage Fund	A Fund with an investment strategy involving investments in companies for product development and initial marketing, manufacturing and sales activities.	VentureXpert Glossary
Expansion Stage Fund	This stage can be used by funds that are managed by both buyout firms and venture capital firms. For venture capital firms, Expansion stage funds invest into portfolio companies that have products and services that are currently available, and require additional capital to expand production to increase revenue. For buyout firms, Expansion stage funds are sometimes referred to as growth or growth equity funds. In this case funds typically only invest in portfolio companies using equity usually to expand operations on a national or international stage, possibly through acquisitions of smaller or similarly sized companies, or increased production.	VentureXpert Glossary
Fund Age	The age of a fund (in years) from the date of the first reported cash flow to liquidation or date of reporting.	
Fund Size	The total amount of capital committed by the limited and general partners of a fund.	EVCA Glossary
Fund Status	A fund may be either Active or Liquidated.	

General Partner (GP)	A partner in a private equity management company who has unlimited personal liability for the debts and obligations of the limited partnership and the right to participate in its management.	EVCA Glossary
Generalist	This stage describes funds that make an equal amount of venture capital and buyout investing.	VentureXpert Glossary
Hedge Fund	An investment vehicle, where managers invest in a variety of markets and securities, to achieve the highest absolute return. Investments could be either made in financial markets, using stocks, bonds, commodities, currencies and derivatives, or by using advanced investment techniques such as shorting, leveraging, swaps and using arbitrage.	EVCA Glossary
Hurdle Rate	A return ceiling that a private equity fund management company needs to return to the fund's investors in addition to the repayment of their initial commitment, before fund managers become entitled to carried interest payments from the fund.	EVCA Glossary
Inception	The starting point of calculations for a fund; the vintage year or date of first capital drawdown.	EVCA Glossary
Index	A benchmark against which financial or economic performance is measured, (e.g. S&P 500, FTSE 100).	EVCA Glossary
J-curve	The curve generated by plotting the returns generated by a private equity fund against time (from inception to termination). The common practice of paying the management fee and start-up costs out of the first contributions does not produce an equivalent book value. As a result, a private equity fund will initially show a negative return. When the first realizations are made, the fund returns start to rise quite steeply. After about three to five years the interim IRR will give a reasonable indication of the definitive IRR. This period is generally shorter for buyout funds than for early stage and expansion funds.	EVCA Glossary

Later Stage Funds	This stage describes funds that make investments into portfolio companies that have an already established product or service that has already generated revenue, but may not be making a profit. Later stage funds make the last round of investments in portfolio companies before an exit in the form of an IPO or acquisition by a strategic partner.	VentureXpert Glossary
Limited Partner	An investor in a limited partnership (i.e. private equity fund).	EVCA Glossary
Limited Partnership	The legal structure used by most venture and private equity funds. The partnership is usually a fixed-life investment vehicle, and consists of a general partner (the management firm, which has unlimited liability) and limited partners (the investors, who have limited liability and are not involved with the day-to-day operations). The general partner receives a management fee and a percentage of the profits. The limited partners receive income, capital gains, and tax benefits. The general partner (management firm) manages the partnership using policy laid down in a Partnership Agreement. The agreement also covers, terms, fees, structures and other items agreed between the limited partners and the general partner.	EVCA Glossary
Liquidated Fund	We define a fund as Liquidated either when reported Liquidated by the GP or when it is above 10 years of age *and* its residual value constitutes less than 10 percent of committed capital.	
Management Fees	Fee received by a private equity fund management company from its limited partners, to cover the fund's overhead costs, allowing for the proper management of the company. This annual management charge is equal to a certain percentage of the investors' commitments to the fund.	EVCA Glossary
Median IRR	The Value appearing halfway in a table ranking funds by IRR in descending order.	EVCA Glossary

Net Asset Value/ Residual Value	The estimated value of the assets of the fund, net of fees and carried interest.	EVCA Glossary
Paid-In Capital	The amount of committed capital an investor has actually transferred to a fund. Also known as the cumulative takedown amount.	EVCA Glossary
Pooled IRR	The IRR obtained by taking cash flows from inception together with the Residual Value for each fund and aggregating them into a pool as if they were a single fund. This is superior to either the average, which can be skewed by large returns on relatively small investments, or the capital weighted IRR which weights each IRR by capital committed. This latter measure would be accurate only if all investments were made at once at the beginning of the funds life.	EVCA Glossary
Portfolio company	The company or entity into which a private equity fund invests directly.	EVCA Glossary
Private Equity	Private equity provides equity capital to enterprises not quoted on a stock market. Private equity can be used to develop new products and technologies (also called venture capital), to expand working capital, to make acquisitions, or to strengthen a company's balance sheet. It can also resolve ownership and management issues. A succession in family-owned companies, or the buyout and buyin of a business by experienced managers may be achieved by using private equity funding.	EVCA Glossary
Private Equity Fund	A private equity investment fund is a vehicle for enabling pooled investment by a number of investors in equity and equity-related securities of companies. These are generally private companies whose shares are not quoted on a stock exchange. The fund can take the form of either a company or an unincorporated arrangement such as a Limited Partnership.	EVCA Glossary

Prospectus	A document which must be delivered to recipients of offers to sell securities and to purchasers of securities in a public offering and which contains a detailed description of the issuer's business. In the USA, it is included as part of the registration statement filed with the SEC and with documents required by stock markets, stock exchanges and national competent authorities.	EVCA Glossary
Quartile	The fund which lies a quarter from the bottom (lower quartile point) or top (upper quartile point) of the table ranking the individual funds by performance measures.	EVCA Glossary
Reporting - EVCA Reporting Guidelines	Guidelines set by EVCA concerning reporting practices towards investors. Their aim is improve transparency, so that investors are better able to monitor and evaluate the performance of their investments and to make the asset class more accessible and comprehensible to new and existing investors.	EVCA Glossary
Sequence	The classification of funds by order of investment. First in a sequence is the new fund, defined as the first fund a management group raises together, regardless of the experience level of individual professionals in that group. Next are follow-on funds, defined as subsequent funds (II, III, IV, etc) raised by the same management group.	EVCA Glossary
Stage	The fund's Stage refers to the stage of development of portfolio companies in which the funds make investments.	
Top Quarter	Comprises funds with a performance measure equal to or above the upper quartile point.	EVCA Glossary
Upper Quartile	The point at which 25 percent of all returns in a group are greater and 75 percent are lower.	EVCA Glossary

Valuation - International Valuation Guidelines	Guidelines developed by EVCA, BVCA and AFIC (the European, British and French Private Equity and Venture Capital Associations) towards investors internationally concerning valuation methodologies. Their aim is improved transparency, so that investors are better able to monitor and evaluate the performance of their investments and to make the asset class more accessible and comprehensible to new and existing investors. The guidelines have been endorsed by more than 20 European and Non-European Associations and are consistent with IFRS and US GAAP.	EVCA Glossary
Vintage Year	The year of fund formation and first drawdown of capital.	EVCA Glossary