CATÓLICA LISBON
BUSINESS & ECONOMICS

PRIVATE EQUITY FUNDS:

European Industry Returns and Performance Benchmarking

Emanuel PEGADO
Master in Finance Candidate
Student: 153316005
Católica Lisbon School of Business and Economics

Professor Ricardo F. Reis
Thesis Dissertation Supervisor
Católica Lisbon School of Business and Economics

Index

Private Equity Funds: European Industry Returns and Performance Benchmarking

Abstract

Through the use of publicly available information and data I have investigated the performance of the European Private Equity Industry versus that of the Stoxx 600 stock index in order to create investment alternatives that are generally considered in the investment decision making of market participants that consider the opportunities in Private Equity investment. Performance of private equity funds, as disclosed on the Thomson Reuters Eikon Platform via information shared by Cambridge Associates, have demonstrated continuous outperformance versus that of stock market indices that follow the biggest European companies' prices. I have gone on to further discriminate the various categories within the Private Equity space and considered only Venture Capital funds and Buyout funds. Buyout funds produced far superior results to the equity markets. However, with regards to the Venture Capital funds, performance was not straight forward, with periods where they lagged behind other benchmarks (including the stock market indices).

1. Introduction

This paper examines the performance of the Private Equity (PE) industry in Europe from the 31st of December 1996 until the 31st of December 2016. This paper aims to explain the general concepts of PE, how investments are typically originated and carried out with particular focus on Venture Capital (VC) and Buyout and Growth (B&G) investment strategies. With the use of existing data, it is possible to show the activities performance in the region versus relevant investment destination alternative. The benchmark from which comparisons and conclusions shall be drawn from are against the returns of index Stoxx Europe 600, this index tracks 600 component European stocks that represent large, mid, and small capitalised companies throughout 17 countries in the European continent[1]. Additionally, industry's returns will be broken down in order to demonstrate if there is dominance by the top European PE funds in this landscape.

Value is the defining aspect of measurement in markets. Economic agents invest with the anticipation that upon selling, price will increase by a satisfactory amount to reward them for risking with their respective investments. This is true for all investment types, irrespective of asset class. Indeed, in our market economy, a company's ability to generate value for its shareholders and the amount of value it creates are the principle measures by which it is judged. Private Equity (PE)[2] is a broad term used for any equity focused investment in a company that is not listed in a stock market by specialised financial firms who will manage these investments through funds. The objective is to help companies grow over the long term in order to produce enough capital gain growth for the possibility to then orchestrate a successful exit from these investments, via whichever appropriate strategy that will achieve the most returns for the respective fund. PE is also ordinarily an alternative source of financing for innovative and/or high potential start-ups and an alternative to capital markets for companies with an established track record. The industry is normally divided by the stage that a fund would initiate its involvement in the target company. Early stage focused VC firms will invest in companies initiating their activity, i.e. the take-off phase for target companies, where rapid growth is experienced. The benefit of a VC engagement for start-ups is that they provide an excellent accelerator platform from which companies in their early stage can grow and develop into market players, consequentially also improving the performance for the interested investors. According to CB Insights, in September 2017 there were in effect 214 companies in the 'unicorn' valuation club (with market

[1] See Stoxx Europe 600 profile site: https://www.stoxx.com/index-details?symbol=SXXP

[2] Solely for the purpose of this study Private Equity is being defined as an asset class due to the relationship between an institutional investor and an intermediary (the PE fund).

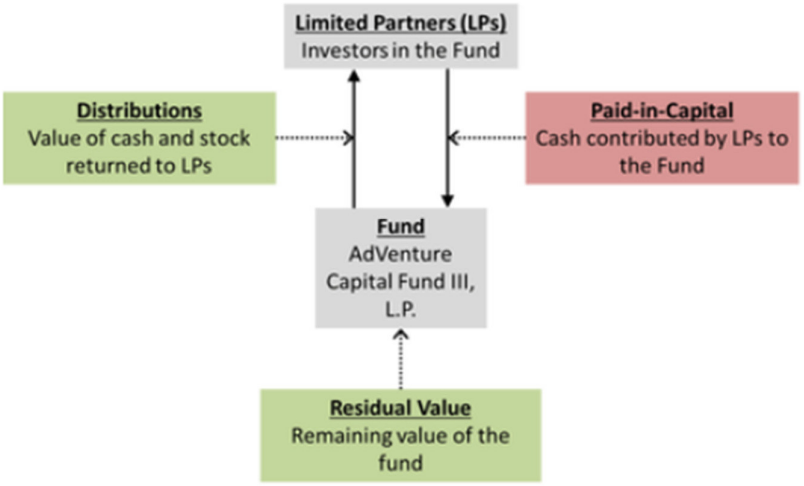
valuations exceeding the $1 billion range)[3]. As over 50% of these start-ups are located outside of the USA it is fair to say that start-up, and in turn VC investments, have gone global. Other private equity firms focus their funds on late stage and/or the buyout of established targets in order to maximise value by attempting to extract the full potential from these companies, and exiting once this is considered to of been achieved.

