Working Paper No. 2004-02

WHAT DRIVES CASH FLOW BASED EUROPEAN PRIVATE EQUITY RETURNS? - FUND INFLOWS, SKILLED GPs AND/OR RISK?

Version: September 2004

CHRISTOPH KASERER
CHRISTIAN DILLER

WORKING PAPER SERIES

Center for Entrepreneurial and Financial Studies

TECHNISCHE UNIVERSITÄT MÜNCHEN

What Drives Cash Flow Based European Private Equity Returns? - Fund Inflows, Skilled GPs and/or Risk?*

Christoph Kaserer [1,2**]
Technische Universität München

Christian Diller [1,2]
Technische Universität München

September 2004

[1] Center for Entrepreneurial and Financial Studies (CEFS), TUM Business School, Technische Universität München, 80333 Munich, Germany

[2] Department for Financial Management and Capital Markets, TUM Business School, Technische Universität München, 80333 Munich, Germany

[*] We thank Giorgio di Giorgio, Donald Hester, Josh Lerner, the participants of the 2004 EVI conference at Tuck Business School, and the participants of the Finance and Economics Seminars at LUISS, Rome, for many helpful comments on earlier versions of this paper. We are grateful to the European Venture Capital and Private Equity Association (EVCA) and Thomson Venture Economics for making the data used in this study available.

[**] Corresponding author:
Univ.-Prof. Dr. Christoph Kaserer
Center for Entrepreneurial and Financial Studies (CEFS)
TUM Business School | Technische Universität München
Arcisstr. 21 | 80333 München
Tel: +49.(0)89-289-25490 | Fax: +49.(0)89-289-25488
E-Mail: christoph.kaserer@wi.tum.de

What Drives Cash Flow Based European Private Equity Returns? - Fund Inflows, Skilled GPs and/or Risk?

Abstract

This paper analyzes the determinants of returns generated by European private equity funds. It starts from the presumption that this asset class is characterized by illiquidity, stickiness and segmentation. As a consequence, Gompers and Lerner (2000) have shown that venture deal valuations are driven by overall fund inflows into the industry giving way to the so called 'money chasing deals' phenomenon. It is the aim of this paper to document that this phenomenon also explains a significant part of variation in private equity funds' returns. This is especially true for venture funds, as they are more affected by illiquidity and segmentation than buy-out funds. Actually, the paper presents a WLS-regression model that is able to explain up to 47% of variation in funds' returns. Apart from the importance of fund flows we can also show that market sentiment, the GPs' skills as well as the idiosyncratic risk of a fund have a significant impact on its returns. Moreover, they seem to be unrelated to stock market returns and negatively correlated with the development of the economy as a whole. According to a bootstrapping inference the results seem to be quite stable.

JEL classification: G24

Keywords: **private equity funds, venture capital, financing, WLS, bootstrapping**

1 Introduction

Private Equity has recently faced an increasing public awareness in Europe. From an economic perspective the allegedly positive impact of venture capital and private equity on economic growth is emphasized. From an asset management perspective it seems that private equity has become one of the most important alternative asset classes. It can be shown, in fact, that institutional investors[1] have increased their share of wealth allocated to this asset class substantially. This is also confirmed by the volume of capital raised by the private equity industry. According to statistics provided by EVCA, this figure increased from Euro 4.2bn in 1992 to over Euro 48bn in 2000. Of course, after the stock market downturn starting in 2000 these cash inflows into the private equity industry decreased as well; however, even in 2002 about Euro 27bn have been invested.[2] Recently published figures indicate that institutional investors are now going to increase their private equity portfolio ratio giving way to a more optimistic outlook for the future of this industry.[3]

Despite this increasing importance of private equity as an asset class there's only a limited understanding of the economic characteristics of this industry. For the time being, the literature can be split up into three different strands: First, the question whether private equity enhances economic growth is discussed. Second, the informational advantages of allocating savings through the private equity channel are analyzed. Third, the characteristics and determinants of private equity returns are investigated.[4] This paper aims to make a contribution with respect to this last issue, where it is especially influenced by the papers of Gompers and Lerner (2000) and Inderst and Müller (2004), who emphasize the impact of a specific competitive environment in the private equity industry.

In frictionless and perfectly competitive capital markets we would expect returns on private equity fund investments to be determined by systematic risk only. Neither personal skills of the management team, i.e. the general partner (GP), nor the inflow of money into private equity funds should have an impact on the performance of these funds. Due to the specific characteristics of the private equity asset class, e.g. the illiquidity of the investment, the stickiness of fund flows, the restricted number of target companies and the segmentation from other asset classes, the market may be far away from being frictionless and perfectly competitive, at least in the short run. A very important finding in this regard has been presented by Gompers and Lerner (2000), who show that inflows into venture funds and target companies valuations correlate positively. Although it is an open question, whether increased valuations are triggered by money pouring into the private equity industry or whether this money flow is triggered by improved expectations with respect to future investment opportunities, and hence by increased valuations, Gompers and Lerner (1999) present

[1] Banks are the largest source for private equity funds. In fact, 25.7% of total funds raised in 1998-2002 stem from the banking industry. Pension funds contributed 23.1% and funds raised from insurance companies were the third largest source at 12.7% of total funds raised. Cf. European Private Equity and Venture Capital Association (EVCA) Yearbook 2003.

[2] Cf. EVCA Yearbook 2003.

[3] The European institutional investors want to increase their private equity portfolio ratio from 1.1% to 3.2% within the next 5 years according to a survey recently published by the consulting company Mackewicz.

[4] Cf. Gompers and Lerner (1999) for an extensive overview and Stefano and Stefano (2004) for a Europe-focused discussion.

some evidence that is more consistent with the first explanation. They basically argue that there is a limited number of favorable investments in the private equity industry giving way to the so called 'money chasing deals' phenomenon.

It is important to note in this regard that the soundness of this reasoning is very much intertwined with the special features of the private equity asset class, as has been shown in the context of an equilibrium analysis by Inderst and Müller (2004). Most importantly, due to the illiquidity of private equity investments improved expectations with respect to future cash flows generated in this industry cannot directly be reflected in increasing asset prices, as it would be the case for the public equity asset class. Hence, the additional money attracted due to this improved economic prospects must entirely be absorbed on primary markets, i.e. by an adjustment of deal pricing. This effect will be reinforced, if it is taken into account that the largest part of money invested in private equity is allocated through private equity funds. In this regard, Ljungqvist and Richardson (2003a) point out that private equity funds normally are segmented from other asset classes and the capital flows between GPs and LPs tend to be sticky, i.e. it takes a longer time in order to adjust the capital invested in the industry to changed expectations or valuations. Both mechanisms make it difficult to quickly redirect funds to other asset classes further reenforcing the pressure on deal valuations in order to bring this segment of the capital market in equilibrium.

If real-life private equity markets are governed in this way, we would expect the realized returns of private equity funds to be affected by total capital inflows in the industry. More specifically, the 'money chasing deals' phenomenon would suggest that there should be a negative correlation between a fund's performance and the amount of savings directed towards the private equity industry. This however would only be true to the extent that fund inflows are not matched by an improvement in the economic perspectives of the ultimate target companies. Hence, it is a major challenge of this paper to develop an approach able to test this theory.

To sum up, this paper may extend the existing literature for the following four reasons. First, using a dataset of 200 mature European private equity funds over the period 1980 to 2003 provided by Thomson Venture Economics (TVE) we are able to develop a regression model that explains more than 47% of variation in private equity returns. By doing so, we use a WLS-regression approach as returns seem to be affected by heteroscedasticity. Moreover, due to the small size of the data set we use a bootstrap regression approach in order to check the robustness of the results. Second, we propose a test for the 'money chasing deals' phenomenon that basically relies on the fact the we make a distinction between absolute and relative cash inflows into private equity funds. We can show that for a given absolute fund inflow an increase in the allocation of money towards a particular fund type has a significant negative impact on the performance of this fund type. Moreover, this effect is very much stronger for venture funds than for buy-out funds. This makes sense, as segmentation and stickiness might be more present in the venture industry than in the buy-out industry. This finding strongly supports the 'money chasing deals' phenomenon. Third, related to this finding we present also evidence that investor sentiment matters. In fact, funds closed in years with above average stock market conditions generate lower returns. Fourth, in the context of our regression approach we find returns to be positively associated with some measures representing GP's skills as well as with

idiosyncratic risk. Compared with this, we find no evidence that private equity funds' returns are correlated with stock market returns, while they even seem to be negatively associated with the development of the economy as a whole.

The paper is organized as follows: In section 2 we start with briefly resuming the literature and laying down the theoretical background for our tests. Section 3 describes the data set as well as some major issues in our methodology. In section 4 we present the results. Section 5 summarizes the results and gives a brief outlook.

2 Related Literature and Theoretical Considerations

Due to the limited availability of return data there are only a few empirical papers dealing with risk and return characteristics of the private equity industry. Three important strands of empirical literature will be reported here. The first is concerned with estimating the return distribution on a private equity fund investment. The second is focused on the question to what extent the returns are determined by fund characteristics. The third rather small strand emphasizes the relationship between fund performance and cash inflows into the industry.

2.1 The Private Equity Fund Return Distribution

As private equity investments are not traded on secondary markets, or, at least, the pricing of such trades is not disclosed, we usually rely on the cash flow history of a fund investment in order to determine its return. For that purpose either the IRR, the public market equivalent (PME), a profitability index or a multiple is used.[5] Ljungqvist and Richardson (2003b) analyze cash flow data provided by one of the largest institutional investors in private equity in the US between 1981 and 1993. They use the excess IRR with respect to a S&P 500 investment, to assess a fund's profitability. They document an outperformance of five to eight percent per year on average.

Gottschalg, Phalippou, and Zollo (2004) analyze the return of a sample of mature private equity funds on the basis of a profitability index. In this context they document an underperformance with respect to the stock market of up to 20 percent in terms of net present value. Kaplan and Schoar (2004) analyze a data set from TVE which includes 746 funds of the years 1980 to 2001. By using the public market equivalent (PME) approach they show that the average funds' returns are quite close to the S&P 500 returns. In fact, they found the PMEs to be in a range from 0.96 to 1.05 on average.

As an alternative approach Cochrane (2004) focuses on the portfolio company level. Their performance is measured by using a dataset from Venture One which consists of the data of the financing rounds of 7.765 companies. After adjusting his results for the survivorship bias, the author calculates mean average returns to be equal to 59% with a standard deviation of 107%. Chen, Baierl, and Kaplan (2002) examine 148 venture capital funds in the TVE data set that have been liquidated before 1999. By assuming intermediate cash flows to be reinvested at the IRR they find an annual average return of 45% with a

[5] A short definition of this methods is given in section 4.

standard deviation of 115%. The results are quite similar to those of Cochrane (2004), who uses the same reinvestment hypothesis.

