

Antecedents and performance implications of style drift in private equity investments

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Using a unique private equity fund dataset, we examine the antecedents and performance implications of style drift in private equity investments. For the first time, we show that drifts from an investment focus are associated with a higher IRR and that both market and fund characteristics influence the occurrence of style drift. We specifically find that style drifts occur mainly from early stage investment to the later stages and increase the IRR while simultaneously decreasing the inherent risks. Overall, our results support Gompers and Lerner's (2000) "money chasing deals" hypothesis as well as Barberis and Shleifer's (2003) theoretical work.

Keywords: *Style drift, style investing, co-movement, private equity, venture capital*

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1. Introduction

Understanding the antecedents and performance consequences of mutual and private equity (PE) funds' change in investment focus ("style drift") is an important research issue (Barberis and Shleifer, 2003; Chan, Chen, and Lakonishok, 2002; Chen and de Bondt, 2004; Cumming, Fleming, and Schwiendbacher, 2005; Pomorski, 2004; Teo and Woo, 2004). Barberis and Shleifer (2003) coined the term "style investing" for funds following a certain strategy and according to studies by Barberis and Shleifer (2003), Teo and Woo (2004) as well as Chen and De Bondt (2004), investors in the mutual fund industry classify risky assets into different investment styles and allocate capital to varying styles. "Style drift" occurs whenever funds pursue investments and finance companies that differ from their stated investment focus (Barberis and Shleifer, 2003). To date the phenomena of style drift has mainly been studied in the mutual funds literature (Brown and Goetzmann, 1997), with Basu (1977) and Banz (1981) carrying out pioneering studies on portfolio investment according to firm characteristics. Brown and Van Harlow (2004) argued that funds that have a consistent investment strategy earn positive returns in comparison to those that do not. Teo and Woo (2004) studied the effects of style investing in a cross-section sample of stock returns, whereas Fung and Hsieh (2003), Bares, Gibson and Gyger (2001) and Brown and Goetzmann (2001) studied the implications of style investing and style consistency in the hedge fund industry.

Similarly to mutual funds, private equity funds (PEFs) usually describe themselves as being focused on a particular segment, in other words as following a particular "style". This focus may be on a specific industry, a geographic region or, most commonly, on a specific development stage of financed companies (Gompers and Lerner, 1999a; Sahlman, 1990). In this sense, many PEFs market themselves as being "early stage", "expansion", or "buy-out" funds in order for investors to assess where their capital will be invested. Institutional investors increasingly categorize their investments into asset classes to allow them to better assess and control their portfolio risk and to facilitate investments' comparison to standard benchmarks (Avramov and Wermers, 2005; Barberis and Shleifer, 2003; Brown and Van Harlow, 2004; Chan, Chen, and Lakonishok, 2002). In order to keep their portfolio balanced, investors pay special attention to a fund's stated stage focus. Consequently, the style and stage consistency of the PEFs' subsequent investment process is vital for institutional investors investing in those funds.

Style drift of private equity funds poses several potential risks for investors: First, it changes the fund's risk and return profile and therefore also the risk and return profile of the limited partner's invested capital. Even if style drifts result in successful investments, limited partners may not be willing to bear the increased overall fund risk implied inherent in such investments, especially if general

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partners “style drift” from later stages to earlier stages. Second, since some investors allocate an important share of their assets to private equity, the impact of changes within the limited partner’s portfolio on the overall performance could be substantialⁱ. Third, capital committed and provided to PEFs is very illiquid and investors may not be able to liquidate or rebalance their positions for many years. Investments in early stage companies may take more than 5 years to be sufficiently mature to sell, and several financing rounds may be required before an exit is possible (Sahlman, 1990). Given these risks for investors, style drift also poses a potential threat to private equity as an asset class; understanding its determinants and consequences is thus important (Cumming, Fleming and Schwienbacher, 2005).

The frequency with which style drift occurs (Cumming, Fleming and Schwienbacher, 2005) suggests, however, that there must also be some benefits associated with them, especially for general partners. Drifted investments may, for instance, have a higher probability of going public, thus improving the fund’s realized return on investment and its investment managers reputation for having a successful investment screening policy. This may in turn help general partners to raise a follow-on fund. Drifting investments may also be related to the fund’s portfolio being better diversified and may therefore reduce the fund’s risk of losses. They may allow cross selling among portfolio companies and thus generate a self-enforcing mechanism that enables portfolio companies to develop more rapidly. Unrelated to portfolio considerations, drifted investments could finally be viewed as just a managerial perk; successful private equity firms’ general partners may believe they can screen good business opportunities across all of a company’s development stages and thus start investing outside the given investment focus.

Despite the relevance of style inconsistency and the related positive and negative consequences that such behavior may have in private markets, the phenomenon has to date received little to no attention in the private equity literature. The goal of this paper therefore is to introduce the concept of style drift in venture capital (VC) and private equityⁱⁱ. In order to shed some light on the antecedents and performance consequences of style drift, we pose the following research questions: **Where and when does style drift occur in PEFs? What are the determinants that lead PEFs to style drift their investments and what impact do style drifts have on an investment’s performance? Which drift directions yield higher returns and lower risks? Does style drift have an impact on the drifted investments’ risk and return characteristics?**

We analyzed investment styles and drift between styles in respect of private equity and venture capital investments analogous to the way that style drift in public equity has been studied. Generally, risky assets within PE and venture capital (VC) funds are categorized according to several

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factors, the most important being the region, industry, or the portfolio company's development stage (Sahlman, 1990). We focused this study on investment style with regard to the development stage of the portfolio company, as several studies have confirmed that this factor is an investment's key differentiating risk factor (Brown and Goetzmann, 1997; Teo and Woo, 2004). We then derive hypotheses that link committed capital, competition for deals, stock market developments, fund size, investment manager experience, and investment amount to the occurrence of style drift as well as hypothesize a relationship between style drift and performance.

The general lack of substantial quantitative empirical studies regarding previous research on PEF performance is most likely due to the entire industry's *private* nature. While disclosure requirements force mutual funds to release information to the public (enabling their use for academic research), private equity companies are reluctant to disclose in-depth financial information. This is to some extent understandable, since information on returns is proprietary and full revelation is likely to result in a competitive disadvantage for the disclosing partnership. As a result, empirical research on private equity's performance has until recently been solely based on aggregate data. Benchmarking PEFs' investment performances against those of other asset classes is, to say the least, challenging. In contrast to quoted assets with daily market prices, we can only observe private markets' valuation on three occasions: on the initial investment date, follow-on investments, and the divestment date. If the historical series of cash flows over the investment's entire life after liquidation is known, the annualized internal rate of return (IRR) can be calculated. Using an interim IRR based on net asset values to determine the annual rate of returns is just an estimation of reality. Until very recently, an exact comparison of PE (measured by the IRR as the annualized internal rate of return over the entire investment life) and stock investment performance (measured by a volatile annual rate of return) was therefore practically impossible.

We test our hypotheses by using a unique international dataset of 426 investments spanning the period between 1986 and 2003, which enables us to overcome most of previous research's limitations as mentioned above. We obtain precisely dated cash flow information regarding each financial transaction between the fund and the portfolio company by matching Venture Economics' self-reported data on financing rounds with the CEPRES dataset that derives information from audited facts from due diligences and monitoring information at the individual investment level. Our dataset had two important advantages over other datasets used in previous studies: First, we are able to see the exact timing of the cash flows (and thus the timing of both the investment and exit decision), and thereby relate the PEF managers' investment decision to the availability of outside investment opportunities. By looking at this relationship, we find strong evidence consistent with the importance of changes in the demand for private equity capital in the investment decision process of PEF managers.

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The second main advantage of our sample is that we were able to document the individual investment decisions within a PEF's portfolio. In particular, we can determine the period of time needed by a PEF manager to exit each investment, in other words, the length of the holding period. We likewise analyze the returns earned by the PEFs on each portfolio company in exact IRR figures.

As far as we know, the only other empirical study on style drift in private equity was conducted by Cumming, Fleming and Schwienbacher (2005), who concentrated on the determinants of style drift by using a sample of US-based portfolio companies. However, these authors only examined the type of exit as a potential proxy for performance, and, as they themselves mention, their findings with regard to the performance implications of style drift can only be considered as suggestive and preliminary. Accurate empirical performance analyses regarding PE and VC investments can only be provided if the data include precise information on cash flows. The lack of this information in Venture Economics, the most comprehensive PE/VC database, led several scholars to use proxies for performance measurement when analyzing Venture Economics data, Gompers and Lerner (1996) being a case in point. Kaplan, Sensoy and Strömberg (2005) indicated the limitations in respect of the precise performance measurement of Venture Economics' data. Gompers (1995) as well as Cumming, Fleming and Schwienbacher (2005) used an investment that had been exited via an initial public offering (IPO) as a proxy for success. However, investments could generate equal or even higher returns by exits via trade sale than via IPO, this proxy may not be accurate. Our study does overcome this limitation and we are able to measure performance precisely by means of the actual cash flows.

We furthermore extend Cumming, Fleming and Schwienbacher's (2005) work by analyzing drift direction (up- or down-drifts) and investigating differences in the realized IRR and multiples. The direction of drifts is of particular interest, as a company's various development stages are associated with a different risk and return relationship. Moreover, the differences between the IRR calculated with actual cash flows and the ones reported by PEFs are well documented in the literature (Ljungqvist and Richardson, 2003a; Kaplan and Schoar, 2005). Our dataset therefore enables an unusually detailed analysis of investment style by considering precise cash flows. Contrary to the majority of studies that had to use a certain exit channel (most commonly an IPO) as a substitute for success, we are able to employ performance measurements based on cash injections and returns to investors' precise history. We find strong evidence that style drift is associated with a higher IRR and that both market and fund factors influence the occurrence of style drift. We furthermore conclude that style drift is as least as important in private equity as it is in publicly traded companies, and, potentially, perhaps even more important. Our results also provide unique evidence regarding the private equity stages that are most affected by style drift besides regarding the stages between which style drift occurs.