As illustrated in the Figure 1 example, PE funds are customarily structured in a way that the Limited Partners (LP) joins a management team known as the General Partner (GP), they in turn will manage the investments for the participating LPs. The PE fund investors hold shares of these LPs and the PE funds invest this institutional money into privately targeted companies, typically these investments will be structured as equity claims[4]. An investment vehicle will be created for each individual transaction, and is capitalised by the PE fund and other third parties that normally consist of namely debt providers and mezzanine investors. This transaction vehicle, managed by the PE fund, will later acquire shares in a targeted company and/or will merge with it, thus creating a unique opportunity to specify its capital structure and to implement particular claims and incentive structures in consequence. The industry was spurred on initially in the 1970s by leveraged buyouts, which involve investing through a specialised investment firm using a relatively small portion of equity with a much larger amount of outside sourced debt financing. Normally in these structures the general partner only provides about 1 percent of the capital required. Capital calls are done by the GP, as well as, when they are ready to engage in an investment and thus require the LPs committed capital contributions. This technique employed by the PE industry is known as subscription-line financing, where investors money is used as a security for financing that is then used for the execution of deals in place of client's capital, it has been witnessed that standard financing in these investments are between 60-90% of sourced debts. A portion of which is senior and secured (this is arranged by the corporate investment bank involved in the transaction); the remaining portion may consist of junior and unsecured debt that produces high yielding bonds. There is also lending that is asset backed by the target companies in nature, meaning that the financing covenant will demand that the target company's assets be redeemable in case of default.

[3] Please consult the CB Insight research article: https://www.cbinsights.com/research/startup-unicorns-international-map/

[4] Equity claims, also known as residual claims, are claims to a share of earnings after debt obligations have been satisfied.

Figures 1: Private Equity Fund Dynamics



The boom in the PE space has led to the creation of several funds with differing investment strategies with specific emphasis being given to the target companies' relative lifecycles. Buyout funds are interested in acquiring companies by purchasing majority or controlling stakes, financing the transaction through a mix of equity and debt. It was found that it is not common practice for 'quick flips' to occur, in the European industry especially. Kaplan (1991) found that the average holding period is of 6.82 years. Early-stage funds are VC funds that look into investing during the early life stage of companies. Growth funds target mature companies that require capital to support expansion efforts or improve internal operational capacity. Late-stage funds are a type of VC fund that invest in later rounds of funding of targets (typically takes place in C or D rounds). Mezzanine funds will opt to use a hybrid of debt and equity financing, comprising of equity-based options (such as warrants) and lower-priority (subordinated) debt. Finally, VC funds that have not limited their investments by stages.

The characteristics of LP investors varies according to their risk appetite. Additionally, the asset allocation weighting that each investor attributes to their portfolio for alternative investments varies according to their risk profile. These investor risk profiles are determined by the characteristics, objectives, and investment philosophy of each one. Traditional participants include, but are not limited to, corporate investors that manufacture products and/or may deliver non-financial services. Endowment funds are structures (commonly organised by universities, institutions, or other foundations) that seek to preserve donations for their future operating necessities. This means that the life span of endowments is organised in such a way to target perpetual existence. Family offices are entities that facilitate and provide financial services to families. This includes for example wealth management services, tax and accounting consulting and other related advice. Government agencies,

which are focused on country, region, or development, are other sources of investors. Other asset managers (not including banks, endowments, family offices, foundations, insurance company or pension funds) manage assets under management into different investment strategies with the objective of generating excess financial returns for their clients. Pension funds, both private and state controlled, are also active investors in PE funds. Finally, sovereign wealth funds managing, state capital contributions are common investors in foreign PE funds, this is to diversify the states portfolio and exposures. The investors in these funds observe a stream of cash-flows for the normal duration of a fund's lifecycle; this can usually last for more than 13 years[5] until the fund is finally liquidated. Hence, time-series estimations may not be applied to measure risk and the abnormal returns of this industries fund.

Jensen (1989) predicted that Private Equity would be the dominant form of a corporate organisation. This was predicted because of the organisational ownership structure and their stakes in portfolios of companies. The activist nature of a PE funds position in a board of directors is believed to positively shake up internal dynamics and therefore lead to better performance in the invested company. Secondly, the high incentives for the private equity professionals - this share of a fund's profits are known as the GP's carried interest, the industry standard is a performance fee of 20%[6] on profits of the fund. Thirdly, the emphasis on lean and efficient organisations. This was all seen as the opposite of public companies at the time. However, the prediction can be considered to have been quite premature, due to the crash of the junk bond markets in the early 1990s, which were so popular in the previous decade.