Rouvinez (2003) proposes another cash flow based approach. By assuming that cash flows are reinvested at a constant interest rate over time he is able to derive a risk and return assessment for a set of more than hundred private equity funds provided by the TVE data set. His results indicate a yearly average return of 14.3% with a standard deviation of 34.4% for private equity funds with a vintage year between 1980 and 1990. Weidig and Mathonet (2004) analyze the risk profiles of direct investments in portfolio companies and investments in private equity funds from 1980 to 1998 in detail. They conclude that there is a diversification benefit for funds and funds-of-funds. The risk profile of a fund is relatively symmetric distributed and the probability of getting back less than the capital invested is stated as 30%.

In contrast to these cash flow based research papers, a few papers try to assess the return of private equity funds on the basis of disclosed net asset values. Timmons and Bygrave (1992) examine venture capital funds and find an average internal rate of return based on net asset values of 13.5% for the years 1974-1989.[6] It should be noted that relying on net asset values causes a bias due to smoothing in book values. Getmansky, Lo, and Makarov (2003) derive an econometric time series model which considers return smoothing as a result of illiquidity in investment portfolios. They show that under such a smoothing process actual return variance and covariance might be higher than derived on the basis of book value related returns. Emery (2003) transfers this methodology to private equity investments and documents evidence of stale pricing of private equity returns. The average annual return difference between BO funds and the S&P 500 is 7.14% and the corresponding excess-return for VC funds and the Nasdaq is 7.45% for the time period from 1986-2001.

A completely different approach is used by Zimmermann, Bilo, Christophers, and Degosciu (2004). They concentrate on a set of 229 publicy traded private equity vehicles. Evidently, in this way a straightforward performance calculation applies. They document substantially larger Sharpe ratios of 1.5 for listed private equity firms than for traditional asset classes. They calculate a positive correlation between private equity and the MSCI World of 0.40 and the Global Bond Index of 0.02.

2.2 Performance, Fund Inflows and Market Sentiment

Of course, the much more interesting question is how these returns are determined. In this section we focus on the question to what extent returns are triggered by fund inflows into the private equity industry, i.e. we address the so called 'money chasing deals' phenomenon. In this context we will also discuss whether market sentiment will have an impact on returns.

Gompers and Lerner (2000) argue that private equity is an asset class segmented from other asset classes making the number of favorable investment opportunities therefore limited. This is not a problem as long as the money inflow into the industry corresponds with rationally formed expectations with respect to the investment opportunities available in the universe of potential

[6] Thomson Venture Economics and EVCA report quarterly average IRRs based on net asset values for the US and for Europe. EVCA reports a cumulative annualized IRR based on net asset values of 10.1% for the period 1992-2002; cf. www.evca.com.

target companies. However, to the extent that the increase in money inflow is higher than the increase in both fundamental valuations of target companies and the increase in the number and size of favorable investment targets a mismatch of funds offered and demanded will arise. Due to the illiquidity of the private equity asset class this mismatch can turn out to be particularly harmful. Improved expectations with respect to future cash flows generated in this industry cannot directly be reflected in increasing asset prices, as it would be the case for the public equity asset class. Hence, the additional money attracted due to this improved economic prospects must entirely be absorbed on primary markets, i.e. by an adjustment of deal pricing.[7] This effect will be reinforced, if it is taken into account that the largest part of money invested in private equity is allocated through private equity funds. Hence, according to amount of 'excess' capital pouring into the industry in a particular vintage year we would expect increasing or decreasing valuations of target companies.[8]

In this regard, it should be taken into account that a large fraction of private equity investments are allocated through private equity funds. For them the segmentation argument might be especially important as they normally are not allowed to invest the committed funds in any other asset class. Hence, even if the GPs would be aware of an overvaluation in the industry they hardly would be able to redirect their funds towards other investment projects. Moreover, as Ljungqvist and Richardson (2003a) point out, capital flows between GPs and LPs tend to be sticky, i.e. it takes a longer time in order to adjust the capital invested in the industry to changed expectations or valuations. Also this second mechanisms makes it difficult to quickly redirect funds to other asset classes further reenforcing the pressure on deal valuations in order to bring this segment of the capital market in equilibrium. It should be noted here that this segmentation and stickiness argument may be more relevant for venture funds than for buy-out funds. The latter have a much broader set of potential investment targets including also public equity.

The hypothesis that capital inflows into the private equity industry increase deal valuations has been corroborated in a seminal article of Gompers and Lerner (2000). They analyze more than 4'000 venture financing rounds of privately held firms through the period 1987 to 1995. They show that the firm valuation in a financing round is the higher the more money poured into the venture industry over the year before the deal was closed. This relationship is as robust as perceivable in magnitude. However, although the authors integrated a lag structure in their regression model they had to admit that on the basis of this evidence one cannot make a final decision as to whether higher valuations due to better prospects cause higher inflows or wether higher inflows cause higher valuations. Nevertheless, Gompers and Lerner (2000, p. 316 n.) argue in favor of the second relationship, i.e. the 'money chasing deals' phenomenon. The most important evidence supporting their interpretation was the fact that the performance of deals closed in 'hot' periods, i.e. periods with relatively

[7] It should be noted, however, that secondary markets for private equity investments though still rather small have grown rapidly over the last years. AltAssets estimates that currently 3 to 5% of yearly private equity investments are traded in secondary deals. Hence, the degree of illiquidity of the private equity asset class is going to be reduced. Cf. http://www.altassets.com/casefor/sectors/2002/nz3261.php.

[8] Inderst and Müller (2004) show that this can, in fact, be the equilibrium outcome in a model where the relative bargaining power of entrepreneurs and venture capitalist depends, among other things, on the relative scarcity of venture capital.

high inflows, was not better than the performance of deals closed during 'cold' periods.

If the theory proposed by Gompers and Lerner (2000) is right we should be able to detect similar relationships also for the returns of private equity funds. However, things become a little bit more intriguing as in this case the investment behavior of private equity fund managers has to be taken into account as well. In fact, Ljungqvist and Richardson (2003a) stress the importance of the competitive environment faced by the GP. First, they argue that as far as the competition for investment targets is concerned, GPs come under pressure the less available are favorable targets for a given amount of capital supplied by LPs. In fact, assuming that the number of companies founded in a particular industry are a good proxy for the number of favorable targets, they can show that the time to return a given multiple of committed capital to the LP becomes the longer the lower the number of newly founded companies is, i.e. the tougher the competition for favorable investment projects among the GPs becomes. Second, Ljungqvist and Richardson (2003a) argue that the competition for deals becomes the tougher the more money is pouring into private equity funds holding the number of favorable investment targets constant. Accordingly, they show that the time to return a given multiple of committed capital becomes the longer the more higher the inflow of money into private equity funds is. As the time to return a given fraction of money is negatively related with the IRR, or also other return measures, their results could also be stated as follows: The more money is pouring into the industry in a given vintage year, the lower the return of funds closed in that particular vintage year. The better the prospects of a particular industry, as measured by the number of newly founded companies in that industry, the higher the returns of a private equity fund investing in this industry. This findings are in accordance with the 'money chasing deals' phenomenon. However, in this paper we argue that the test for the 'money chasing deals' should be set up a slightly different. Nevertheless, also our results strongly support this relationship.

One additional aspect should be discussed in this regard. First, it is an open question whether one regards the 'money chasing deals' phenomenon as having behavioral causes or as being a fully rational equilibrium outcome. It may be that the overshooting of capital investments in the private equity industry is due to some kind of herding behavior, where investment opportunities are systematically over- or underestimated by investors. However, Ljungqvist and Richardson (2003a, p. 4 n.) point out that it could also simply be a consequence of the stickiness of private equity fund investments. Inderst and Müller (2004) argue that the supply of venture capital is related to entry cost and transparency of the venture market. To some extent we will be able to present evidence in favor of the behavioral based view. We can show that funds raised in vintage years with above average stock market returns have lower returns. Similar evidence has also been presented by Kaplan and Schoar (2004). This suggests that beyond the mere liquidity driven effects market sentiment might have an impact on fund returns.[9]

[9]It should be noted that there is also a new strand in IPO literature relating the underpricing and long-run performance to market sentiment on the issued date; cf. among others Cornelli, Goldreich, and Ljungqvist (2004).

2.3 The impact of GPs' Skills and Fund Characteristics on Performance

It has been pointed out that the 'money chasing deals' phenomenon is closely related to the idea of illiquidity, segmentation, and stickiness of private equity markets. From this it follows that the skills of the management team should have a more significant impact on fund returns than it is the case for funds investing in public market securities. In efficient public markets a great deal of information, public or private, is incorporated in the asset prices. Hence, the ultimate outcome of an investment strategy should be almost the same, regardless whether the investor undertakes informational activities or not.[10] In fact, there is no clear evidence from mutual fund performance literature that fund returns may be driven by fund managers skills, like selection and timing abilities.[11] Also, due to the lack of illiqudity and stickiness of public securities markets there is yet no evidence that mutual fund returns are determined by past fund inflows or by other factors driven by investor sentiment.[12]

Now, given the discussion presented above we would expect fund management skills to be much more important in private equity funds than in public mutual funds. Knowledge about investment opportunities in the private equity industry may be distributed very unequally and, due to the lack of a continuous market for this assets, it may take a long time until this information is disseminated. The first consequence of this idea is that deal returns should have a much higher volatility than public stock market prices.[13] Now, if among different management teams there is a systematic difference in knowledge about private equity investment opportunities we would expect that good deals are concentrated in a few fund portfolios, i.e. the portfolios of the skilled management teams. In fact, it is well known - and it will once again be corroborated in this paper - that private equity funds' returns distributions are heavily skewed. Finally, if skills are unequally distributed at a given point in time it may well be that their distribution is not independent over time. Hence, we would expect the returns of subsequent funds run by the same management team to be correlated. This gives way to the so called persistence phenomenon in private equity funds' returns. It has been documented by Kaplan and Schoar (2004), Ljungqvist and Richardson (2003a) or also Gottschalg, Phalippou, and Zollo (2004). According to Kaplan and Schoar (2004) it is more pronounced for ven-

[10] Of course, in such a situation it would be individually rational not to undertake costly information activities and rather behave as a free rider. This is what is called the Grossman/Stiglitz information paradoxon. The question then is, how does a society make sure that public information is incorporated in asset prices.

[11] For instance, Henriksson (1984) found only weak evidence in favor of market timing abilities of mutual fund managers, although his methodology has recently be subject to criticism; cf. Goetzmann, Ingersoll, and Ivkovich (2000). More generally, the evidence on performance persistence in mutual funds indicates that this a short-run phenomenon, at the most. Cf. in this regard Hendricks, Patel, and Zeckhauser (1993) and, as a more recent article, Deaves (2004). No evidence in favor of market timing abilities and only weak evidence in favor of selection abilities has been found by Daniel, Grinblatt, Titman, and Wermers (1997). Similar results are also documented for closed-end funds; cf. Madura and Bers (2002). Short-term persistence seems also to apply to real estate mutual funds; cf. Lin and Yung (2004).