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In addition, we investigate the direction of style drift by looking at examining the stages from and to which private equity investments drift. We demonstrate that style drift occurs to areas that are adjacent to each other (for instance, from the seed to the early stage, or from the early stage to expansion, but not from the seed stage to a later or mezzanine one). Our results are fully in line with the style drift theory: style drifts occur mostly towards less riskier market segments (from earlier to later stages) and generate higher returns. Our results reveal that, style drift follows a risk reduction strategy without decreasing the associated return, thus improving the investments' risk-return-profile. We also show that style drift is related to competition and to changes in market developments. The investment managers therefore do not choose a static focus for the fund as a whole, but adjust their investment strategy dynamically with regard to key parameters. We furthermore contribute to venture capital's selection versus treatment hypothesis as discussed by, for example, Amit, Brander and Antweiler (2002), Hellmann, (2002), Hellmann, Egan, and Brander (2005), Hellmann and Puri (2002). Ultimately, our results support the literature that argues that selection is more important than treatment.

The remainder of the paper is organized as follows: the next section develops hypotheses with regard to the antecedents and consequences of style drift. Thereafter we provide a detailed description of the new dataset's various properties and compare this dataset to others used in private equity studies. Following the data and methodology section, we provide both descriptive and confirmatory results regarding style drift's key determinants as well as its relationship with investment performance. The concluding section presents a discussion and suggestions regarding areas of future research that would tie in with our results as well as with those in the PEF literature, and a discussion of our findings' implications for theory and practice.

2. Theory and hypotheses development

2.1 The determinants of style drift

In recent years, studies have paid increasing attention to PEF managers' investment behavior. There has been particular interest in the analysis of cash flows, private equity investments' return and risk characteristics, and these factors' consequences for valuations and investment decisions. Gompers and Lerner (2000) offer an explanation for investment managers drifting by suggesting that when capital inflows into the private equity industry increase, valuations increase as a result of "too much money chasing too few deals". Inderst and Müller (2004) suggest that overall market conditions

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affect the deal structure, entrepreneurs and PEFs' bargaining power and consequently, early stage companies' valuations. Ljungqvist and Richardson (2003a, 2003b) provide the first notion of style drift's consequences for the private equity industry, although they focused neither theoretically nor empirically on the phenomenon.

2.1.1. Prediction regarding capital inflows into funds' influence on style drift

According to Barberis and Shleifer's (2003) style investing theory, funds change their investment style depending on the different styles' relative performance. Consistent with Barberis and Shleifer (2003), Gompers and Lerner (2000) found that the prices of deals in a particular market segment increase if the demand for that specific type of securities increases due to higher capital inflows into the funds. They describe this phenomenon as "money chasing deals". The number of attractive deals within a particular stage is generally limited. If more money floods into specific market segments and investment stages, the greater competition for deals and the increased costs will impair the particular segment's performance perspectives. In the private equity industry an increase in committed capital to VC and PE funds will not be evenly allocated to funds focusing on specific stages. Thus, a disproportionate allocation to a particular stage will alter the relative competition and prices between different stages. In line with previous studies, we therefore argue that funds will drift their investments between stages more often if more money is committed to the industry, because it is assumed that there is a limited supply of deals at each stage.

Hypothesis 1: *The amount of committed capital is positively associated with style drift.*

2.1.2. Prediction regarding competition's influence on style drift

The measurement of funds' competition for attractive deals is achieved by taking into consideration the number of new funds raised during the specific year that a fund for the first time provides a portfolio company with a capital injection. Kaplan and Schoar (2005) as well as Ljungqvist and Richardson (2003a) use a similar variable to test for competition among private equity investors. New firms are most likely to enter an industry when returns are increasing in a given stage or focus; hence, new entrants are likely to focus on the stage that offers superior returns. This would in turn mean that committed capital for that stage will also increase, since more investment managers have entered the market. Analogous to Gompers and Lerner's (2000) "money chasing deals" finding, we argue that it is not only more capital flowing into funds, but also the number of funds hunting for deals at any given time that increases the competition for the limited number of attractive deals. Increased

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competition due to “funds chasing deals” will prompt more managers to shift their investment focus. We therefore propose our second hypothesis:

Hypothesis 2: Competition for deals is positively associated with style drift.

2.1.3. Prediction regarding public market performance’s influence on style drift

Gompers, Lerner, Kovner and Scharfstein (2005) point out that the venture capital industry is highly volatile, and that much of this volatility can be associated with shifting valuations and activity in the public equity markets. The link between public market valuations and the venture capital and private equity industry’s development is also confirmed by Inderst and Müller (2004) as well as by Kaplan and Schoar (2005). Stock market developments are also closely related to the economy’s general growth and in a growing economy, more investment opportunities become available (Acs and Audretsch, 1993; Gompers and Lerner, 1999a). Assuming that this increase in opportunities affects all segments of the VC and PE industry evenly, more attractive deals become available in all segments, so that fund managers have less incentive to shift their focus from one stage to another.

Hypothesis 3: Positive stock market development is negatively associated with style drift.

2.1.4. Prediction regarding fund size’s influence on style drift

According to Kanniainen and Keuschnigg’s (2003) optimal portfolio theory, there exists an optimal number of investments for every fund, since fund managers face a trade-off regarding the intensity of advice to their portfolio companies and overall portfolio size. In order to maintain or even to achieve the optimal number of portfolio companies during times of increased competition in a particular market segment, managers could consider attractive deals in other market segments rather than adding less attractive deals within their investment focus. This argument is in line with Barberis and Shleifer’s (2003) style investing theory. An increase in fund size could increase the fund managers’ incentives and flexibility to style drift due to their improved ability to afford due diligence and external advice’s high costs. This would decrease the investment manager’s need to rely on his own skills in a specific stage focus and lower the hurdle to switch to an adjacent stage. Therefore, we conclude that:

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Hypothesis 4: *Fund size is positively associated with style drift.*

2.1.5. Prediction regarding investor experience's influence on style drift

As a proxy for experience, we measure a VC or PE fund management firm's number of quarters since its establishment until its initial investment into a portfolio company. Fund managers' experience plays a key role in attracting new deals as well as in raising capital, as confirmed, for example, by Cumming, Fleming, and Suchard (2006). Fund managers with more years in business generally have a better reputation, a wider network from which to draw deal flow as well as better screening abilities within their segment. They consequently have better access to the most attractive deals within their investment focus and less incentive to drift their investment.

Hypothesis 5: *Investment manager experience is negatively associated with style drift.*

2.1.6. Prediction regarding the total investment amount's influence on style drift

In-line with Barberis and Shleifer's (2003) style investing theory, we postulate that fund managers will only drift from their specified investment focus if a deal's expected relative performance in another segment is significantly higher. Moreover, fund managers are concerned about the overall risk of the portfolio and therefore would only drift, if the new investment opportunity has a lower expected risk than the average investment opportunity within the fund's stage focus. If an investment opportunity outside the fund's investment focus was found that increases the overall performance of the fund and does not increase the overall risk of the portfolio, then investment managers will allocate a higher amount of capital into that investment. By doing so, a manager can optimally invest the capital committed to the fund and at the same time concentrate its managerial resources on a reduced number of investments. From these premises, we pose the following prediction:

Hypothesis 6: *Investment amount is positively associated with style drift.*

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2.2 Performance implications of style drift

The growing list of empirical studies that examine style consistency and mutual funds' performance (Barberis and Shleifer, 2003; Brown and Harlow, 2004; Chan, Chen, and Lakonishok, 2002; Wermers, 2000) motivated us to investigate the link between style drift and performance in the private equity industry. Despite the arguments that have been brought forward againstⁱⁱⁱ a positive relationship between style drift and performance, we posit that in the private equity context, the advantages of style drift outweigh its disadvantages, thus making such a relationship feasible.

The first motivation for the relationship is that previous research has suggested that active portfolio management, which includes changing the investment style, is one of the most important components of portfolio management (Chen and De Bondt, 2004; Sharpe, 2002). Over a PEF's life, which often extends up to ten years (Sahlman, 1990), different styles will perform differently (Chen and De Bondt, 2004), making no single style optimal for all periods and circumstances. Often, it is simply the investment manager who is able to identify and time a style concept early enough, who will earn a superior return (Birch, 1995). Since PEFs obtain commitments from investors to invest in certain categories of investment opportunities, strong changes in market conditions are necessary to legitimize style drifting and compensate for its associated potential reputation costs. In accordance with Cumming, Fleming and Schwienbacher (2005), we argue that investment managers will only style drift for investments that are more likely to yield favorable realizations.

A second motivation is that although investment managers add value to their portfolio companies by providing non-financial resources (Hellmann, 2002), the literature also stresses the role of "selection over treatment" (Amit, Brander and Antweiler, 2000; Hellmann, Egan and Brander, 2005). Consistent with Barberis and Shleifer's (2003) model, the birth of a style often triggers good performance by recruiting new funds to invest in it, further raising the prices without or with only a weak connection to fundamental values. PEF managers might select deals in segments out of their stage focus accepting that they cannot add as much value as within their focus, which they justify on a deal by deal basis on the relative better risk-return perspective of the selected stage.

Thirdly, Gompers and Lerner (1999b) asserted that aggregate flows in the private sector tend to be driven by demand shocks and that too much capital can flow into the private sector, leading to a "money chasing deals" phenomenon (Gompers and Lerner, 2000; Kaplan and Stein 1993). In such circumstances, investment managers will chase previous "winner styles" and dump "losers". Consistent with this reasoning Barberis and Shleifer (2003) analyzed style investing's effects by showing that a particular style's higher relative returns lead to higher inflows, which bid prices away

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from other styles and positively affect the “chased” investments’ prices. This model predicts that style-level momentum and value strategies will be profitable and that the momentum and strategies’ asset-level counterparts will not solely drive this profitability. Thus, consistent with the positive feedback style trading view that style flows chase good style returns (Teo and Woo, 2004), we expect style returns to affect fund and investment returns through style switchers’ positive feedback activities.

Finally, a stage with strong previous performance will induce new funds to enter that particular market segment, thus leading to increased capital inflows. These two effects - more competition due to an increased quantity in funds and to an increased capital commitment - have a direct impact on increased entry valuation of new investments and thus reduce the segment’s expected returns during the future exits. Fund managers could then start searching for good business opportunities in other segments with lower entry valuations enabling higher expected exit returns. This would in turn mean that the fund managers are displaying anti-cyclical investment behavior. Collectively, more competition due to an increased quantity in funds and an increased capital commitment have a direct impact on investments’ entry valuation and thus reduce the segment’s expected returns. Fund managers may then start searching for good business opportunities in other segments with lower entry valuations and higher expected returns. In sum, we posit a positive relationship between style drift in private equity and fund performance.

Hypothesis 7: Style drift is positively associated with performance.

3. Methodology

Our study’s level of detail and accuracy exceeds that of previous empirical studies that focused on staging and its influence on performance. We merged the Venture Economics (www.thomsonfinancial.com) data - which is very comprehensive in respect of each financing round but does not contain information about each round’s separate cash flow tranches - with the CEPRES database (www.cepres.de) data – which provides details on each cash transaction and whose information is based on due diligence and monitoring reports, partially including investment firms’ audited filings. The Venture Economics database has been used for empirical studies on the private equity industry a number of times over the last decade (Lerner, 1994a; 1994b). However, IRR measurements based only on Venture Economics data can lead to a milestone bias that can materially affect researchers’ estimates of returns and valuation patterns over time. This aspect is pointed out by Kaplan, Sensoy and Strömberg (2005), who also stress Venture Economics’ inability to accurately

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measure the timing of financing rounds. The IRR is only meaningful when calculated on the investment's exact financial transaction date, but Venture Economics only provides dates of financing rounds, not the exact date of the cash injection, which can differ from the financing round's date due to the staging (tranching) of rounds into several cash injections, also known as milestone rounds. The same applies to the exit date that Venture Economics provides, which does not always coincide with the precise date of cash flow's distribution to the investor.

The CEPRES and Venture Economics databases each contain extensive details on equity capital financing, but measure partly different characteristics of each financing. To measure the influence of stage drift on return on investment as precisely as possible, we used the Venture Economics data for information on the financing rounds and completed the sample with the accurate cash flow information on each milestone round (tranches) as provided by the CEPRES database. CEPRES contains exact data on each of the investor's cash injections into the portfolio company and each of the company's cash distributions to the investor. Empirical studies by Cumming and Walz (2004), Cumming, Schmidt and Walz (2004), and Schmidt (2004) offer a more detailed introduction to the CEPRES database that also forms the empirical basis of a recent publication by Knigge, Nowak and Schmidt (2006). Details of the merged dataset of this study were first introduced by Calanog, Krohmer and Lauterbach (2006). While the Venture Economics database contains information on more than 110 different variables in respect of each financing round, CEPRES provides more than 40 different variables regarding each investment. The information in Venture Economics is voluntarily self-reported by fund management firms, while the CEPRES data is partially based on audited facts from due diligence and monitoring information. Furthermore, CEPRES provides precise cash flow information on each financial transaction between the fund and the portfolio company. A financing round can be split into several cash flows or tranches, which Cuny and Talmor (2003) regard as milestone financing.

The CEPRES dataset is somewhat related to other VC and entrepreneurial finance papers with cross-country datasets. The scope of our data is similar to Black and Gilson (1998) and Jeng and Wells (2000), but those datasets are based on aggregate industry figures and do not contain transaction-specific information. Lerner and Schoar (2003) present cross country data on specific transaction structures with a couple of hundred of observations, but do not have data on returns. Cumming and MacIntosh (2003) have data on exits and returns in Canada and U.S., but are limited in both the transactions' breadth and depth. Similarly, Cumming and Fleming (2003) have data on a couple of hundred investments from 13 Asia-Pacific countries, but lack details such as unexited IRRs etc. Gompers, Lerner and Desai (2003) present a large dataset on entrepreneurial firms across different European countries, but do not consider information pertaining to venture capital finance. Our

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dataset is also somewhat related to U.S. datasets. Schmidt (2003) investigates the risk and return characteristics of PEF investment in US portfolio firms. Ljungqvist and Richardson (2003a) and Kaplan and Schoar (2005) present data on private equity returns at the fund level, but do not make use of transaction-specific details in respect of each entrepreneurial firm investment.

Our dataset allows a detailed analysis of investment style while also considering precise cash flows, which has not been possible before. By merging the Venture Economics and CEPRES databases' comprehensive information, we increased the validity of our analyses and could analyze more than 150 original variables in respect of each investment, thus making a very detailed analysis of both datasets' intersection possible. At the time of the merger of the two databases in November 2003, CEPRES contained 5,308 investments into 4,476 portfolio companies provided by 229 funds belonging to 74 fund management firms. The data obtained from Venture Economics included 178,300 financing rounds. The entries of the two datasets are matched on four different levels: the name of the fund management firm, the name of the fund, the name of the portfolio company and the date of the fund's initial investment in the portfolio company. The matching resulted in 1,774 investments with congruent entries on all four levels in both databases. To avoid reporting bias potentially inherent in unrealized investments, the dataset was reduced to 1,011 cases of fully and partially realized investments. Since our study was focused on investment style, we further considered only those investments with complete information on the specific investment focus at all three levels: the management firm, the fund, and the company. To identify drifts in investment style, funds or management firms with a general focus were also removed from the sample, as an investment drift would not be defined in respect of these cases. To avoid a double count, we then also removed the cases where the same investment management firm's follow-on fund invested in a company already considered in respect of the predecessor fund.

After the merger of the databases and the above-mentioned adjustments of the sample for the style drift analyses, our dataset encompasses 426 investments made in 411 portfolio companies by 63 different venture capital and PEFs belonging to 29 investment management firms. These investments include 763 financing rounds and 1,118 cash transactions between June 1986 and March 2003. During this period of more than 15 years, the venture capital and private equity industry went through different cycles, including the Internet bubble period between roughly September 1998 and March 2000. Therefore, no significant loss of generality arose from the shortening of the dataset. The dataset is representative with regard to the frequency distribution of the investments, showing a steady increase from 1995 onward and a peak during 1998 and 1999, where 38.03% of all observations are concentrated. The number of financings in the sample drops after the Internet bubble burst in 2000:

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only 26 observations (6.10% of the sample) fall in the period after the crash. This sample thus matches generally the market's investment behavior pattern during the entire period.

The country distribution of this dataset is also similar to the respective proportions of the market sizes: the majority of the investments (239), representing 66.9% of the sample, were carried out in the USA, which continues to be the most significant private equity market. 114 investments were made in Europe (31.9%), with the UK, France and Germany being the biggest markets with 51, 35 and 17 investments respectively. No country was specified with regard to 69 investments (16.2%). As far as the focus of our study is concerned, the distribution of the portfolio companies' development stages is as follows: leveraged buy-outs (34.7%), mezzanine (3.9%), later stage (9.2%), expansion stage (12.2%), early stage (33.1%) and seed stage (7.0%). In 235 cases (55.2% of the sample), the investments were made by venture capital funds, in 143 cases (33.6%) by mezzanine funds, and in 48 cases (11.3%) by buy-out funds. In terms of industry sector, most investments are related to either the Health Care and Life Science or the information technology sectors (14% each) followed by the Industrial/Manufacturing sector with 53 investments (12.8%), Software and Telecommunications, both with 43 investments (1.4% each), Internet 23 (5.6%), Consumer Diversified 19 (4.6%), Retail 16 (3.9%), Semiconductors 11 (2.6%), Media and Financial Services with 8 each (1.9%), Materials with 7 (1.7%), and other industries with 67 investments (16.2%). No sector could be specified in respect of only 12 investments.

4. Variable definitions and summary statistics

4.1. Dependant variables

4.1.1. Style drift

According to Barberis and Shleifer (2003): "To test any predictions that emerge from a model of style investing, it is important to have a concrete way of identifying styles". In the mutual fund industry, investors classify risky assets into different styles and allocate capital to varying styles (Chen and De Bondt, 2004; Teo and Woo 2004). We analyze investment styles and drift between styles in respect of private equity and venture capital investments analogous to public equity's style concept. Generally, risky assets within PE and VC funds are categorized according to several factors, primarily by the portfolio company's region, industry, or development stage. Sahlman (1990) and others have observed that venture capital and PEFs focus their investment strategy on different stages of the portfolio company's development. This strategy focus can be interpreted as a particular investment

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style. VC and PE funds are therefore able to style drift between different stages. We thus focused this study on investment style with regard to development stage, as several studies have confirmed this factor as an investment's key differentiating risk factor. Plummer (1987) and Sahlman (1990) described the development stages' details, their underlying risks and fund managers' specific skill requirements.

Venture capital and private equity management firms pool investment managers with a superior expertise, skill set, and network within a *specific investment focus*, and base their investment style and strategy on this competitive advantage. We classify fund management firms' focus into six different categories (Firm f), with f being either "seed", "early stage", "expansion", "later stage", "mezzanine", or "buy-out". As fund managers raise funds with a limited partnership structure as well as a restricted lifetime, fund volume and investment focus, we also distinguish between three different investment fund strategies (Fund s), where s stands for "venture capital", "mezzanine", or "buy-out". We furthermore maintain that venture capital includes the development stages "seed", "early stage", "expansion", and "later stage".

As a fund can provide its initial injection of capital into a portfolio company at different stages of the company's development, we distinguish between six different development stages (Company ds). The denomination of the development stages of the portfolio companies are the same as the denomination of the different styles for the fund management firm (Firm f) mentioned above. Based on the overlap of the categories Firm f , Fund s , and Company ds , we define style drift as follows: *an investment style drift occurs when* a) the focus of investment management firm f does not equal the development stage of portfolio company ds , and b) the strategy of fund s does not fit the development stage of portfolio company ds .

A brief summary of the respective development stages is given below.

Seed investments: Seed investments are associated with the highest risk, as they have to prove their concept or technology, gain a first customer as well as penetrate the market and find an exit. Information asymmetries between investors and entrepreneurs are highest at this stage, mainly due to a lack of tangible assets. The upside potential of seed investments is particularly high, as entry valuations tend to be very low and the business is fully scalable. Investors focusing on the seed stage usually need in-depth technical expertise and talent to guide the company through the first steps of development.

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Early stage investments: In this study, early stage investments are considered a company's start-up and early development. The specific risks of this stage are building up a management team and developing the product's marketability.

Expansion investments: A company in the expansion stage faces the challenge of scaling up sales and market penetration. Risks involved are the rapid gain of market share, the establishment of brand recognition and, ideally, market leadership. Investors need to support a long-term growth strategy and offer business development know-how.