[12] There is, however, evidence, that investors chase returns, i.e. mutual funds that have been successful in the past attract additional money; cf. Deaves (2004). Evidence presented by Madura and Bers (2002) on foreign closed-end funds is to some extent compatible with the view that investor sentiment drives closed-end fund prices.

[13] This is confirmed by the findings of Cochrane (2004).

ture funds. If this story is true we expect superior performance to be caused by superior selection abilities. We would, however, not expect to have them caused by public market timing abilities, as information with respect to public markets is very much more dispersed than information with respect to private markets. This is exactly what we will find in our study. There is persistence in fund returns, but it seems not to be due to market timing abilities. This is in contrast to the results presented by Nowak, Knigge, and Schmidt (2004) as they find clear support in favor of market timing abilities during the investment phase of the fund.

As far as fund characteristics are concerned, Ljungqvist and Richardson (2003b) find that a fund's excess IRR has an inverse U-shaped relationship with fund size. However, contrary to what we would expect, they do not find a significant relationship between a funds systematic or total risk and its excess IRR. This is somehow puzzling. It should be noted that the explanatory power of their regressions are quite low, as the adjusted R^2 is in the range of 3 to 6 percent.

Gottschalg, Phalippou, and Zollo (2004) show that the profitability index of a VC-fund is unrelated to size, while for the BO-funds there is a positive relationship. Moreover, performance seems to be positively related to the systematic risk of a fund. Finally, they show that performance is positively related to economic growth and stock market returns during the lifetime of the fund. Kaplan and Schoar (2004) document that funds' IRRs are positively associated with its size and with the stock market return.

3 Data

3.1 Preliminary Remarks

We use a dataset of European private equity funds that has been provided by Thomson Venture Economics (TVE).[14] It should be noted that TVE uses the term private equity to describe the universe of all venture investing, buyout investing and mezzanine investing.[15] Actually, we have been provided with various information related to the timing and size of cash flows, residual net asset values (NAV), fund size, vintage year, fund type, fund stage and liquidation status for a total of 791 funds in over the period 1980-2003. Some 14 of these funds have been funds of funds. We excluded these funds from our data set as they combine a number of single private equity funds and, hence, provide redundant information for the purpose of this study. Moreover, given the small sample size it will not be possible to draw general conclusions with respect to the performance of this particular fund type.

As far as the different fund types and stages are concerned it should be noted that we use the same definitions as TVE. A synopsis of these definitions can be found in table 1.

[14] TVE is recording private equity data for five different world regions. One of them is Europe.

[15] Fund of fund investing and secondaries are also included in this broadest term. TVE is not using the term to include angel investors or business angels, real estate investments or other investing scenarios outside of the public market.

Insert table 1

As one can see from Table 2, about 59% of the funds in our sample are venture capital funds, while the remaining 41% are categorised as buyout funds. The average fund size according to the TVE-data is Euro 182.75m.[16] Variation in fund size is considerably high, as the largest fund is 132 times as large as the median fund. Moreover, as one might expect, buyout funds are on average about 3.7 times as large as Venture capital funds. As far as the stage of the sample funds is concerned, it can be seen that one quarter are early stage funds, about one seventh are balanced funds and almost one fifth are late stage funds. As one may expect, the size of the funds differs perceivably depending on their stage.

Insert table 2

3.2 Increasing the Data Universe

Before presenting the results in the next section we have to deal with a problem caused by the limited number of liquidated funds included in our data set. Table 2 shows that we have only 95 liquidated funds in our data set with an average age of about 13 years. It could be argued that by looking at liquidated funds only a selection bias might arise, for instance, because more recently closed funds had a better performance on average.[17] In order to mitigate this problem different approaches have been developed in the literature. Basically, their starting point is the question whether it may be possible to infer future cash flows of a fund sufficiently well on basis of its cash flow history. If this is the case, it would be possible to include also not yet liquidated funds in the cash flow analysis without incurring a systematic bias in the analysis. However, estimating future cash flows turns out to be a tricky issue.

Hence, in this paper we use an approach that does not rely on how to assess future cash flows of non liquidated funds. Instead we propose to treat those funds as if they were liquidated that have a small net asset value relative to their realized cash flows. In such cases treating the current net asset value as a final cash flow will have a minor impact on the IRR or some other return measure used. From an economic perspective such funds can be defined as mature, as - from a cash flow perspective - they have already seen most of their history.[18] Specifically, we define a fund to be mature if it meets the following condition:

$$\frac{RNAV_N}{\sum_{t=0}^{N}|CF_t|} \leq q$$

[16] It should be noted that TVE is calculating the fund size on the basis of committed capital.
[17] In fact, tables 6 to 8 corroborate this view.
[18] A similar idea can be found in Meyer/Weidig (2003).

Here, $RNAV_N$ stands for the residual net asset value of a fund at end of period N.[19] Of course, q is a parameter that has to be chosen in an arbitrary way. In this study we will work with a q equal to 0.1 for one sample and 0.2 for another, respectively. Hence, we add non-liquidated funds to our sample if their residual value is not higher than 10% or 20%, respectively, of the undiscounted sum of the absolute value of all previously accrued cash flows. For these funds the IRR is calculated under the assumption that the residual net asset value is distributed by the end of our observation period.

The condition stated above can be simplified by taking into account that the sum of cash flows can be rewritten in the following way:

$$\sum_{t=0}^{N} |CF_t| = \sum_{t=0}^{N} TD_t + \sum_{t=0}^{N} D_t$$

Here TD_t is the capital paid into the fund at time t, while D_t is the distribution paid by the fund at time t. Hence, in this way we disentangle draw downs from distributions. Now, taking into account that the following definitions hold

$$DPI_N = \frac{\sum_{t=0}^{N} D_t}{\sum_{t=0}^{N} TD_t}$$
$$RVPI_N = \frac{RNAV_N}{\sum_{t=0}^{N} TD_t}$$

the initial condition stating which funds should be added to the data set can be rewritten as follows:

$$\frac{1+DPI_N}{RVPI_N} \geq \frac{1}{q}$$

All funds that are not liquidated by 30 June 2003, and satisfying this condition for q=0.1 together with the liquidated funds are put in sample I, while all funds satisfying this condition for q=0.2 together with all liquidated funds are put into sample II. A short description of these three samples is given in table 3. As one can see, sample I consists of 200 funds, while sample II has 262 funds. This is a perceivable increase given that we have only 95 liquidated funds.

Insert table 3

For a good part of our analysis we concentrate on the 'intermediate' sample I. A more detailed description of this sample can be found in table 4.

Insert table 4

[19] In principle, it would be better to use discounted cash flows in the denominator rather than undiscounted. However, we believe that this difference is not so important, given that it can be taken into account by adjusting the parameter q. Therefore, we stick to the approach presented here, as in this case the condition can be easily transformed into another very simple condition.

4 Empirical Results

4.1 Return Distribution of European Private Equity Funds

In this section we present the results with respect to the return distribution of European private equity funds. It should be noted here first, that there is an ongoing debate on how to measure the return distribution of an illiquid investment. This is especially important if one is interested in asset allocation decisions. As this paper is focused on the determinants of private equity returns we do not emphasize this issue.[20] However, as the shortcomings of the IRR are well-known we use three alternative performance measures in our study: the PME, the excess-IRR as well as the undiscounted payback period. The PME is defined as the ratio of the present value of all cash distributions over the present value of all take-downs. Hereby, the year-by-year realized return on a public market equity index is used as the discount rate. More precisely, the PME is defined as follows:

$$PME = \frac{\sum_{t=1}^{T} cf_t \prod_{i=t+1}^{T} (1 + R_{Ii})}{\prod_{t=1}^{T} (1 + R_{It})}$$

Here, R_{It} is the net return on the public equity index in period t, while cf_t is the normalized distribution of the private equity fund in period t. Normalized distributions are expressed as a fraction of the present value of all take-downs where R_{It} is used as the discount rate. As we can only observe the returns on a market index that are gross of management fees, we will make the following correction in this study: For an equity index we assume management fees to be equal to 50bp per year, while for a bond index these fees are assumed to be equal to 20 bp. Hence, the net yearly return is equal the gross yearly return, as indicated by the index performance, times 0.995 and times 0.998, respectively. In this paper the MSCI Europe is used as an equity index and the JP Morgan Government as a bond index.

The excess IRR is defined as a fund's IRR minus the return on a public market index that can be achieved by investing at fund closing and selling at the end of a fund's lifetime. The payback counts the number of months it takes before cumulated distributions equal cumulated take-downs. Of course, not all funds in our sample ever reach their payback period. Hence, as far as reported results include the payback period they refer to the subset of funds having a finite payback period. As one can see from table 5 all four return measures display a statistically highly significant degree of correlation. This is especially true as far as the IRR, the Excess-IRR, as well as the PME is concerned. For the multivariate part of the presented analysis we will therefore mainly concentrate on these three return measures.

Insert table 5

The private equity fund performance on the basis of the four different performance measures is resumed in tables 6 to 8. The average IRR of samples I and

[20] A more detailed discussion of this issue in the context of the data set used here can be found in Kaserer and Diller (2004).

II is perceivably higher than the IRR of the subsample consisting of liquidated funds only. In fact, starting with an average IRR of 10% for the liquidated sample we reach an IRR of about 13% for sample I and 14% for sample II. These figures are slightly lower than the results reported by Kaplan and Schoar (2004) for the US-market, as they report an average IRR of 17%. Simultaneously, the standard deviation of the IRRs increases significantly when expanding the data universe. Our method to include well performing as well as bad performing funds in the sample, has a positive net effect and drives the IRR upward. Moreover, we'd like to stress the highly skewed distribution of all the return measures except the payback. This is in line with our presumption that unequally distributed skills and industry knowledge among the GPs should generate this kind of return distribution. It also should be noted that the average payback in all the three different sub-samples is about 90 months or 7.5 to 7.8 years. This figure is very close to the result of Ljungqvist and Richardson (2003b), who document a payback period of slightly less than seven years.

Insert table 6 to 8

Table 7 reports the excess IRR of different sub-samples. This excess return is defined as the IRR of a single fund minus the IRR of the MSCI Europe index realized over the lifetime of the fund. Regardless of the benchmark and the excess subsample the IRR is positive in most of the cases. Moreover, buyout funds seem to have consistently higher IRRs than venture capital funds. Finally, table 8 gives the distribution of PMEs and BMEs for the three different subsamples as well as for different fund types. The average PME is only larger than one for sample II, while the value-weighted average is larger than one for sample I and II. This is in contrast to the results derived for the Excess-IRR.