Later stage investments: Later stage investments also include profitable companies with poor cash flows as well as companies with growing rapidly towards the point of liquidity. Specific risks at this stage are, for example, the provision of working capital for the further expansion of manufacturing facilities, expanded marketing, and product enhancements. Fund managers focusing on this stage require strong ties to investment bankers, need to advise the company with regard to its preparation for exiting, and negotiate with potential buyers.

Mezzanine investments: Mezzanine financings are offered to companies with a certain level of stable cash flows or tangible assets. Risks include the business's stability, thus investors need skills to assess the company's financial structure and outlook.

Buyout investments: Buy-out investments involve a strategy in which a company, or a controlling stake of it, is acquired by using borrowed money (bonds or loans) to leverage the equity stake. The key risk associated with buy-out investments is the credit risk faced by financings with a high level of leverage, and a company development that is less good than expected. Investors need expertise in financial modeling and credit risk assessment.

The mezzanine and buy-out stages are usually covered by PEFs, whereas the remaining stages are usually covered by venture capital funds.

4.1.2. Internal rate of return (IRR)

To measure performance, we use the realized internal rate of return, which we define as the cash outflow's discounted sum minus the sum of all cash inflows from the fund to the company. The realized IRR not only considers how much has been invested in a company and returned to investors, but also the draw downs and capital returns' schedule. A \$1 investment in a company yielding \$2

would imply a doubling of the investment, if the value of time is not taken into consideration. If the return is made within ten years, the realized IRR would be 7% p.a. On the other hand, if we realize the same return but within five years, the IRR would increase to 15% p.a. To our knowledge, the only study that used actual cash flows to measure performance was that of Ljungqvist and Richardson (2003a). As PE deals' flows are generally confidential and only known to the fund and the relevant company, most empirical studies on PE performance do not have access to accurate cash flow information and use either inaccurate cash flow assessments or proxies such as, for example, the type of exit. Our performance analysis is based on the CEPRES database's accurate cash flow information.

4.2. Independent variables:

4.2.1. Committed capital

We measured committed capital as investors' annual sum of new commitments to PE and VC funds. Gompers and Lerner (2000) and Kaplan and Schoar (2005) similarly use this variable to test for market conditions.

4.2.2. Competition for deals

To measure funds' competition for attractive deals, we considered the number of new funds raised during a specific year when a fund for the first time provides a portfolio company with a capital injection. A similar variable is used to test for competition among private equity investors by Kaplan and Schoar (2005) as well as by Ljungqvist and Richardson (2003a).

4.2.3. Stock market developments

We apply two different measures of stock markets' development. Our first variable measures the NASDAQ composite index's variations three quarters before the fund's initial investment in a portfolio company, as NASDAQ is an important exit channel for VC and PE investments. The delay of three quarters between the changes in public market developments and the consideration of their impact on fund management behavior is considered due to the time required for a fund's market screening and due diligence before investing in a portfolio company. For our performance analysis, we use the NASDAQ composite index's variation from the first investment tranche in a portfolio company until the exit date. This variable captures the development of the investors' sentiment during a company's entire holding period in the fund, which may help fund managers time the market and determine the optimal exit time.

4.2.4. Fund size

We measure fund size as the total amount of capital committed to a specific fund.

4.2.5. Investment manager experience

As a proxy for experience, we measure a VC or PE fund management firm's number of quarters between its establishment and the initial investment in the relevant portfolio company.

4.2.6. Investment amount

This variable measures the total amount of cash inflows into a company from the initial investment tranche to the exit.

We also used a number of control variables regarding market conditions, characteristics of the fund management as well as characteristics of the portfolio company in our analyses, which are presented in table 1 along with a more exhaustive description of the dependent and independent variables used in this study.

5. Results

5.1. Descriptive results

Based on the previous section's definition of investment drift, the following provides some descriptive statistics on investment drifts' frequency. Table 2 reveals the frequency distribution of stage drifts in absolute and relative terms. To begin with, 205 (48.1% of the sample) of the 426 investments in the sample were stage drifted. Stage drifts are therefore quite common and a detailed analysis of style drift's determinants and impact is important for a better understanding of the venture capital and private equity industry. Mezzanine funds are the most likely to stage drift their investments (130 cases), accounting for 63.11% of all observed drifts, most of which occurred by financing buy-out transactions (96). Early stage funds accounted for more than 20% of drifts. However, there were no stage drifts by venture capital funds specializing in seed and later stage investments, or by buy-out funds. An explanation for this could be that seed and buy-outs investments represent both ends of the private equity investment chain and thus require a higher grade of specialization. As the information asymmetries and risks are highest in seed investments, investors focusing on this stage need very specialized expertise more than any other venture capitalist. Only 11 investments were drifted to seed

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companies. Furthermore, these drifts were led by early stage funds, so the differences in the adjacent investment focus may not be as significant as those in the more distinct stages.

Stage drifts to buy-out investments were the most common ones (99 investments) representing around 48.06% of all drifts. Almost all drifts to the buy-out stage, with two notable exceptions from early stage funds, were led by mezzanine funds. This again confirms that drifts occur mostly among stages closely related to each other, as the underlying risks and the required management skills are more similar. Another interesting fact that table 2 corroborates is related to the drift direction: investment managers seem to be very concerned about the risk/return profiles of drifted investments. This can be concluded after determining that more than 75% of all drifts were made from the earlier stages of a company's development to the later stages. As a company grows and the early stages of its development are successfully accomplished, the business turns more stable and the information asymmetries between management and investors decrease, thus making such investments generally "safer".

Table 3 also provides further insight into the relationship between stage drifts, drift direction, committed capital to the industry, and the number of new funds entering the industry per year between 1986 to 2003. A steady growth can be detected in all variables for the period 1986-2000 until the Internet crash occurred. Thereafter there is a downward trend in all measures. It is clear that most of the stage drifts occurred between 1996 and 2000 (144, or 7.2% of all drifts). An unusual high level of activity in both the private and public markets characterized those years. During this period, capital committed to the industry rose strongly. Moreover, a total of 1,386 new funds were raised, and 521 new firms entered the industry. These figures compare to only 902 new funds raised and 318 new firms entering the market between 1986 and 1995. A similar picture to general drifts can be observed regarding drift direction. Both up-drifts and down-drifts were most frequent between 1996 and 2000, accounting for 68.7% and 75.6% respectively. It is also noteworthy that many of the funds raised from 1996 onward may still be active and the frequency of stage drifts could thus increase within the next years, as more funds chase the same deals (Gompers and Lerner, 2000)

At first sight, these results confirm our hypotheses. There seems to be a strong relationship between committed capital, number of new entrants and stage drifts. These relationships will be studied in more detail in subsection 5.2. Table 4 reveals the development of performance by showing the average internal rate of return on investments in respect of the different stages of the entire sample. To facilitate the analysis, the portfolio companies were divided into three clusters. The first cluster includes only seed or early stage investments. The second cluster includes those investments made in the expansion and later stages. Both of these clusters include only venture capital

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investments. The last cluster refers to private equity investments, i.e. mezzanine and buy-outs. Results do not change qualitatively if every stage was shown individually. It is noteworthy that almost throughout the entire sample, the last cluster has positive returns per year. Conversely, seed and early stage investments show negative average IRRs for almost every year in the sample. The second cluster shows an almost equal number of positive and negative results.

Finally, we take real cash flows as a risk indicator for each investment to calculate the probability of a partial loss. We consider an investment to be a partial loss if the investment managers could not recover their full investment amount. In other words, an investment was a partial loss if the IRR was less than 0% p.a., or as a total loss if its associated return was less than -99%. Similar to assessing credit risks by calculating drop-out rates, we assessed the loss rates of three different data sub-samples by the number of partial or total losses' ratio to the entire number of investments per year in every sub-sample. The first sub-sample includes investments belonging to the seed and early stages. In the second sub-sample, we grouped deals in the expansion and later stages, while the third category contains mezzanine and buy-out investments. These sub-samples represent three different categories of stage-specific risks.

The first cluster with the earliest stages shows the highest level of risk. These investments show a partial loss probability of 63.3% for the entire sample period, and an associated total loss probability of 37.9%. The results confirm the higher risks borne by these types of investments, as highlighted in the description of portfolio company stages in the methodology section. The second cluster reveals a partial loss probability of 3.3% and a total loss probability of only 11.2%, a 70% reduction compared to the first cluster. Finally, the third cluster, which only included mezzanine and buy-out investments, shows a partial loss probability of 15.7% and a total loss probability of just 2.5%.

There is a clear negative relationship between risk and performance in respect of the different clusters. Mezzanine and buy-out investments generally reveal the lowest levels of risk, and, simultaneously, the highest returns. The reverse is true of seed and early stage investments. It is typical for investments in early stages to show on average high risks and relative low returns, as the extraordinary returns of the best funds can be based on a small number of extremely successful outperforming winners. Since Barberis and Shleifer (2003) refer to risky assets in their style-investing theory, the above descriptive figures emphasize the strong differences in the inherent risks of companies' specific development stages. The investment behavior of funds that focus on certain stages are usually analyzed by deploying stage-risk specific skill sets, networks, and know-how. When fund managers realize that the inherent risks change dramatically - for example, by an increase in

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competition due to new funds entering that stage, or to more capital being committed to funds in their stage - they can shift their focus and drift their investment style.

5.2. Regression results

Our empirical analysis consists of three steps. We first present binary logistic regression estimates relating to the determinants of style drift, including various control variables. Thereafter, we use ordinary least squares regressions in a “log-log” framework to determine the independent variables’ influence on the investment’s performance. Finally, we study non-drifted and drifted investments’ different characteristics as based on the drift direction by employing a t-test for mean comparison.

5.2.1. Results of the determinants of style drift

We examine the variables governing the relationship between an observed stage drift in the full sample of 426 investments by means of binary logistic regression in order to shed light on the determinants of stage drift. We employ this method because our dependent variable “stage drift” is dichotomous in nature. In our regression analysis, we control for market environment, time of investment, fund characteristics and portfolio firm characteristics to isolate the effects of our main variables on the decision to drift an investment. The results of the regression models on the determinants of style drift are shown in table 5. An examination of table 5 reveals the results of the tests of hypotheses 1-6.