4.2 Performance, Fund Inflows and Market Sentiment

As explained in section 2.2 the basic idea of the 'money chasing deals' phenomenon is a mismatch of capital supplied and demanded in the private equity industry. It has been pointed out that due to illiquidity, segmentation and stickiness of private equity investments the market clearing mechanisms may from time to time cause an over- or an undershooting of target companies' asset prices. The basic empirical problem is that this mismatch cannot simply be detected by just looking at the supply side, i.e. at capital inflows in the private equity industry. One would have to know to what extent this inflows are due to improved economic prospects in the industry and to what extent they overshoot the demand. Ljungqvist and Richardson (2003a) choose an approach were they rely on the assumption that investment opportunities in the private equity industry, i.e. the demand side, are captured by the number of companies founded. To the extent that private equity funds' returns cannot be explained by this variable, capital inflows should serve as a variable representing the overshooting effect. This might be somehow questionable. For instance, as far as Europe is concerned, a strong correlation between the private equity fund inflow and the number of IPOs can be detected. Moreover, both variables are also highly correlated with the number of patent registrations. This can be seen

in table 9. In our view, this is a strong indication that the inflow of capital into the private equity industry is highly correlated with the general perception of the investment opportunities in this industry. Hence, an increase in these inflows should go along with an improvement in the economic outlook of the private equity industry. Therefore, it may be more than questionable whether this variable by itself is able to detect the 'money chasing deals' phenomenon.

Insert table 9

This is why we follow a different approach in our paper. In our view total fund inflow is, basically, triggered by the economic prospects of the private equity industry. However, in the short-run there might be a mismatch between the funds that can be invested in new favorable investment projects and the money pouring in the industry. Due to the stickiness of the private equity market a 'money chasing deal' phenomenon can arise, at least in the short run. In order to test this idea empirically one would have to make an assessment of the sign of this mismatch, at least. This is, of course, rather difficult or even impossible. However, a way to approach this problem would be the following: If a mismatch between supply of capital and demand for investment funds arises, its impact would be the harder the more the fund flows are directed towards a particular part of the private equity industry. So, if capital inflows increase by 10% and, by the same time, the share of early stage venture funds, later stage venture funds, buy-out funds, etc., is the same as the year before, this supply shock will be less harmful than in the case where the 10% increase has to be swallowed by early stage funds alone. This is the more true, of course, the more segmented the private equity industry is in itself. Given that funds often are committed to invest only in firms of specific stages such a segmentation could, in fact, arise.

So, our basic idea is that competition for valuable investment projects is much more affected, if additional money is unequally distributed between the different fund types. This is why we distinguish between the absolute fund inflow in the private equity industry and the relative fund inflow, i.e. the allocation of money between the venture capital and the buy-out funds. The former can be regarded as a measure for the perception of investment opportunities while the latter is a measure for the intensity of deal competition. According to the 'money chasing deals' phenomenon we would expect the absolute inflow to have a positive impact on fund returns, while the relative inflow should have a negative impact. Moreover, it has already been emphasized that venture funds may be more affected by segmentation and stickiness than buy-out funds. Hence, we expect an increase in the fraction of money directed towards venture fund to have a stronger negative impact on returns than an increase in the fraction of money directed towards buy-out funds.

This is exactly corroborated by the results of our regression analysis. Before discussing the results it should be mentioned that we have chosen a WLS-regression approach due to the existence of heteroscedasticity in our data set. In fact, figure 1 reveals that IRR variance may be substantially higher for small funds than for large funds. Actually, by applying a Levene-test the null-hypothesis that residuals have equal variance has to be rejected on a 5% sig-

nificance level, as can be seen from table 10. This is why we decided to use a WLS-regression approach.

Insert figure 1

Insert table 10

Regression specifications (1) to (3) in table 11 reveal that, as predicted, the absolute fund inflow of a particular year has a positive impact on the return of the funds closed in that particular year. This result still holds, even if we use the change in the absolute fund inflow instead of the absolute money inflow, as can be seen from regression specifications (4) to (6) in the same table. The relative inflow, i.e. the share of capital that goes to that particular fund type, has a negative impact on the fund's returns, as predicted. Both effects are statistically highly significant and do not change in different regression specifications. Moreover, in regression equations (2) and (5) we use the relative funds allocated to venture funds only as an independent variable. Also in this case the regression parameter is negative and highly significant. If instead the relative funds allocated to buy-out funds only are used as an independent variable we got no significant effect.[21] Hence, the change in the fraction of funds allocated to a particular fund type has a clear impact on venture fund returns, while no impact can be detected for buy-out funds. In our view, these findings strongly corroborate the 'money chasing deals' phenomenon.

It should be noted that we also find a negative impact of the stock market return in the vintage year of the fund on its final return. Hence, we could say that fund returns are the lower the better the market sentiment in the vintage year is. This finding supports the idea that the over- or undershooting of capital supply in the private equity industry might have a behavioral explanation.

Insert table 11 to 14

Tables 12 to 14 give the results for the same regression specifications used in table 11 with the important difference, however, that the Excess-IRR or the PME is used as dependent variable. As one can see, most of the results are unchanged, at least as far as the sign and the significance of the regression parameters are concerned. Finally, it should be noted that the regression approach presented in tables 11 to 14 is able to explain up to 47% of cross-sectional variance of fund returns. This is a remarkable result supporting our confidence in the model that we proposed. Evidently, the 'money chasing deals' phenomenon accounts for a perceivable part of return variation in private equity funds. According to the VIFs the model is not affected by a multicollinearity problem. Moreover, all results seem to be robust, as the outcome of the bootstrap regression approach suggests. There, we did a random resampling of the data set by making 200 independent draws with replacement. Then the WLS-regression was recalculated for this new data set. These steps were repeated for 1'000 times.

[21] For simplicity, not all of the regression results are reported here.

In this way we got a distribution for all the regression parameters allowing us to calculate different confidence levels. The results are reported in tables 15 to 17. As one can see, the difference in the regression parameter estimation is small in size as well as with respect to significance levels.

Insert table 15 to 17

4.3 The Impact of GPs' Skills and Risk on Fund Performance

As expected we also find statistically significant evidence for persistence in fund returns. The results suggest that an increase of 1 percentage point in the IRR of the preceding fund leads to an increase of about 0.5 percentage points in the IRR of the follow-on fund. As it has been explained, this results fits nicely into the picture of a sticky and segmented asset class. This is even more true, as we do not find market timing abilities to be accountable for persistent returns. In fact, this is exactly what we would expect for a fund industry with sticky capital flows. It should be noted here that we use a market timing ability variable proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). This variable basically expresses whether a GP tends to call a take-down during a phase of low market valuation.

One important question that is yet unanswered in the literature is to what degree private equity returns can be explained by the stand alone risk and/or systematic risk of the fund's investment policy. As has been reported in section 2, results reported in the literature are quite inconclusive in this regard. To a certain extent this may be due to the fact that it is rather unclear how riskiness should be measured for an illiquid asset class. Here we propose two measures of riskiness. First, the investment policy as defined by the fund stage can be regarded as a measure of the stand alone risk of a fund. As can be seen from tables 11 to 14 we find clear support that a riskier investment policy, characterized by the fund stage, leads to higher returns. For that purpose we defined 5 different stage categories, three for the venture funds and two for the buy-out funds.[22] These stages are assigned numbers from 0 to 4, where the highest risky stage, i.e. early stage, got the number 0 and the stages with lowest risk, i.e. private equity, got the number 4. As we can see from tables 11 to 14, there is a significant difference in returns for the different stages. The expectation of this difference is between 2 and 3 percentage points for every stage tier. Hence, the expected difference in the IRR between an early stage fund and a private equity fund is in the range of 8 to 12 percentage points. This result is in accordance with the model proposed by Jones and Rhodes-Kropf (2002) showing that due to principal-agent problems venture capital returns should be negatively affected by the amount of idiosyncratic risk.

As far as the stock market risk is concerned our evidence suggests that private equity funds' returns are not influenced by stock market returns. Hence, it seems that this kind of systematic risk is not present in this asset class, or at least cannot be detected in our model. What is even more surprising is the fact

[22]The stages for the venture funds are early stage, balanced/diversified, later stage. For the buy-out funds we have the stage leveraged buy-out and private equity.

that private equity returns are negatively correlated with the overall economic development as measured by the GDP growth. Tables 11 to 14 document a significant negative impact of the economic growth over the lifetime of the fund on the fund's IRR, Excess-IRR or PME.[23] Both results are puzzling and deserve additional attention beyond the reach of this paper. Basically, the question is whether this result is driven by the fact that the IRR is a biased return measure or whether there is an economic logic behind this result. At a first glance, however, it supports the assertion that private equity is an asset class with low market risk.

5 Conclusion

In this paper a comprehensive data set of European private equity funds provided by TVE was analyzed. Our main focus was to give new insights into the determinants of funds' returns. For that purpose we started from the presumption that this asset class is characterized by illiquidity, stickiness and segmentation. It has been argued in theoretical and empirical papers that these characteristics can cause an over- or undershooting of private equity asset prices, at least in the short run. Most importantly, Gompers and Lerner (2000) have shown that venture deal valuations are driven by overall fund inflows into the industry giving way to the so called 'money chasing deals' phenomenon. Also, Ljungqvist and Richardson (2003a) have shown that the investment behavior of a GP depends on fund inflows into the industry. It was the aim of this paper to document that this phenomenon also explains a significant part of variation in private equity funds' returns. This is especially true for venture funds, as they are more affected by illiqudity and segmentation than buy-out funds. Actually, the paper presents a WLS-regression model that is able to explain up to 47% of variation in funds' returns. Apart from the importance of fund flows we can also show that market sentiment, the GPs' skills as well as the idiosyncratic risk of a fund have a significant impact on its returns. Moreover, they seem to be unrelated to stock market returns and negatively correlated with the development of the economy as a whole. According to a bootstrapping inference the results seem to be quite stable.

[23] It should be noted here that the economic growth over lifetime variable is uncorrelated with the lifetime MSCI return variable as well as with the lifetime private equity industry inflows.

References

Chen, P., G. T. Baierl, and P. D. Kaplan (2002). Venture capital and its role in strategic asset allocation. *Journal of Portfolio Management 28*(Winter), 83–89.

Cochrane, J. H. (2004, May). The risk and return of venture capital. Working Paper.

Cornelli, F., D. Goldreich, and A. Ljungqvist (2004). Investor sentiment and pre-issue markets. Working Paper, NYU Stern School, Departement of Finance.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers (1997). Measuring mutual fund performance with characteristic-based benchmarks. *Journal of Financial and Quantitative Analysis 52*, 1035–1058.

Deaves, R. (2004). Data-conditioning biases, performance, persistence and flows: The case of canadian equity funds. *Journal of Banking and Finance 28*, 673–694.

Emery, K. (2003). Private equity risk and reward: Assessing the stale pricing problem. *Journal of Private Equity 6*(Spring), 43–50.