The results are very robust across all specifications and capture a fairly good amount of the variability of fund managers’ style drift probability (pseudo- R^2 between 22.6% and 25.3%). The dependent variable is always a dummy equal to one for drifted investments, and zero for non-drifted investments. The regression analysis shows a positive coefficient ($\beta = 4.80E-06$ in model (3); $t < .05$) for the amount of capital committed to the industry, showing that this variable has a positive impact on fund managers’ decision to drift their investments, thus confirming hypothesis 1. Our second hypothesis suggested a positive association between the number of new funds raised in the VC and PE market per year and the probability of stage drifts. We test this hypothesis using the variable competition as defined in table 1. The variable shows positive and robust results throughout all specifications ($\beta = .677$ in model (2); $t < .05$). Hypothesis 2 is thus confirmed in line with the “funds chasing deals” argument.

To test our third hypothesis, we consider the changes in the NASDAQ composite index three quarters before the initial investment date. Supporting the arguments presented by Acs and Audretsch

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(1993), there is a significant negative relationship along all regressions between these changes and the probability of style drift ($\beta = -2.265$ according to model (2); $t < .05$). This result confirms hypothesis 3 regarding stock markets and style drift. Our fourth hypothesis is also confirmed by our analysis. Larger funds specifically seem to suffer less from potential reputation loss if a drift leads to unsuccessful investments result and are able to diversify more broadly than smaller funds. There is a positive relationship between the size of the fund and style drifts ($\beta = .006$ in model (2); $t < .01$). Fund managers with increased experience are able to screen good business opportunities more successfully and may have built an extensive network to generate a steady deal-flow. Our fifth hypothesis predicts a negative relationship between fund managers' time in business and style drift, which is supported by our regression results. The variable Time in Business does indeed negatively affect the probability of style drift ($\beta = -.581$ in model (2); $t < .01$). Finally, the variable Investment Amount positively affects the probability of style drift ($\beta = 1.21E-05$ in model (3); $t < .01$), which confirms hypothesis 6. Note that none of the control variables, except for the variable Time to Invest in regression models (3) and (4), have a significant impact on style drifts.

5.2.2. Results of style drifts' influence on an investment's Internal Rate of Return

Following Gompers and Lerner (2000), we analyze the importance of different variables in respect of an investment's internal rate of return (IRR), using ordinary least square regressions in a "log-log" framework. The logarithm of the dependent variables is therefore regressed on dummy variables and on the logarithm of a number of continuous, independent variables. It is possible to use this framework, because the effects of these variables may be multiplicative.

Our regression results confirm our last hypothesis, and is also in line with the analysis made in section 5.1. Fund managers seem to be more prone to drift their investments if they see an increased possibility of achieving superior results. The dummy investment drift has a positive influence on the realized IRRs of investments ($\beta = .187$ in model (6); $t < .01$). The results are very robust even after controlling for several factors on the macroeconomic and investment level. We tested portfolio company characteristics with two variables: the amount invested in each company and every company's holding period in respect of the fund's portfolio. The total amount invested in a company has no effect on the realized IRR. On the other hand, the holding period of a company in a portfolio, does, as expected, have a positive effect on the IRR. This result is in line with previous studies by Gompers (1996) and emphasizes fund managers' importance in respect of adding value to portfolio companies.

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Fund and management firm characteristics do not seem to play a significant role in respect of the realized IRR, since neither the time in business nor the fund size variables seem to explain the level of return. Finally, we control for a number of market characteristics. Not surprisingly, interest rates' level has a negative impact on investments' realized IRR. The second variable for the development of the NASDAQ composite index had a positive effect on the realized IRR of an investment. Moreover, the level of committed capital is not only a determinant for VC and PE funds to style drift their investments, but also helps them to increase the realized IRR. The last control variable for market conditions, the entry variable, is positively associated with the realized IRR. This is in line with Barberis and Shleifer's (2003) theory, as more funds will enter an industry if the relative performance increases.

5.2.3. Results of drift direction's influence on an investment's performance and risk

In the previous subsection, we identified and discussed the determinants that lead funds to style drift their investments and the implication of those drifts with regard to an investment's performance. The next and last step is to investigate the characteristics of those drifts based on drift direction. As public equity traders apply style drift to improve their deals' risk-return characteristics, we also examine whether the drift direction has a similar influence on the behavior of investment managers of PE funds. As we have previously described the inherent risks of each stage (see subsection 5.1 and table 4), we can argue that a drift from an earlier stage to a later stage is generally a direction towards less risk. Our analysis provides an overview of the different characteristics of drifted and non-drifted investments, with the results of all the analyses presented in table 7.

The first notable difference in characteristics is reflected by both performance measures. The results indicate that drifted investments generate a significantly larger IRR than non-drifted investments, while no differences could be established for the realized multiple of those investments. This result highlights the main differences between IRR and multiple measures. While the mean for drifted investment yielded a positive log in respect of IRR, this was not the case with regard to non-drifted investments (mean difference .237, $t < .01$). Drifted investments are almost twice as probable of being an IPO candidate than non-drifted investments (mean difference .074, $t < .05$). The private equity literature has acknowledged that an IPO is generally the exit channel associated with the highest returns for PEFs, not only in terms of financial gains, but also in reputation. The possibility of raising a follow-on fund may be dependent on the number of portfolio companies funds have taken public (Black and Gilson, 1998; Gompers, 1996; Gompers and Lerner, 1999b). More support for this theory arises when the write-off rate of both types of investment is examined. Non-drifted investments are more than 3 times more likely to be written-off than drifted investments (mean difference .0193, $t <$

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.01). On the other hand, no difference could be determined between the two investment types when examining trade sales as exit channel. Both risk measures, the absolute investment amount, and the relative investment amount were greater for drifted investments than for their non-drifted counterparts (mean difference investment amount .484, $t < .01$ and mean difference investment share .014, $t < .01$). This confirms the results from our regression analysis. Private equity managers do seem to increase the portfolio risk when they make the decision to drift an investment.

Secondly, we analyze the differences between non-drifted investments and up-drifts and notice an almost similar picture to that of the previous analysis. Nevertheless, up-drifts seem to further enhance funds' returns, as their average IRR is not only higher than for non-drifted investments (mean difference .273, $t < .01$), but also larger higher than for all investment drifts. Here again, no difference is found in term of realized multiples. In respect of the exit channels, up-drifts have a higher probability of being exited via an IPO (mean difference .109, $t < .01$) and are very seldom written-off (mean difference -.209, $t < .01$), compared to non-drifts. On the other hand, trade sales were equally probable for up- and non-drifted investments. Confirming the results of the first analysis, up-drifts are far riskier than non-drifted investments, both in absolute and relative terms (mean difference investment amount .465, $t < .01$ and mean difference investment share .014, $t < .01$).

The third step involves comparing non-drifted investments with those drifts made to earlier stages of development, the down-drifts. The first surprising results emerge when examining both performance measurement variables. No differences are established between these types of investments, neither in terms of realized IRR nor in terms of realized multiples. The average IRR for down-drifted investments was even negative. Down-drifts are not more successful for fund managers compared to non-drifted investments. Contrary to up-drifts, down-drifts therefore do not seem to be a more likely IPO candidate than non-drifted investments. Nevertheless, similar to up-drifts, down-drifts are not written-off as regularly as non-drifted investments (mean difference -.138, $t < .10$). The most important results of this analysis therefore concern risk measures. Although down-drifts do not yield a higher return than non-drifted investments, they are associated with an increased risk for the fund overall, both in absolute and relative terms (mean difference investment amount .551, $t < .01$ and mean difference investment share .012, $t < .01$).

Finally, we conduct an intra-group analysis and compared both types of drift directions' characteristics. In this analysis, the differences in performance and risk between both drift directions become clear. Firstly, in terms of performance measures, we identify up-drifts as clearly outperforming down-drifts in terms of IRR (mean difference .165, $t < .05$). While the average up-drift generates a positive IRR, this is not the case with regard to down-drifts. Again, no differences are found in the

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realized multiples. Nevertheless, up-drifts are much more likely to be exited via an IPO than down-drifts (mean difference .159, $t < .01$). On the other hand, the other exit channels do not show any difference between the types of drift. Contrary to our expectations, no significant differences in the risk measures are found.

6. Discussion and Conclusion

We set out to understand the reasons behind funds drifting on their investments, its implications to the realized internal rate of return of those investments as well as the performance and risk profile of investments given the direction in which they are drifted. We considered both market and fund characteristics as antecedents of style drift. The results have theoretical and practical implications for investment strategies in general and the private equity industry in particular.

6.1. The antecedent of style drift

Regarding the antecedents of style drift, we find that the amount of capital committed to the industry has a positive impact on the decision of fund managers to drift their investments. This finding is in line with the finding of Ljungqvist and Richardson (2003b), where larger inflows of capital to the industry makes it more difficult for fund managers to invest their committed capital. This may in turn prone managers to drift from their focus to find good business opportunities in less competitive market segments. This finding also supports the findings of Gompers and Lerner (2000), as “money start chasing deals” if committed capital increases. Particularly, doubling the amount of capital committed to funds between two years increases the probability of a stage drift by 4.8%. This result has significant implications considering the increase of capital committed to VC and PE funds during the last years. For instance, the amount of capital committed to the private equity industry increased from USD 205.4 billion in 1999 to USD 324.9 billion in 2000, an increase of 58.2% according to data from Thomson Venture Economics and the National Venture Capital Association. For the US market, commitments rose between 1999 and 2000 from USD 114.3 billion to USD 182.8 billion, an increase of 59.9%. These high growth figures indicate the incentive to style drift has considerably grown during the Internet bubble period. An alternative explanation for this behavior could be the pressure fund managers face to successfully invest the committed capital before the partnership agreement ends, a phenomenon that has been investigated by Kandel, Yuklea and Leshchinskii (2004) who consider the fund’s limited lifetime as a possible source of inefficiency. Although being only a control variable in our analysis, this alternative explanation is also confirmed in our study. The time between the closing of a fund’s fundraising and initial cash injection into the observed portfolio company is positively associated with stage drifts.

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Secondly, we also find that increases in the number of new funds raised in the VC and PE market per year leads to increases in the probability of stage drifts. This result confirms our hypothesis regarding the “funds chasing deals” argument. Our findings indicate that a doubling of the competition within a sector leads to an increased probability of drift of up to 35.4%. This result is very relevant as, for example, the number of new funds raised in the US between 1998 and 1999 increased by 45.9%, from 244 to 356. This would in turn mean that during 1999 funds drifted on their investments with an increased probability of 16.3% compared to the previous year. On the other hand, between 2000 and 2001 the number of new funds decreased by 41.6%, from 416 to 243, leading to a 14.7% reduction of the probability of stage drift.

With regard to market conditions, changes in the NASDAQ composite index development three quarters before the investment date have a strong negative impact on stage drifts, thus also confirming our third hypothesis. Our findings suggest that an increase of 1% in the NASDAQ Composite would lead to a 1.7% reduction in the probability of funds drifting their investment style. An improved macroeconomic environment favors the creation and development of businesses and more interesting investment opportunities thus arise (Acs and Audretsch, 1993). Fund managers face more attractive investment opportunities in their respective investment focus and may therefore have less incentive to drift.

In line with hypothesis 4, we furthermore find fund size to have a positive effect on stage drifts. According to our findings, an increase of USD 1 million in the size of the fund would lead to an increase of .5% in the probability of investment drift. This result is economically significant as the size of the median fund in our sample is USD 145.2 million and that of the average fund USD 181.8 million, thus the average fund in our sample was associated with an 18.3% greater probability of drifting investments than our median fund was. This result could be due to the fact that a few large funds right-skew the distribution, and that the majority of funds tend to be smaller than our average fund. Larger funds are more able to diversify themselves than smaller ones. Bad investment decisions would not affect these funds' overall return as significantly as that of their smaller counterparts would be. An alternative explanation could be that larger funds suffer less from potential reputation loss due to unsuccessful investments resulting from drifts. Finally, if many of their previous investments have been successful, fund managers feel more confident and due to “managerial perks” or “empire building” may start investing in other areas. However, all of the above confirm that larger funds may be more prone to style drift.

Our results also confirm our fifth hypothesis. Fund managers with more experience do not seem to be prone to style drift. These findings support the argument that a more experienced

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investment management firm has over the years built up an extensive network, a steady generation of deal flows, an increased expertise in the specific investment focus, and a reputation through its good track record. Reputation is important for fund managers as it enables them to access equity and debt markets (Diamond, 1989). This makes it easier for them to identify the best investment opportunities within a specific segment and gives them less incentive to switch to another market segment. In particular, doubling fund managers' time in business leads to a 58.1% reduction in the probability of style drift according to regression model (2). This result indicates that a larger proportion of younger fund managers tend to drift investments. This finding is in line with Gompers's (1996) grandstanding argument that younger firms seek to gain reputation rapidly. In order to raise follow-on funds quicker, younger firms are willing to move their investments towards an IPO faster, which could indicate that they are also more willing to drift their style to later stages.

Surprisingly, the mere .29 correlation between time in business and fund size suggests that fund size should not be used as a proxy for experience. Investment management firms specializing for example on early stage investments gain more experience as they raise and close funds but keep their fund size relatively constant to optimally invest the capital committed.

The total amount invested in a portfolio company has a positive effect on stage drifts. This result confirms our hypothesis. In our regression analysis we find that an increase of USD 1 Mio. in the total amount invested is associated with an increased probability of stage drift of .01% according to regression model (3). These findings may be explained by the results shown in table 2, in which drifts to later stages are much more frequent than those to earlier stages. As later stage investments tend to be larger than earlier stage investments, it is plausible to observe a positive association between style drift from earlier to later stages and the increasing investment amount.

6.2. Effects of style drift on an investment's performance

This subsection examines the impact of style drift (in form of a stage drift) on an investment's performance, most specifically, on an investment's internal rate of return. Our regression results have shown a positive impact of stage drifts on the IRR of an investment. In particular and consistence with the notion that style drifts directly affect investment performance, stage drifts are associated with an increase in the IRRs of 27.2%, according to model (2). Note that this finding is totally independent from the form in which the investments have been realized or exited. We do not look at the different exit channels available for PEFs, but rather concentrate on the effects of style drift. In this sense, an exit via an IPO may be a very successful channel, mostly because of the reputational consequences for fund managers, but it may not be the most successful one. The observed large increase in the IRRs

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may also give some insights into the investment behavior of fund managers. Presumably, fund managers would only drift on their stated focus if they saw a good change of making an (expected) quick profit and thus explain, at least to some extent, the large increase in performance. Although in this study we only concentrate on the investment level and not on the portfolio level, style drift becomes profitable for fund managers as it may enhance the overall return of their portfolio. As previously discussed, investment firms with realized superior returns have an easier time raising follow-on funds (Gompers, 1996). On the other hand, we cannot precisely assess the impact of these results for limited partners (fund providers), as this would require an assessment of the overall risk and return profile of their portfolio.

Turning to our control variables, we find very interesting and sometimes also surprising results. Firstly, we find a strong positive effect of the holding period on the IRR. This result can be interpreted as in line with existing literature as the longer a manager holds a company in its portfolio, the better chances he has of adding value to it and thus increase the return. We find that, following regression model (3), doubling a company's holding period of a portfolio leads to a 19.9% increase in the IRR.

Not surprisingly, we furthermore find that the level of interest rates has a negative effect on investments' IRR. The discussion of the determinants of style drift in the previous section also noted this result. Higher debt costs reduce the attractiveness of investments. Especially mezzanine and buy-out investments rely heavily on the availability and price of outside financing for their investments, thus an increase of the interest rates makes them less attractive. In our analysis and according to model (2), an increase of 1% in the level of interest rates is associated with a decrease in the IRR by as much as 46.1%.

Developments in public markets too have an important effect on performance. For an analysis of this, we examine the variations in the NASDAQ composite index from the time of the first cash injection into a portfolio company until its exit. We find a positive relationship between this variable and investments' realized IRR. Better market conditions and an improved investor sentiment have a decisive impact on investments. We further find that, according to regression model (1), an increase of 50% in public market valuations enhances the realized IRR of investments by a further 7.6%. We show that according to model (3), doubling the amount committed would lead to returns increasing by as much as 5.3%. We also find that, according to model (4), a doubling in the number of new funds is associated with a 2.8% increase in IRR. Surprisingly, we find that the fund managers' time in business has no effect on performance. On the other hand, since, as we have seen, experienced managers do not tend to drift on investments, this may partly explain this finding.

6.3. Characteristics of drift direction

Our last research question refers to the differences between drifted and non-drifted investments subject to the drift direction. To better assess investments' performance and risk, we employ a t-test of mean comparison analysis and examine the three exit channels, two relevant fund performance measures, and two proxy measures of risk. We divide our study into four categories. We start by examining the differences between drifted and non-drifted investments. We then go a step further by comparing non-drifted investments with up-drifts, in other words, investments drifts to later stages than the one committed to by the fund as stated in its original investment focus. The following step consists of studying the relationships between non-drifted investments and down-drifts, or drifts to earlier stages. Finally, we examine differences between drifts in both directions.

While the mean drifted investments yield a positive IRR log, this is not the case in respect of the non-drifted investments. This result is very important and stresses the main differences between the two measures. Clearly, the return measured in realized IRR can be of higher importance for private equity managers than the multiple on investment cost. This result is in line with our finding in the previous section. From an economic perspective, this is significant, as most of the general partners' compensation comes from an investment's "carried interest". General partners receive about 20% of all profits made by their investments (Gompers and Lerner, 1999b), therefore the interests earned from an investment are decisive. This result also enforces the opportunistic investment behavior explanation that we present in the previous section, especially when the different exit channels of investments are examined. Our results show that drifted investments have almost twice the probability of being exited via an IPO than non-drifted investments. That IPOs are the best exit channels for PEFs not only in terms of returns, but also in terms of reputation and that the possibility of raising a follow-on fund may be dependent on the number of companies that funds have taken public has been well documented in the private equity literature (Gompers, 1996; Gompers and Lerner, 1999a; Black and Gilson, 1998). Furthermore, non-drifted investments are more than 3 times more likely to be written-off than drifted investments. In our sample, drifts occur mainly to later stages and especially to buy-out investments. More mature companies (those in later stages of development) are less probable to cease operations than those in the earlier stages of development. Fund managers seem to make these investments knowing that the expected success probability is higher. Irrespective of the increased risk (in both absolute and relative terms), drifting investments seems to be an optimal ex-post decision by general partners during the fund's investment period, although ex-ante – before the investment period - this could not be the case.

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An almost identical picture is found when comparing the relationship between non-drifted investments and up-drifts. However, both risk measures are the same for up-drifts as for general drifts, or are smaller. Furthermore, the realized IRRs for up-drifts are somewhat higher than for general drifts. Up-drifts therefore tend to outperform general drifts on a risk and return analysis. This may exactly reflect general partners' reasoning when they consider an investment opportunity, and supports our arguments in the previous paragraph. Of the 205 drifts detected in our sample, 160 of them (or 78.05% of all drifts) were up-drifts. Here again, companies in later stages prove themselves more stable than earlier stage companies. Thus, a successful exit is more probable for firms of this type. However, as our sample includes only exited or partially exited investments, this reasoning may not be applicable.

In the following step, we compare non-drifted investments with down-drifts. According to Cumming, Fleming and Schwienbacher (2005), drifts to earlier stages are more common when committed capital to the industry increases. This gives PEFs an incentive to go down the development chain and profit from the higher expected returns from early stage companies. Nevertheless, as previously noted, these investments bear a much higher risk. It is also noteworthy that earlier stage investments require more entrepreneurial skills from fund managers additionally to their financial expertise. Earlier stages companies' increased risk/return profile seems to be the reason why down-drifts and non-drifted investments in our sample revealed almost no differences with respect to performance measures or exit channels. Fund managers moreover do better with non-drifted investments than with down-drifts in the sense that non-drifted deals are more frequently exited via an IPO, although there is no statistical difference. In addition, down-drifts also increase portfolio risk considerably, as the size of the average down-drift investment accounts for 5% of the portfolio, compared to only 4% of a non-drifted investment.

Finally, we present the results of the analysis of the two drift directions. The first notable difference concerns both drifts' performance. The average up-drift generates a positive IRR, while this is not the case with down-drifts. Nevertheless, the down-drifted investment in the distribution's third quartile generates almost the same return as the comparable up-drifted one. Moreover, no differences are found when the risk measures were examined. Therefore, we can conclude that up-drifts have a much more attractive risk and return profile than down-drifts. This finding stresses the higher risks and rewards associated with earlier stage companies. Also noteworthy, and very surprising, is the fact that, on average, more capital is invested in down-drifts than in up-drifts ($8.837 > 8.751$).