Getmansky, M., A. W. Lo, and I. Makarov (2003, April). An econometric model of serial correlation and illiquidity in hedge fund returns. MIT LFE Working Paper No.LFE-1041A-03.

Goetzmann, W., J. Ingersoll, and Z. Ivkovich (2000). Monthly measurement of daily timers. *Journal of Financial and Quantitative Analysis 35*, 257–290.

Gompers, P. A. and J. Lerner (1999). *The Venture Capital Cycle*. Cambridge: MIT Press.

Gompers, P. A. and J. Lerner (2000). Money chasing deals? The impact of fund inflows on private equity valuations. *Journal of Financial Economics 55*, 281–325.

Gottschalg, O., L. Phalippou, and M. Zollo (2004). Performance of private equity funds: Another puzzle? Working Paper, INSEAD.

Hendricks, D., J. Patel, and R. Zeckhauser (1993). Hot hands in mutual funds: Short-run persistence of relative performance, 1974-1988. *Journal of Finance 48*, 93–130.

Henriksson, R. D. (1984). Market timing and mutual fund performance: An empirical analysis. *Journal of Business 57*, 73–96.

Inderst, R. and H. M. Müller (2004). The effect of capital market characteristics on the value of start-up firms. *Journal of Financial Economics 73*, forthcoming.

Jones, C. M. and M. Rhodes-Kropf (2002, March). The price of diversifiable risk in venture capital and private equity. Working Paper.

Kaplan, S. N. and A. Schoar (2004). Private equity performance: Returns, persistence and capital. Sloan School of Management Working Paper (available on SSRN).

Kaserer, C. and C. Diller (2004). Beyond irr once more. *Private Equity International* (July/August).

Lin, C. Y. and K. Yung (2004). Real estate mutual funds: Performance and persistence. *Journal of Real Estate Research 26*, 70–93.

Ljungqvist, A. and M. Richardson (2003a). The investment behavior of private equity fund managers. NYU Stern Working Paper.

Ljungqvist, A. and M. Richardson (2003b). The cash flow, return and risk characteristics of private equity. NBER Working Paper 9454, http://www.nber.org/papers/w9454.

MacKinnon, J. G. (2002). Bootstrap inference in econometrics. *Canadian Journal of Economics 35*, 615–645.

Madura, J. and M. K. Bers (2002). The performance persistence of foreign closed-end funds. *Review of Financial Economics 11*, 263–285.

Nowak, E., A. Knigge, and D. Schmidt (2004, March). On the performance of private equity investments: Does market timing matter? Working Paper.

Rouvinez, C. (2003). How volatile is private equity? *Private Equity International* (June), 22–24.

Stefano, C. and G. Stefano (2004). *Venture Capital - A Euro System Approach*. Milan.

Timmons, J. A. and W. D. Bygrave (1992). *Venture Capital at the Crossroads*. Cambridge: Harvard Business School Press.

Weidig, T. and P.-Y. Mathonet (2004, January). The Risk Profiles of Private Equity. SSRN Working Paper Series, http://ssrn.com/abstract=495482.

Zimmermann, H., S. Bilo, H. Christophers, and M. Degosciu (2004). The risk and return of publicly traded private equity. WWZ/Department of Finance, Working Paper No. 6/04.

Table 1: Private equity funds' type and stage definitions

Type definitions:

- Venture capital funds (VC): TVE uses the term to describe the universe of venture investing. It does not include buyout investing, mezzanine investing, fund of fund investing or secondaries. Angel investors or business angels are also not be included in the definition.
- Buyout funds (BO): TVE uses the term to describe the universe of buyout investing and mezzanine investing. It does not include venture investing, fund of fund investing or secondaries. Angel investors or business angels are also not be included in the definition.

Stage definitions:

- Early Stage (ES): A fund investment strategy involving investment in companies for product development and initial marketing, manufacturing and sales activities. We included seed and start-up funds in this definition.
- Balanced/Diversified (B): A venture fund investment strategy that includes investment in portfolio companies at a variety of stages of development (Seed, Early Stage, Diversified, Later Stage).
- Late Stage (LS): Development funds provide for the major growth expansion of a company whose sales volume is increasing. Although the company has clearly made progress, it may not yet be showing a profit. The money invested is used to finance the initial development of the young company. Later stage fund investment involves financing the expansion of a company which is producing, shipping and increasing its sales volume. In this definition, we included all the funds which stage is signed as development(DEV), expansion(EX) and Late Stage (LS).
- Buyout (BO): TVE uses the term to describe the universe of buyout investing and mezzanine investing. It does not include venture investing, fund of fund investing or secondaries. Angel investors or business angels are also not be included in the definition. The definition involves e.g. leverage buyouts (LBOs), management buyouts (MBOs) and bridge financing.

Table 2: Characteristics of Total Funds Sample 1980-2003[a]

Type of Funds	All	Venture Capital Funds			VC	BO
Stage of Funds		Early Stage	Balanced	Late Stage	Total	Total
# of Funds	777	197	116	143	456	321
in %	100.0%	25.4%	14.9%	18.4%	58.7%	41.3%
Size (EURm)						
Average	182.75	70.89	144.13	60.50	86.26	319.81
Median	47.80	28.20	40.35	30.00	31.20	85.20
Stdev	513.04	122.55	435.79	109.38	243.66	722.35

	All	Liquidated Funds	Non-liquidated Funds
# of Funds	777	95	682
in %	100.0%	12.2%	87.8%
Size (EURm)			
Average	182.75	52.14	202.87
Median	47.80	26.20	53.10
Stdev	513.04	103.62	546.30

[a] The complete data set provided by Thomson Venture Economics (TVE) includes 777 European private equity funds. TVE uses the term private equity to describe the universe of all venture investing, buyout investing and mezzanine investing. In accordance with TVE we use the following type definitions: Venture capital funds (VC) represent the universe of venture investing. It does not include buyout investing, mezzanine investing, fund of fund investing or secondaries. Angel investors or business angels are also not be included in the definition. Buyout funds (BO) represent the universe of buyout investing and mezzanine investing. Moreover, the following stage definitions are used: Early Stage (ES) is a fund investment strategy involving investment in companies for product development and initial marketing, manufacturing and sales activities. We included seed and start-up funds in this definition. Balanced/Diversified (B)is a venture fund investment strategy that includes investment in portfolio companies at a variety of stages of development (Seed, Early Stage, Diversified, Later Stage). Late Stage funds include development funds that provide for the major growth expansion of a company whose sales volume is increasing. Later stage fund investment also involves financing the expansion of a company which is producing, shipping and increasing its sales volume. Size is measured as total capital committed to a fund.

Table 3: Number of Observations and Size in the Three Data Sets Used

	Liquidated Funds	Sample I	Sample II
Number of Observations			
VC	47	99	131
BO	48	101	131
Total	95	200	262
Size in mio. Euro			
Average	52.14	78.05	121.24
Median	26.20	33.10	39.10
Stdev	103.62	128.89	433.76

Table 4: Characteristics of Funds in Sample I

Vintage Year	N	Sum Take-Downs	Mean Multiple	Mean Lifetime
1980	1	5.18	4.02	21.00
1981	4	79.34	1.88	15.00
1982	1	17.38	1.14	10.00
1983	4	66.78	1.64	16.75
1984	8	179.30	1.57	17.13
1985	17	414.66	1.42	13.82
1986	15	297.37	1.29	13.07
1987	19	1'506.52	1.68	13.74
1988	31	1'221.38	1.33	12.48
1989	25	2'161.84	2.57	12.64
1990	18	1'587.27	1.90	11.56
1991	15	552.84	1.68	11.13
1992	9	297.82	2.40	11.00
1993	8	670.00	2.29	8.13
1994	9	1'445.49	2.31	8.67
1995	3	606.96	1.49	8.00
1996	3	30.07	5.95	5.33
1997	6	677.22	1.63	5.50
1998	2	203.59	1.07	5.00
1999	1	37.26	2.04	4.00
2000	1	8.16	5.29	3.00

Table 5: Coefficient of correlation between four different return measures (Sample I, 200 funds)[a]

		IRR	Excess-IRR	Payback
	VC-Funds			
PME	Pearson Correlation Coefficient	0.893***	0.876***	-0.539***
	Prob. (2-sided)	0.000	0.000	0.000
	N	101	101	77
IRR	Pearson Correlation Coefficient	1	0.992***	-0.618***
	Prob. (2-sided)		0.000	0.000
	N		101	77
Excess-IRR	Pearson Correlation Coefficient		1	-0.611***
	Prob. (2-sided)			0.000
	N			77
	BO-Funds			
PME	Pearson Correlation Coefficient	0.900***	0.892***	-0.696***
	Prob. (2-sided)	0.000	0.000	0.000
	N	99	99	80
IRR	Pearson Correlation Coefficient	1	0.983***	-0.643***
	Prob. (2-sided)		0.000	0.000
	N		99	80
Excess-IRR	Pearson Correlation Coefficient		1	-0.697***
	Prob. (2-sided)			0.000
	N			80
	All Funds			
PME	Pearson Correlation Coefficient	0.873***	0.862***	-0.500***
	Prob. (2-sided)	0.000	0.000	0.000
	N	200	200	157
IRR	Pearson Correlation Coefficient	1	0.989***	-0.594***
	Prob. (2-sided)		0.000	0.000
	N		200	157
Excess-IRR	Pearson Correlation Coefficient		1	-0.610***
	Prob. (2-sided)			0.000
	N			157

***Coefficient of correlation is significant at the 1%-level, at least.

[a] The PME is the ratio of the present value of all cash distributions over the present value of all take-downs. Hereby, the year-by-year realized return on the MSCI Europe is used as the discount rate. In order to take into account management fees of a public equity investment we multiplied the yearly realized index return with 0.995; i.e. we assumed management fees of a public equity investment to be equal to 50bp per year. The IRR is the discount rate making the present value of all distributions equal to the present value of all take-downs. The payback counts the number of months it takes before cumulated distributions equal cumulated take-downs. Of course, not all funds in our sample have a payback period. Reported correlation coefficients, hence, refer to a subset of funds having a finite payback period.