In general, our analysis confirms previous research on the positive relationship between IPOs and the superior performance of those investments. Nevertheless, to the best of our knowledge we are

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the first to show that this relationship may be dependent on drift direction, especially, as up-drifts confirm the theory while down-drifts do not as they are associated with a better performance than non-drifted investments. The probability of the former investments being exited via an IPO is much smaller than for the latter ones. Moreover, we find a negative correlation between performance and write-offs. Furthermore, although drifted investment show a higher performance than non-drifted ones, this comes with a higher associated risk, thus also confirming: superior performance is generally related to increased risk.

6.4. Conclusions

This paper is one of the first to examine the antecedents of style drift in private equity and the first to link style drift to investment performance in the private equity industry. This study adds to the existing literature in several respects. It primarily complements the recent analysis of style drift in private equity by Cumming, Fleming and Schwienbacher (2005): First, we affirm the importance of understanding style drift in private equity by providing evidence of its substantial occurrence as predicted by Barberis and Shleifer's (2003) style-investing hypothesis. Second, style-based strategies seem to be profitable, as Barberis and Shleifer (2003) predicted. We thus affirm the preliminary evidence of a positive relation between style drifting and investment performance that Cumming, Fleming and Schwienbacher (2005) provided. We furthermore extend their work by showing that drifted and non-drifted investments do differ in their actual internal rate of return (IRR). Investment multiples may be similar for drifted and non-drifted investments, but the IRR is higher in drifted investments. Third, by comparing the direction of style drift (upward and downward drift), we find that the returns are higher for up-drift investments. We again extend the work of Cumming, Fleming and Schwienbacher (2005) by analyzing the drift direction and linking it to performance. By showing that drift occurs mainly upward from earlier to later stages, we provide evidence that investment managers actively change their funds' risk-return profile by looking for higher returns without increasing the associated risk. Furthermore, we confront the methodological limitations of the self-reported data inherent to the Venture Economics database that Cumming, Fleming and Schwienbacher (2005) used by using a unique database that merges the Venture Economics database with the CEPRES database containing partially audited information.

Our study also complements the recent literature that examines the style drift question theoretically, most notably the first theoretical study of the implications of style drift by Barberis and Shleifer (2003). They argue that certain styles' higher relative returns lead to money chasing styles in cycles of positive feedback trading. **They further suggest that of assets within the same style will move**

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more than their fundamentals, while the prices of assets in other styles will move less than their fundamentals.

Furthermore, we link style drift to performance. Previous research on style investing in public equity documents a strong positive relationship between fund returns and subsequent flows (Chevalier and Ellison, 1997; Sirri and Tufano, 1998). One key differentiator of PE and VC funds when compared to public equity funds is that investors are not able to simply chase returns by transferring money from funds that do poorly to those that do well. Investors are committed to stick with the PE/VC fund during the total period of the fund's lifetime, usually more than five years, regardless of its performance. They can, of course, adjust their commitment strategy to new funds and might then focus on styles with strong recent returns. The analyses of this type of investor's change of commitment style could be a field of future research. One key differentiator in analyzing style drift between public and private equity is the liquidity of the market. Public equity portfolios' traders and investment managers are able to change their style over time. However, PEF managers have to first raise their fund by promising their limited partners to focus on a more or less restricted investment strategy for the fund, and then have to invest in the agreed focus over the fund's total lifetime of usually 10-12 years.

On the investor level, commitment is guaranteed for the fund's total lifetime without the option to simply terminate the commitment and change to another fund in case of poor performance. On the fund manager level, his investment style has to follow the agreed upon focus. Further, an investment in a PE or VC portfolio company is generally not liquid, and poorly performing companies cannot simply be sold and traded for better performing deals. Due diligences and negotiation efforts incur high transaction costs for PE and VC investments. Consequently, the only way to drift the investment style within the fund's lifetime without generating high transaction costs is an investment in a new portfolio company that falls outside the fund's stated investment focus. We therefore focus our analyses on exactly this type of style drift. We confirm that similar causes of style drift have similar effects on style drift in public equity as well as in private equity. More competition in a given market segment has a positive influence on the probability of style. In public equity, the direction of style drift is usually towards a segment with a better risk-return profile and driven by previous returns. Moreover, we find that, consistent with the positive feedback style-trading hypothesis, style drift flows chase good style returns. Finally, we also provide evidence that money flows into "popular" styles in positive feedback cycles. Thus, our results support Barberis and Shleifer (2003) who show how funds' pursuit of styles can account for observed patterns regarding returns. Our paper can also be related to the analyses by Kandel, Yuklea and Leshchinskii (2004), Kaplan and Stein (1993) and Gompers (1996) on "grandstanding".

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Our findings hold implications for investment managers, portfolio companies and private equity investors. For investment managers, our results suggest that it may be as important to understand the style that will be preferred by other investment managers at the time of the exit as providing non-financial value added to portfolio companies, as our results imply that more value is created by superior selection of investments at the right time than by providing added value by the fund manager.

For investors into PEF, our results are an indication that the originally targeted portfolio diversification before the fund's investment period is difficult to maintain during their investment period, since approximately half of PEFs exhibit style drift over the course of a fund's lifetime. Since style drift in private equity is associated with much higher transaction costs in terms of time and money invested, investors and investment managers may want to incorporate style calculation information into their investment strategies. Unlike public equity, private equity investments are harder to rebalance and transaction fees are much higher. Due to style drift's time intensity in private equity, it is associated with high opportunity costs for investment managers.

Our study has some limitations. First, since we do analyze the IRR of each investment and not of all deals in the market in a specific stage segment, we cannot identify, whether previous returns, either of within the market's stage segment or of the specific investor's deals in that segment, have influenced the probability of style drift. Second, we also do not measure whether the returns after style drift have been better for the investor than before the drift. These are fields usually analyzed in public equity research and are fields for further research into PE and VC investing.

Future research may build on our findings in a number of ways. First, our results contradict authors, such as Brown and Harlow (2002), who have found that style consistency is associated with higher results in public equity markets. Future studies might therefore want to re-examine the relationship between style drift and performance. Second, future studies could examine whether investment managers' previous returns influence performance. Third, it would be interesting to examine whether previous returns in a particular stage lead to increased drifting of funds to that stage. Fourth, it would be a further field of research, whether changes of the level of committed capital into funds focusing on specific stages influences stage drifts to a particular stage. Another interesting question would be whether economic growth induces investment managers to leave public equity markets and to transfer their style drift practice to a private equity environment. Finally, our study is done at an investment level. Effects of style drift at fund level could deliver a more in-depth knowledge of fund managers' motives for drifting.

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Tables

Table 1: Description of Variables

Description of Variables		
	Variable Name	Variable Description
Drift	Stage Drift	A dummy variable equal to 1 if an investment was made in portfolio company <i>i</i> even though the development stage of portfolio company <i>i</i> does not match the specified stage focus of the fund, otherwise 0
Performance Measures	Log [IRR+1,1]	The exact IRR (Internal Rate of Return) based on the investment cash flows from the fund to the portfolio company and the return flow from the company to the fund. For the regression analyses we take logs of (IRR+1,1) to conform to the Gaussian assumptions necessary for classical linear regressions and to cover all positive and negative IRR results as well as write-offs
	Multiple	The amount of capital outflows from an investment in relation to the total capital inflows into a portfolio company.
Risk Measures	Investment Amount	Total amount invested in portfolio company <i>i</i> in all investment rounds by the fund (in real 2003 U.S. Dollars)
	Investment Share	Total amount invested in portfolio company <i>i</i> in all investment rounds by the fund (in real 2003 U.S. Dollars)
Exit Channels	IPO	A dummy variable equal to 1 if portfolio company <i>i</i> was exited from the fund in the form of an initial public offering, otherwise 0
	Trade Sale	A dummy variable equal to 1 if portfolio company <i>i</i> was exited from the fund in the form of a sale to a strategic or financial investor, otherwise 0
	Write Off	A dummy variable equal to 1 if portfolio company <i>i</i> has been totally written off, otherwise 0
Control Variables		
Portfolio Company	Investment Amount [log]	Total amount invested in portfolio company <i>i</i> in all investment rounds by the fund (in real 2003 U.S. Dollars) [For some regressions we calculate logs]
	Holding Period [log]	The holding period refers to the time from the first cash injection into the portfolio company and the relevant company's final cash distribution to the fund [For the regression analysis we calculate logs]
	Age of Company	Age of portfolio company <i>i</i> (in years since its founding date) at the date of the initial investment by the fund [For some regressions we calculate logs]
Fund / Management Firm	Time in Business [log]	Number of quarters the investment managers have been active in the industry [For the regression analysis we calculate logs.]
	Time to Invest	Time between closing of the fundraising and initial investment in portfolio company <i>i</i> (in quarters)

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	Fund Size [log]	Size of the fund at Date of Investment (in real 2003 U.S. Dollars, in millions)* [For some regressions we calculate logs]
Market	Investment in Bubble	A dummy variable equal to 1 if the fund's initial investment in portfolio company i was made during the Internet bubble (between September 1998 and March 2000), otherwise it is 0.
	Exit in Bubble	A dummy variable equal to 1 if the investment was exited and had the final cash distribution back to the fund during the Internet bubble (between September 1998 and March 2000), otherwise it is zero.
	No. of IPOs [log]	Number of (PE-backed) IPOs in the year of the initial investment into portfolio company i. [For some regressions we calculate logs]
	Committed Capital [log]	Committed Capital on the Overall Market at Date of Investment (in real 2003 U.S. Dollars, in millions)* [For some regressions we calculate logs]
	Risk Free Rate [log]	The short-term interest rate at the date of the initial investment by the fund in portfolio company i (for U.S. investments: The Federal Reserve Bank 1 month treasury bills) [For some regressions we calculate logs]
	NASDAQ Development	NASDAQ Development is the variation of the NASDAQ Composite Index between the initial investment date by the fund in portfolio company i versus three quarters before the initial investment.
	NASDAQ Development II [log]	NASDAQ Development is the variation of the NASDAQ Composite Index between the initial investments by the fund in portfolio companies i and exit dates [For the regression analysis we calculate logs.]
	Entry [log]	This variable controls for competition among funds in the market by looking at the number of newly raised funds in the entire VC+PE industry during the year of an investment's exit [For the regression analysis we calculate logs.]
	Competition [log]	Competition indicates the number of newly raised funds in the whole VC+PE industry at the time of the first investment tranche in portfolio company i [For the regression analysis we calculate logs.]

* The inflation adjustment is based on Consumer Price Index (CPI) data for all urban households and all items. Data are derived from the records of the U.S. Department of Labor (www.bls.gov)

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Table 2: Absolute and Relative Frequency of Drift by Venture Capital and PEFs

		Investment Manager Stage Preference						
		Seed	Early	Expansion	Later	Mezzanine	Buyout	Total
Stage of Portfolio Company	Seed	0	11	0	0	0	0	11
	Early	0	0	0	0	0	0	0
	Expansion	0	19	0	0	33	0	52
	Later	0	12	27	0	1	3	43
	Mezzanine	0	1	0	0	0	0	1
	Buyout	0	2	0	0	96	0	98
	Total	0	45	27	0	130	3	205
		Investment Manager Stage Preference						
		Seed	Early	Expansion	Later	Mezzanine	Buyout	Total
Stage of Portfolio Company	Seed	0%	24.4%	0%	0%	0%	0%	5.4%
	Early	0%	0%	0%	0%	0%	0%	0%
	Expansion	0%	42.2%	0%	0%	25.4%	0%	25.4%
	Later	0%	26.7%	100%	0%	.8%	100%	210%
	Mezzanine	0%	2.2%	0%	0%	0%	0%	.5%
	Buyout	0%	4.4%	0%	0%	73.8%	0%	47.8%
	Total	0%	100%	100%	0%	100%	100%	100%

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Table 3: Descriptive Statistics: Performance and risk

Year	Investments	Stage Drift	Up-drifts	Down-drifts	Committed Capital (\$Mio.)	# of new Funds
1986	2	0	0	0	17,040.4	34
1987	1	0	0	0	36,249.6	37
1988	2	0	0	0	34,626.5	22
1989	4	1	1	0	31,794.8	31
1990	10	3	3	0	26,533.4	16
1991	7	2	2	0	26,265.8	8
1992	11	3	3	0	27,296.3	22
1993	10	3	2	1	36,854.3	30
1994	17	13	10	3	54,281.4	34
1995	28	16	13	3	63,903.5	68
1996	44	20	15	5	75,658.0	60
1997	44	26	20	6	12,574.6	99
1998	82	40	35	5	17,298.3	82
1999	80	34	25	9	205,394.8	138
2000	58	24	15	9	324,947.4	142
2001	22	17	13	4	182,146.8	83
2002	3	3	3	0	97,110.6	17
2003	1	0	0	0	89,587.9	5

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Table 4: Descriptive Statistics: Probability of loss and average IRR

Year	Probability of partial loss			Average IRR		
	Seed / Early	Expansion / Later	Mezzanine / Buyout	Seed / Early	Expansion / Later	Mezzanine / Buyout
1986	.0%	--	--	.133	--	--
1987	100.0%	--	--	-.100	--	--
1988	100.0%	--	--	-1.000	--	--
1989	33.3%	.0%	--	.134	.030	--
1990	71.4%	100.0%	.0%	-.285	-1.000	.137
1991	20.0%	50.0%	--	.091	.004	--
1992	42.9%	.0%	.0%	-.099	.420	.097
1993	50.0%	.0%	.0%	-.123	.016	.141
1994	10.0%	33.3%	30.0%	-.457	-.242	-.033
1995	46.2%	.0%	16.7%	-.216	.253	.082
1996	53.3%	57.1%	0.0%	-.108	-.409	.126
1997	63.2%	.0%	28.6%	-.290	.321	-.032
1998	46.7%	26.9%	16.7%	-.047	.216	.009
1999	77.8%	36.4%	16.7%	-.519	.086	-.089
2000	90.5%	37.5%	6.9%	-.752	-.175	.079
2001	66.7%	40.0%	7.1%	-.615	-.203	.102
2002	--	--	.0%	--	--	.141
2003	--	--	.0%	--	--	.180

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Table 5: Regression Analysis on the Determinants of Stage Drifts

		Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
		Dependent Variable = Investment drift	Dependent Variable = Investment drift	Dependent Variable = Investment drift	Dependent Variable = Investment drift	Dependent Variable = Investment drift	Dependent Variable = Investment drift
	Constant	.259	-2.120 *	.216	-.507	.763	.045
Portfolio Company	Investment Amount	9.49 E-05**	7.87 E-05**	1.21 E-04***	9.96 E-04 ***	1.04 E-04 ***	9.55 E-04 ***
	Age of company	.014	.017				
Fund Investment / Management Firm	Time in Business	-.480 ***	-.581 ***	-.479 ***	-.534 ***	-.453 ***	-.513 ***
	Time to Invest	.153	.179	.238 **	.223 **		
	Fund Size	.004 **	.006 ***	.004 ***	.005 ***	.004 **	.005 ***
Market	Investment in Bubble			.169	.342		
	No. of IPOs			2.85 E-04	-6.13E-04	.001	4.41E-04
	Risk Free Rate	-.052	-.041	-.058	-.021	-.112	-.090
	NASDAQ Development	-1.284 *	-2.480 ***	-1.585 **	-1.685 **	-1.616 **	-1.724 **
	Committed Capital	5.05E-06 **		4.80E-06 **		4.58E-06 **	
	Competition [log]		.805 ***		.344 *		.354 *
Model Diagnostics	No. of Observations	248	248	308	308	308	308
	Pseudo R ²	.234	.253	.245	.237	.234	.226
	X ²	66.043	72.361	86.585	83.441	82.041	78.902
	p-value	.000	.000	.000	.000	.000	.000

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Table 6: Regression Analysis on the Determinants of the Internal Rate of Return (IRR)

		Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
		Dependent Variable = Log [IRR+1,1]	Dependent Variable = Log [IRR+1,1]	Dependent Variable = Log [IRR+1,1]	Dependent Variable = Log [IRR+1,1]	Dependent Variable = Log [IRR+1,1]	Dependent Variable = Log [IRR+1,1]
	Constant	-2.310 *	-1.023	-2.537 ***	-.864	-1.812 ***	-.722 **
Portfolio Company	Investment Drift	.225 **	.272 **	.145 *	.178 **	.164 **	.187 ***
	Investment Amount [log]	-0.015	-0.011				
Management Firm	Holding Period [log]	.166 ***	.161 ***	.199 ***	.175 ***	.170 ***	.163 ***
	Time in Business [log]	-.081 *	-.058	-.037	-.016		
	Fund Size [log]	-.058	-.087	-.029	-.038	-.038	-.045
Market	Exit in Bubble	-.086	-.071				
	No. of IPOs [log]	.103	.107	.044	.020		
	Risk Free Rate [log]	-.390 *	-.461 **	-.383 ***	-.293 **	-.325 **	-.274 **
	NASDAQ Development II	.152 *	.148 *	.093 *	.084 *	.097 **	.088 *
	Committed Capital [log]	.469 **		.503 ***		.376 ***	
	Entry [log]		.291 **		.208 ***		.187 ***
Model Diagnostics	No. of Observations	183	183	291	291	299	299
	Adjusted R ²	.113	.118	.113	.099	.106	.101
	F value	3.343	3.459	5.648	5.004	6.915	6.621
	p-value	.001	.000	.000	.000	.000	.000

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Table 7: Regression Analysis on the Determinants of Stage Drifts

	Performance Measures		Exit channels			Risk Measures	
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)	Model (7)
	Dependent Variable = Log	Dependent Variable = Log [Multiple]	Dependent Variable = IPO	Dependent Variable = Trade Sale	Dependent Variable = Write Off	Dependent Variable = Log	Dependent Variable = Investment
Full Sample	-.097	3.125	.108	.383	.178	8.517	.044
No Stage Drift	-.211	3.096	.072	.403	.271	8.286	.039
Stage Drift	.026	3.158	.146	.361	.078	8.770	.053
Mean Comparison	.237 ***	.062	.074 ***	-.042	-.193 ***	.484 ***	.014 ***
No drift	-.211	3.096	.072	.403	.271	8.286	.039
Up Drift	.062	3.479	.181	.350	.063	8.751	.053
Mean Comparison	.273 ***	.383	.109 ***	-.053	-.209 ***	.465 ***	.014 ***
No drift	-.211	3.096	.072	.403	.271	8.286	.039
Down Drift	-.103	2.012	.022	.400	.133	8.837	.051
Mean Comparison	.108	-1.084	-.050	-.003	-.138 *	.551 ***	.012 ***
Up Drift	.062	3.479	.181	.350	.063	8.751	.053
Down Drift	-.103	2.012	.022	.400	.133	8.837	.051
Mean Comparison	-.165 **	-1.467	-.159 ***	.050	.071	.086	-.002

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ⁱ For example, the Yale endowment, one of the largest endowments in the US with over \$12 billion in assets under management, allocates more than 15% of their portfolio to private equity. (Yale Endowment Report, 2004).

ⁱⁱ Following Cumming, Fleming and Schwienbacher (2005), we hereafter simply use the term “private equity”. The distinction between private equity and the term venture capital is particularly blurred by the fact that VC funds often style drift into later stage investments - commonly referred to as “private equity” investments - and that PEFs likewise often style drift into earlier stage investments - commonly referred to as “venture capital” investments. For expositional simplicity, we therefore use private equity as the most generic term to refer to early stage venture capital as well as late stage private equity (Cumming, Fleming and Schwienbacher, 2005).

ⁱⁱⁱ Transaction cost theory suggests that the costs of trading investments can significantly affect the return of an investment strategy (Keim and Madhavan, 1997). Since style-consistent portfolios have less portfolio turnover, they spend less time identifying, selling and buying investments, and thus have lower transaction costs (Barberis and Shleifer 2003; Brown and Harlow, 2002). Managers who commit to a certain style are also less likely to make selection errors (Brown and Harlow, 2002). Finally, managers who style drift often make investments decisions regarding fields in which they have little or no expertise.