Table 6: Distribution of IRR and payback period for different fund types[a]

IRR and Payback	IRR(CF)			Payback in months		
	VC	BO	Total	VC	BO	Total
Liquidated Funds						
Average	7.32%	12.64%	10.01%	108.53	83.63	94.62
Median	4.77%	9.79%	7.28%	110.00	84.50	95.50
75th Percentile	12.98%	18.67%	14.24%	143.50	113.75	120.50
25th Percentile	-4.00%	8.23%	0.00%	87.50	62.25	66.50
Min	-12.12%	-13.66%	-13.66%	32.00	21.00	21.00
Max	103.73%	88.05%	103.73%	215.00	139.00	215.00
Stdev	17.82%	17.67%	17.85%	41.38	33.61	38.99
Sample I						
Average	12.00%	13.39%	12.69%	102.79	78.38	90.35
Median	8.05%	10.80%	9.14%	104.00	70.00	90.00
75th Percentile	15.65%	18.76%	17.13%	127.50	106.75	118.50
25th Percentile	1.90%	9.00%	4.45%	74.50	54.25	61.50
Min	-13.56%	-13.66%	-13.66%	16.00	20.00	16.00
Max	153.91%	88.05%	153.91%	215.00	169.00	215.00
Stdev	22.06%	16.18%	19.34%	41.90	33.94	39.86
Sample II						
Average	12.50%	15.63%	14.07%	99.58	81.48	90.09
Median	7.40%	11.00%	9.56%	96.50	71.00	84.00
75th Percentile	16.31%	19.95%	18.17%	127.00	108.75	118.00
25th Percentile	0.00%	1.69%	0.05%	69.50	54.25	60.75
Min	-13.56%	-13.66%	-13.66%	16.00	18.00	16.00
Max	181.90%	133.25%	181.90%	215.00	200.00	215.00
Stdev	24.95%	20.59%	22.89%	42.84	37.35	40.97

[a] The IRR is the discount rate making the present value of all distributions equal to the present value of all take-downs. The payback counts the number of months it takes before cumulated distributions equal cumulated take-downs. Of course, not all funds in our sample have a payback period. Reported correlation coefficients, hence, refer to a subset of funds having a finite payback period.

Table 7: Excess-IRR of private equity funds with respect to MSCI Europe[a]

Excess-IRR of MSCI Europe	VC	BO	Total
Liquidated Funds			
Average	-2.27%	3.37%	0.58%
Median	-4.17%	-0.77%	-2.70%
75th Percentile	1.76%	9.47%	5.21%
25th Percentile	-10.84%	-7.08%	-9.21%
Min	-22.24%	-24.00%	-24.00%
Max	90.99%	84.13%	90.99%
Stdev	17.41%	19.14%	18.42%
Number of Ob.	47	48	95
Sample I			
Average	3.62%	5.29%	4.45%
Median	-1.37%	1.57%	0.61%
75th Percentile	5.94%	12.56%	10.24%
25th Percentile	-8.02%	-6.17%	-7.32%
Min	-22.24%	-24.00%	-24.00%
Max	169.35%	84.13%	169.35%
Stdev	24.27%	17.16%	21.01%
Number of Ob.	101	99	200
Sample II			
Average	5.10%	8.25%	6.68%
Median	0.64%	3.53%	1.71%
75th Percentile	8.22%	12.87%	11.23%
25th Percentile	-6.99%	-5.04%	-5.92%
Min	-22.24%	-20.00%	-22.24%
Max	176,0%	127.00%	176.00%
Stdev	25.07%	20.63%	22.96%
Number of Ob.	131	131	262

[a] The excess IRR is defined as a fund's IRR minus the return on the MSCI Europe equity index that can be achieved by investing at fund closing and selling at the end of a fund's lifetime.

Table 8: PME and BME of Private Equity Funds by Sample Definitions[a]

	PME			BME		
	VC	BO	Total	VC	BO	Total
Liquidated Funds						
Average	0.82	0.90	0.86	1.11	1.07	1.09
Median	0.68	0.89	0.80	0.81	1.09	0.99
75th Percentile	0.97	1.24	1.10	1.38	1.37	1.38
25th Percentile	0.33	0.51	0.42	0,54	0.64	0.58
Min	0.07	0.06	0.06	0.07	0.09	0.07
Max	6.97	2.79	6.97	10.45	2.95	10.45
Stdev	1.01	0.53	0.81	1.51	0.60	1.14
Value-weighted			0.94			1.21
Sample I						
Average	0.98	0.94	0.96	1.14	1.24	1.20
Median	0.75	0.86	0.82	1.06	1.02	1.03
75th Percentile	1.17	1.24	1.23	1.44	1.43	1.43
25th Percentile	0.40	0.59	0.51	0.66	0.63	0.66
Min	0.01	0.06	0.01	0.02	0.09	0.02
Max	6.97	2.79	6.97	10.45	2.95	10.45
Stdev	1.15	0.51	0.89	1.02	0.59	1.11
Value-weighted			1.04			1.27
Sample II						
Average	1.01	1.06	1.03	1.25	1.21	1.23
Median	0.76	0.92	0.85	0.99	1.13	1.07
75th Percentile	1.22	1.35	1.27	1.27	1.42	1.45
25th Percentile	0.44	0.61	0.55	0.60	0.77	0.66
Min	0.01	0.06	0.01	0.02	0.09	0.02
Max	7.27	4.61	7.27	10.45	5.27	10.45
Stdev	1.15	0.70	0.95	1.38	0.74	1.10
Value-weighted			1.16			1.30

[a] The PME is the ratio of the present value of all cash distributions over the present value of all take-downs. Hereby, the year-by-year realized return on the MSCI Europe is used as the discount rate. In order to take into account management fees of a public equity investment we multiplied the yearly realized index return with 0.995; i.e. we assumed management fees of a public equity investment to be equal to 50bp per year. The BME is defined in the same way as the PME with the difference that the JP Morgan Government bond index is used to determine the discount rates. In order to take into account management fees of a public bond investment we multiplied the yearly realized index return with 0.998; i.e. we assumed management fees of a public bond investment to be equal to 20bp per year.

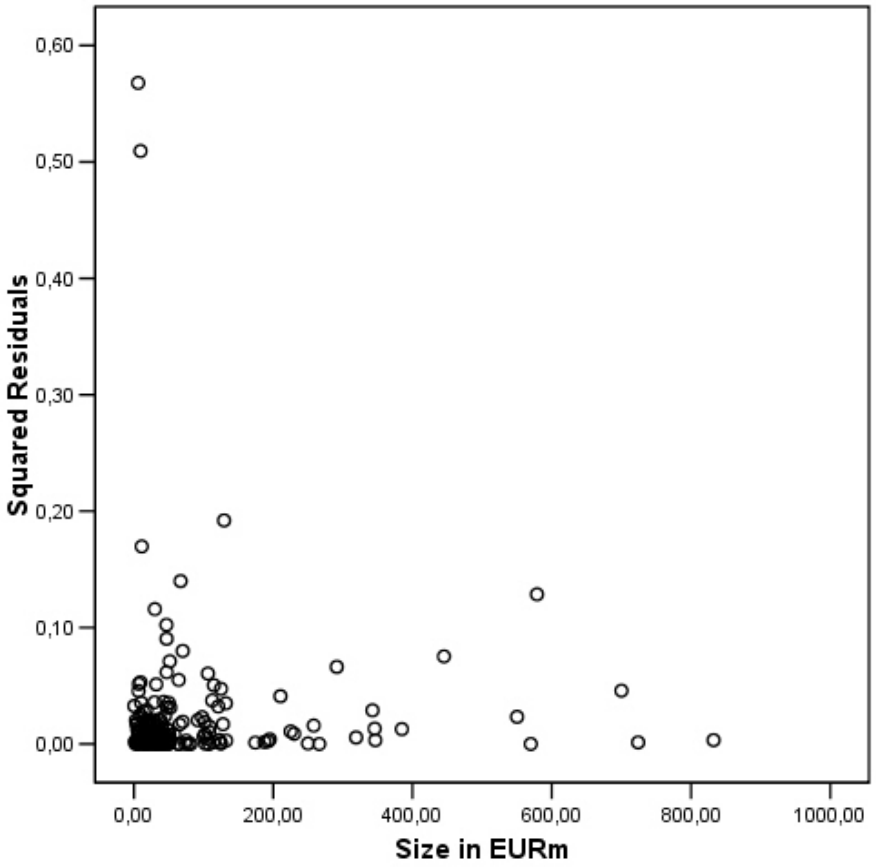
Table 9: Coefficient of correlation for different independent variables (1983-2000)[a]

		# of Patents	Inflow PE	Inflow VC	Inflow BO	MSCI return
# of IPOs	Pearson Correlation Coefficient	0.773***	0.933***	0.896***	-0.950***	-0.119
	Prob. (2-sided)	0.000	0.000	0.000	0.000	0.709
# of Patents	Pearson Correlation Coefficient	1	0.914***	0.867***	0.928***	-0.101
	Prob. (2-sided)		0.000	0.000	0.000	0.709
Inflow PE	Pearson Correlation Coefficient		1	0.984***	0.988***	-0.098
	Prob. (2-sided)			0.000	0.000	0.709
Inflow VC	Pearson Correlation Coefficient			1	0.944***	-0.170
	Prob. (2-sided)				0.000	0.513
Inflow BO	Pearson Correlation Coefficient				1	-0.043
	Prob. (2-sided)					0.870

Coefficients of correlation marked with *** are significant at the 1%-level, at least.

[a] All variables are recorded on an annual basis. # of Patents is the number of patents registered with European patent office. # of IPOs refers to the number of IPOs in Germany, as a European figure is not available over this time period. Inflow PE, VC, and BO is the investment volume in private equity, venture capital or buy-out funds as recorded by the EVCA. MSCI return is the yearly return of the MSCI Europe equity index.

Figure 1: Squared residuals plotted against size variable (Sample I, 200 Funds)



Unstandardaized residuals used in this plot where obtained from estimating equation (1) in table **??**.

Table 10: Levene-test on variance difference of residual deciles (Sample I, 200 Funds)[a]

		Levene Statistic	df1	df2	Sig.
Unstandardized residuals	based on mean	2,024	9	180	0,039
	based on median	1,571	9	180	0,127

[a] Residuals used in this test where obtained from estimating equation (1) in table **??**. The null hypothesis in the Levene-test is that the variance of k groups formed by the unstandardized residuals are all equal. As can be seen, in the mean-based test the null hypothesis has to be rejected at a 5%-level.

Table 11: WLS estimation results on fund returns: IRR as dependent variable (Sample I, 200 Funds)[a]

Sample I	Dependent Variable: IRR																	
	(1)		VIF	(2)		VIF	(3)		VIF	(4)		VIF	(5)		VIF	(6)		VIF
Constant	0.875			0.722			0.697			1.327			1.121			0.948		
	(0.000)	***		(0.000)	***		(0.000)	***		(0.000)	***		(0.000)	***		(0.000)	***	
Stage	-0.032		1.930	-0.034		3.409	-0.024		2.001	-0.046		1.858	-0.051		3.280	-0.032		2.091
	(0.011)	**		(0.040)	**		(0.039)	**		(0.000)	***		(0.004)	***		(0.014)	**	
MSCI return p.y.	0.110		1.221	0.113		1.234	-0.057		1.274	0.009		1.156	0.016		1.179	-0.101		1.175
	(0.142)			(0.143)			(0.472)			(0.909)			(0.846)			(0.211)		
MSCI return in VY	-0.104		1.151	-0.100		1.152	-0.081		1.159	-0.139		1.167	-0.131		1.166	-0.087		1.209
	(0.044)	**		(0.059)	*		(0.111)			(0.009)	***		(0.016)	**		(0.101)		
GDP growth rate p.y.	-0.231		1.024	-0.227		1.024	-0.154		1.032	-0.319		1.096	-0.312		1.096	-0.208		1.207
	(0.000)	***		(0.000)	***		(0.007)	***		(0.000)	***		(0.000)	***		(0.002)	***	
IRR of preceding fund, else 0	0.459		1.027	0.385		1.037	0.511		1.036	0.425		1.032	0.372		1.046	0.505		1.042
	(0.028)	**		(0.071)	*		(0.009)	***		(0.044)	**		(0.087)	*		(0.012)	**	
VC fund inflow relative				-0.159		3.263							-0.190		3.175			
				(0.017)	**								(0.007)	***				
Fund Type inflow relative	-0.408		1.841				-0.318		2.007	-0.519		1.776				-0.352		2.006
	(0.000)	***					(0.005)	***		(0.000)	***					(0.009)	***	
Fund type inflow absolute	0.066		1.129	0.063		1.138	0.037		1.221									
	(0.000)	***		(0.000)	***		(0.003)	***										
Absolute difference										0.127		1.108	0.119		1.100	0.058		1.325
of fund type inflow										(0.000)	***		(0.000)	***		(0.052)	*	
Timing Take Downs 36mths							-0.029		1.068							-0.028		1.071
							(0.190)									(0.230)		
N	190			190			158			182			182			152		
Adjusted R^2	0.391			0.364			0.166			0.344			0.310			0.143		
Significance	0.000			0.000			0.000			0.000			0.000			0.000		
Power Value	-0.100			-0.100			0.100			-0.200			-0.200			0.000		
Log-likelihood	95.776			91.775			105.242			86.465			81.940			96.761		

[a] As dependent variables we use the IRR, as defined in the text. *Stage* is an ordinal variable where we assigned the following numbers to funds with different stage focus: Early Stage=0, Balanced/Diversified=1, Developed/Late Stage=2, LBO=3 and Private Equity=4. We assume the investment policy of a fund to be the riskier the lower the value of this variable is. *MSCI return p.y.* is the annualized return over the lifetime of the fund. *MSCI return in VY* is the return in the vintage year. *GDP growth rate p.y.* is the annualized growth over the lifetime of the fund. *IRR of preceding fund, else 0* is the IRR of the preceding fund, if one exists, otherwise it is set to zero. *Fund type inflow relative* is the ratio of total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *VC fund inflow relative* is the ratio of total funds allocated to funds during the vintage year of the fund, if it is a VC fund, else it is zero. *Fund type inflow absolute* are total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *Absolute difference of fund type inflow* between the fund type inflow of the Vintage Year and the year before. *Timing Take Downs 36 mths* is defined according to the definition proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). The variable is supposed to measure the timing ability of the fund manager. The weight applied to each observation is $Size^{PowerValue}$. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided).

Table 12: WLS estimation results on fund returns: Excess-IRR as dependent variable (Sample I, 200 Funds)[a]

Sample I	Dependent Variable: Excess-IRR																	
	(1)		VIF	(2)		VIF	(3)		VIF	(4)		VIF	(5)		VIF	(6)		VIF
Constant	0.758			0.612			0.552			1.306			1.102			0.969		
	(0.000)	***		(0.001)	***		(0.002)	***		(0.000)	***		(0.000)	***		(0.000)	***	
Stage	-0.027		1.894	-0.031		3.311	-0.023		1.966	-0.048		1.788	-0.057		3.094	-0.038		2.016
	(0.027)	**		(0.064)	*		(0.053)	*		(0.000)	***		(0.001)	***		(0.004)	***	
MSCI return p.y.																		
MSCI return in VY	-0.086		1.051	-0.081		1.050	-0.098		1.069	-0.153		1.053	-0.144		1.049	-0.122		1.113
	(0.084)	*		(0.109)			(0.050)	**		(0.003)	***		(0.006)	***		(0.022)	**	
GDP growth rate p.y.	-0.220		1.017	-0.215		1.018	-0.150		1.018	-0.337		1.082	-0.329		1.083	-0.249		1.150
	(0.000)	***		(0.000)	***		(0.010)	***		(0.000)	***		(0.000)	***		(0.000)	***	
IRR of preceding fund, else 0	0.432		1.027	0.359		1.037	0.496		1.035	0.383		1.032	0.321		1.045	0.456		1.040
	(0.040)	**		(0.095)	*		(0.012)	**		(0.074)	*		(0.144)			(0.027)	**	
VC fund inflow relative				-0.158		3.211							-0.216		3.082			
				(0.017)	**								(0.002)	***				
Fund type inflow relative	-0.397		1.831				-0.325		1.986	-0.542		1.759				-0.383		1.997
	(0.000)	***					(0.005)	***		(0.000)	***					(0.006)	***	
Fund type inflow absolute	0.079		1.035	0.076		1.055	0.056		1.064									
	(0.000)	***		(0.000)	***		(0.000)	***										
Absolute difference										0.159		1.081	0.150		1.079	0.103		1.272
of fund type inflow										(0.000)	***		(0.000)	***		(0.001)	***	
Timing Take Downs 36mths							-0.030		1.062							-0.025		1.060
							(0.185)									(0.298)		
N	190			190			158			182			182			152		
Adjusted R^2	0.470			0.450			0.209			0.416			0.390			0.159		
Significance	0.000			0.000			0.000			0.000			0.000			0.000		
Power Value	-0.100			-0.100			0.100			-0.200			-0.200			0.000		
Log-likelihood	93.607			90.066			101.789			82.896			78.955			91.383		

[a] As dependent variables we use the Excess-IRR, as defined in the text. *Stage* is an ordinal variable where we assigned the following numbers to funds with different stage focus: Early Stage=0, Balanced/Diversified=1, Developed/Late Stage=2, LBO=3 and Private Equity=4. We assume the investment policy of a fund to be the riskier the lower the value of this variable is. *MSCI return p.y.* is the annualized return over the lifetime of the fund. *MSCI return in VY* is the return in the vintage year. *GDP growth rate p.y.* is the annualized growth over the lifetime of the fund. *IRR of preceding fund, else 0* is the IRR of the preceding fund, if one exists, otherwise it is set to zero. *Fund type inflow relative* is the ratio of total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *VC fund inflow relative* is the ratio of total funds allocated to funds during the vintage year of the fund, if it is a VC fund, else it is zero. *Fund type inflow absolute* are total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *Absolute difference of fund type inflow* between the fund type inflow of the Vintage Year and the year before. *Timing Take Downs 36 mths* is defined according to the definition proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). The variable is supposed to measure the timing ability of the fund manager. The weight applied to each observation is $Size^{PowerValue}$. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided).

Table 13: WLS estimation results on fund returns: PME as dependent variable (Sample I, 200 Funds)[a]

Sample I	Dependent Variable: PME											
	(1)		VIF	(2)		VIF	(3)		VIF	(4)		VIF
Constant	3.246			2.595			3.333			3.245		
	(0.000)	***		(0.002)	***		(0.000)	***		(0.000)	***	
Stage	-0.114		1.868	-0.086		3.609	-0.098		1.970	-0.116		1.893
	(0.041)	**		(0.277)			(0.024)	**		(0.041)	**	
MSCI return p.y.										0.060		1.249
										(0.869)		
MSCI return in VY	-0.286		1.047	-0.237		1.039	-0.250		1.062	-0.296		1.131
	(0.172)			(0.262)			(0.156)			(0.175)		
GDP growth rate p.y.	-0.598		1.025	-0.596		1.028	-0.697		1.027	-0.604		1.042
	(0.032)	**		(0.035)	**		(0.001)	***		(0.032)	**	
PME of preceding fund, else 0	0.099		1.032	0.078		1.039	0.085		1.049	0.099		1.032
	(0.401)			(0.518)			(0.385)			(0.403)		
VC fund inflow relative				0.167		3.555						
				(0.000)	***							
Fund Type inflow relative	-1.435		1.845				-1.037		2.000	-1.441		1.852
	(0.009)	***					(0.013)	**		(0.009)	***	
Fund type inflow absolute	0.181		1.031	-0.324		1.056	0.113		1.063	0.183		1.191
	(0.000)	***		(0.300)			(0.006)	***		(0.000)	***	
Absolute difference of fund type inflow												
Timing Take Downs 36mths							-0.079		1.070			
							(0.333)					
N	190			190			158			182		
Adjusted R^2	0.147			0.119			0.112			0.142		
Significance	0.000			0.000			0.001			0.000		
Power Value	-0.500			-0.500			0.000			-0.500		
Log-likelihood	-203.435			-206.447			-99.719			-203.441		

[a] As dependent variables we use the PME, as defined in the text. *Stage* is an ordinal variable where we assigned the following numbers to funds with different stage focus: Early Stage=0, Balanced/Diversified=1, Developed/Late Stage=2, LBO=3 and Private Equity=4. We assume the investment policy of a fund to be the riskier the lower the value of this variable is. *MSCI return p.y.* is the annualized return over the lifetime of the fund. *MSCI return in VY* is the return in the vintage year. *GDP growth rate p.y.* is the annualized growth over the lifetime of the fund. *PME of preceding fund, else 0* is the PME of the preceding fund, if one exists, otherwise it is set to zero. *Fund type inflow relative* is the ratio of total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *VC fund inflow relative* is the ratio of total funds allocated to funds during the vintage year of the fund, if it is a VC fund, else it is zero. *Fund type inflow absolute* are total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *Absolute difference of fund type inflow* between the fund type inflow of the Vintage Year and the year before. *Timing Take Downs 36 mths* is defined according to the definition proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). The variable is supposed to measure the timing ability of the fund manager. The weight applied to each observation is $Size^{PowerValue}$. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided).

Table 14: WLS estimation results on fund returns (II) - PME as dependent variable (Sample I, 200 Funds)[a]

Sample I	Dependent Variable: PME											
	(5)		VIF	(6)		VIF	(7)		VIF	(8)		VIF
Constant	4.533			3.695			4.195			4.497		
	(0.000)	***		(0.000)	***		(0.000)	***		(0.000)	***	
Stage	-0.157		1.820	-0.138		3.471	-0.134		2.019	-0.152		1.860
	(0.005)	***		(0.081)	*		(0.004)	***		(0.008)	***	
MSCI return p.y.										-0.222		1.129
										(0.526)		
MSCI return in VY	-0.338		1.066	-0.276		1.052	-0.281		1.094	-0.305		1.133
	(0.099)	*		(0.183)			(0.122)			(0.149)		
GDP growth rate p.y.	-0.894		1.122	-0.870		1.128	-0.904		1.161	-0.863		1.156
	(0.002)	***		(0.004)	***		(0.000)	***		(0.004)	***	
PME of preceding fund, else 0	0.145		1.051	0.128		1.061	0.094		1.046	0.147		1.051
	(0.205)			(0.278)			(0.350)			(0.201)		
VC fund inflow relative				-0.424		3.501						
				(0.177)								
Fund Type inflow relative	-1.755		1.804				-1.167		1.989	-1.741		1.806
	(0.003)	***					(0.015)	**		(0.004)	***	
Fund type inflow absolute												
Absolute difference	0.366		1.135	0.327		1.132	0.232		1.265	0.355		1.190
of fund type inflow	(0.000)	***		(0.000)	***		(0.027)	**		(0.000)	***	
Timing Take Downs 36mths							-0.045		1.070			
							(0.591)					
N	182			182			152			182		
Adjusted R^2	0.134			0.099			0.098			0.131		
Significance	0.000			0.000			0.003			0.000		
Power Value	-0.600			-0.600			0.000			-0.600		
Log-likelihood	-196.198			-199.737			-97.657			-196.008		

[a] As dependent variables we use the PME, as defined in the text. *Stage* is an ordinal variable where we assigned the following numbers to funds with different stage focus: Early Stage=0, Balanced/Diversified=1, Developed/Late Stage=2, LBO=3 and Private Equity=4. We assume the investment policy of a fund to be the riskier the lower the value of this variable is. *MSCI return p.y.* is the annualized return over the lifetime of the fund. *MSCI return in VY* is the return in the vintage year. *GDP growth rate p.y.* is the annualized growth over the lifetime of the fund. *PME of preceding fund, else 0* is the PME of the preceding fund, if one exists, otherwise it is set to zero. *Fund type inflow relative* is the ratio of total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *VC fund inflow relative* is the ratio of total funds allocated to funds during the vintage year of the fund, if it is a VC fund, else it is zero. *Fund type inflow absolute* are total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *Absolute difference of fund type inflow* between the fund type inflow of the Vintage Year and the year before. *Timing Take Downs 36 mths* is defined according to the definition proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). The variable is supposed to measure the timing ability of the fund manager. The weight applied to each observation is $Size^{PowerValue}$. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided).

Table 15: Bootstrap WLS estimation results on fund returns: IRR as dependent variable (Sample I, 200 Funds)[a]

Sample I	Dependent Variable: IRR											
	(1)		(2)		(3)		(4)		(5)		(6)	
Constant	0.6826	***	0.6130	***	0.7588	***	0.8877	***	0.7499	***	1.0174	***
Stage	-0.1149		-0.0183		-0.0201		-0.0160		-0.0235		-0.0291	**
MSCI return p.y.	-0.4897		-0.0638		-0.1019		-0.1223		-0.1295		-0.1473	
MSCI return in VY	-0.0887		-0.0840		-0.0937		-0.1084	**	-0.0995	*	-0.1065	*
GDP growth rate p.y.	-0.1702	***	-0.1639	***	-0.1699	***	-0.2013	***	-0.1809	***	-0.2242	***
IRR of preceding fund, else 0	0.4257	*	0.3871	*	0.4497	*	0.4175		0.4026	*	0.4165	*
VC fund inflow relative			-0.1374	**					-0.1436	**		
Fund type inflow relative	-0.2580	***			-0.3188	***	-0.3030	**			-0.3738	***
Fund type inflow absolute	0.0423	***	0.0343	*	0.0356	*						
Absolute difference of fund type inflow							0.0524		0.0278		0.0694	
Timing Take Downs 36mths					-0.0335	*					-0.0342	
N	190		190		158		182		182		152	
# of bootstrap samples	1000		1000		1000		1000		1000		1000	
Power Value	-0.10		-0.10		0.10		-0.20		-0.20		0.00	

[a] Here we use a bootstrap WLS regression approach with 1'000 random resamplings of the data set. For an introduction in this method cf. MacKinnon (2002). Numbering of equations refer to table 11. As dependent variables we use the IRR, as defined in the text. *Stage* is an ordinal variable where we assigned the following numbers to funds with different stage focus: Early Stage=0, Balanced/Diversified=1, Developed/Late Stage=2, LBO=3 and Private Equity=4. We assume the investment policy of a fund to be the riskier the lower the value of this variable is. *MSCI return p.y.* is the annualized return over the lifetime of the fund. *MSCI return in VY* is the return in the vintage year. *GDP growth rate p.y.* is the annualized growth over the lifetime of the fund. *IRR of preceding fund, else 0* is the IRR of the preceding fund, if one exists, otherwise it is set to zero. *Fund type inflow relative* is the ratio of total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *VC fund inflow relative* is the ratio of total funds allocated to funds during the vintage year of the fund, if it is a VC fund, else it is zero. *Fund type inflow absolute* are total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *Absolute difference of fund type inflow* between the fund type inflow of the Vintage Year and the year before. *Timing Take Downs 36 mths* is defined according to the definition proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). The variable is supposed to measure the timing ability of the fund manager. The weight applied to each observation is $Size^{PowerValue}$. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided).

Table 16: Bootstrap WLS estimation results on fund returns: Excess-IRR as dependent variable (Sample I, 200 Funds)[a]

Sample I	Dependent Variable: Excess-IRR											
	(1)		(2)		(3)		(4)		(5)		(6)	
Constant	0.5367	***	0.4614	**	0.6199	***	0.8923	***	0.7369	***	1.0576	***
Stage	-0.0124		-0.0201		-0.0211		-0.0256	*	-0.0350	*	-0.0378	**
MSCI return p.y.												
MSCI return in VY	-0.1044	*	-0.1072	**	-0.1179	*	-0.1724	***	-0.1610	***	-0.1617	**
GDP growth rate p.y.	-0.1632	***	-0.1569	**	-0.1749	***	-0.2302	***	-0.2090	***	-0.2754	***
IRR of preceding fund, else 0	0.4216	*	0.3691	*	0.4260	*	0.3543		0.3366		0.3429	
VC fund inflow relative			-0.1416	**					-0.1747	***		
Fund type inflow relative	-0.2707	***			-0.3270	***	-0.3529	***			-0.4013	***
Fund type inflow absolute	0.0638	***	0.0557	***	0.0614	***						
Absolute difference of fund type inflow							0.0832	*	0.0622		0.1143	**
Timing Take Downs 36mths					-0.0254						-0.0216	
N	190		190		158		182		182		152	
# of bootstrap samples	1000		1000		1000		1000		1000		1000	
Power Value	-0.10		-0.10		0.10		-0.20		-0.20		0.00	

[a] Here we use a bootstrap WLS regression approach with 1'000 random resamplings of the data set. For an introduction in this method cf. MacKinnon (2002). Numbering of equations refer to table 12. As dependent variables we use the Excess-IRR, as defined in the text. *Stage* is an ordinal variable where we assigned the following numbers to funds with different stage focus: Early Stage=0, Balanced/Diversified=1, Developed/Late Stage=2, LBO=3 and Private Equity=4. We assume the investment policy of a fund to be the riskier the lower the value of this variable is. *MSCI return p.y.* is the annualized return over the lifetime of the fund. *MSCI return in VY* is the return in the vintage year. *GDP growth rate p.y.* is the annualized growth over the lifetime of the fund. *IRR of preceding fund, else 0* is the IRR of the preceding fund, if one exists, otherwise it is set to zero. *Fund type inflow relative* is the ratio of total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *VC fund inflow relative* is the ratio of total funds allocated to funds during the vintage year of the fund, if it is a VC fund, else it is zero. *Fund type inflow absolute* are total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *Absolute difference of fund type inflow* between the fund type inflow of the Vintage Year and the year before. *Timing Take Downs 36 mths* is defined according to the definition proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). The variable is supposed to measure the timing ability of the fund manager. The weight applied to each observation is $Size^{PowerValue}$. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided).

Table 17: Bootstrap WLS estimation results on fund returns: PME as dependent variable (Sample I, 200 Funds)[a]

Sample I	Dependent Variable: PME															
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
Constant	2.9400	***	2.4588	***	3.6499	***	2.9290	***	3.8070	***	3.0371	***	4.6410	***	2.9001	
Stage	-0.0632		-0.0444		-0.0950		-0.0472		-0.0969	*	-0.0752		-0.1432	**	0.0354	
MSCI return p.y.							-0.3896								-1.5660	
MSCI return in VY	-0.3065		-0.3187		-0.4128	**	-0.2443		-0.4228	*	-0.4087	**	-0.4795	**	-0.2437	
GDP growth rate p.y.	-0.5886	***	-0.5556	***	-0.7845	***	-0.5505	*	-0.7124	**	-0.6397	***	-1.0014	***	-0.3328	
PME of preceding fund, else 0	-0.0592		-0.0755		0.0117		-0.0615		-0.0429		-0.0419		0.0189		-0.1307	
VC fund inflow relative			-0.3257								-0.3719					
Fund type inflow relative	-1.0197	***			-1.1238	**	-0.9155	**	-1.3283	***			-1.3689	***	-1.1032	
Fund type inflow absolute	0.1738	***	0.1445	***	0.1219	**	0.1392	**								
Absolute difference of fund type inflow									0.1094		0.0064		0.2508	**	0.1029	
Timing Take Downs 36mths					-0.0451								-0.0248			
N	190		190		158		182		182		182		152		182	
# of bootstrap samples	1000		1000		1000		1000		1000		1000		1000		1000	
Power Value	-0.50		-0.50		0.00		-0.50		-0.60		-0.60		0.00		-0.60	

[a] Here we use a bootstrap WLS regression approach with 1'000 random resamplings of the data set. For an introduction in this method cf. MacKinnon (2002). Numbering of equations refer to table 13 and 14. As dependent variables we use the PME, as defined in the text. *Stage* is an ordinal variable where we assigned the following numbers to funds with different stage focus: Early Stage=0, Balanced/Diversified=1, Developed/Late Stage=2, LBO=3 and Private Equity=4. We assume the investment policy of a fund to be the riskier the lower the value of this variable is. *MSCI return p.y.* is the annualized return over the lifetime of the fund. *MSCI return in VY* is the return in the vintage year. *GDP growth rate p.y.* is the annualized growth over the lifetime of the fund. *PME of preceding fund, else 0* is the PME of the preceding fund, if one exists, otherwise it is set to zero. *Fund type inflow relative* is the ratio of total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *VC fund inflow relative* is the ratio of total funds allocated to funds during the vintage year of the fund, if it is a VC fund, else it is zero. *Fund type inflow absolute* are total funds allocated to VC (BO) funds during the vintage year of the fund, if it is a VC (BO) fund. *Absolute difference of fund type inflow* between the fund type inflow of the Vintage Year and the year before. *Timing Take Downs 36 mths* is defined according to the definition proposed by Nowak, Knigge, and Schmidt (2004, p. 12 n.). The variable is supposed to measure the timing ability of the fund manager. The weight applied to each observation is $Size^{PowerValue}$. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level (two-sided).