PE traditionally is thought to provide an attractive alternative investment due to its diversification benefits. However, benefits can be lower than expected as PE has significant exposure to liquidity risk factors, similar to public equity and other alternative classes. Due to high leverage PE is therefore sensitive to capital constraints faced by the providers of debt, i.e. the main book runners being banks and hedge funds (which are the standard sources of capital for the PE fund financing). Brunnermeier and Pedersen (2005) established the theory of availability of capital, which specified that funding liquidity is positively related to market liquidity. This translates into low market liquidity forcing PE

[5] See Financial News article: *Average private equity fund life span exceeds 13 years* https://www.fnlondon.com/articles/average-private-equity-fund-life-span-exceeds-13-years-20150327

[6] See FT article: Private equity's dirty finance secrets https://www.ft.com/content/48d107b2-5fed-11e7-91a7-502f7ee26895

managers to almost certainly finding it much more difficult to refinance investments, hence leading to lower returns - a situation that many PE funds are currently in.

2. Literature Review

In the Kaplan and Schoar (2005) paper, it was their objective to investigate the performance of private equity. They found that the better performing PE partnerships had more success in establishing follow-on funds and larger funds. This relationship is concave in nature meaning top performers grow proportionally less than average performing partnerships. At the industry level, market entry and fund performance are cyclical; however, established funds were much less sensitive to these cycles than new entrants in the market.

In another academic study by Phalippou and Gottschalg (2009), it was concluded that PE performance is commonly overstated by the industry associations and in other studies. This is due to the use of inflated accounting valuations for ongoing investments and the bias for better performing funds being used in applied data sets. Their paper concluded that there is a risk-adjusted underperformance by funds of an estimated 6%. By revising the Kaplan and Schoar (2005) paper's subsample they found that by filtering out "six-quarter inactivity" the performance multiplier metric was 1,01x (rather than 1,05x as shown by Kaplan and Schoar) and that the Internal Rate of Return was of 15% (rather than 19%). Additionally, the number of observations fell to 599 (from 746 in the KS study). However, it is relevant to note that matching Kaplan and Schoar sample with precision was probably not possible, and that some discrepancies were also noted in Kaplan and Schoar findings. Nevertheless, the study originally focussed primarily on the impact of performance of sample selection bias, accounting values and fees. It was argued that their starting point for performance measurement was not actually relevant, but rather the accounting implemented for sample bias, the use of the appropriately weighted profitability indices. Finally, the exclusive use of average-IRR tends to bias performance upwards.

Sorensen and Jagannathan (2013) promoted, previous work done by Kaplan and Schoar (2005), having a Public Market Equivalent (PME) measure as a basis of comparison versus Private Equity returns. This is because PME's are valid no matter the risk of the PE investment that is undertaken, and it is suitably robust against different variations in the timing, due to the application of stochastic discounting, and systematic risks for the underlying cash flows, due to sturdiness against manipulation of timings of these same cash flows, along with other risks of GP manipulations. Their paper proves that PMEs are an important metric as investors do not have to follow a specific investment strategy

to utilise this type of data. PMEs are suitable for ex-post performance usage as there is no need for knowledge of betas and/or any other similar parameters.

L'Her, Stoyanova, Shaw, Scott, and Lai (2016), used the Burgiss dataset to study private equity buyout fund performance. Their findings on performance before risk adjustments were consistent with those in the Burgiss reports and indicated significant outperformance of buyout fund investments versus the CEM benchmark[7]. They went on to use a bottom-up approach and identified the systematic risks of underlying companies in buyout funds to inform an appropriate risk-adjusted benchmark, which they then determined to be a levered size- and sector-adjusted public index. After making these risk adjustments no significant outperformance of buyout fund investments versus the public market equivalent on a dollar-weighted basis occurred. However, the authors still maintained that even without significant risk-adjusted outperformance buyout funds can play a valuable role in institutional investors' portfolios.

Franzoni, Nowak and Phalippou (2012), found that the PE industry diversification benefits expected by investors may be lower than anticipated. They state that PE is exposed to the same liquidity risk factors as public equity and other alternative asset classes may face. The unconditional liquidity risk premium is close to 3% annually and, in a four-factor model[8], the inclusion of this liquidity risk premium reduces alpha to zero. In addition, they provided evidence that the link between PE returns and overall market liquidity due to a 'funding liquidity channel'[9].

By using data from corporate tax returns to examine the evolution of firms' financial structure, and performance after LBOs, the paper produced by Cohn, Mills, and Towery (2013) utilised sample of 317 LBOs that occurred between 1995 and 2007. Their findings showed little evidence of operating improvements subsequent to an LBO, although consistent with prior studies, they did observe operating improvements in the set of LBO firms that have public financial statements. It was also found that firms do not reduce leverage after LBOs, even if they generate excess cash flow. Results would

[7] CEM is a global benchmarking company; they are an independent provider of benchmarking information for large pools of capital including pension funds, endowments/foundations and sovereign wealth funds. For more information: http://www.cembenchmarking.com/aboutus/aboutus.aspx

[8] In portfolio management the Carhart four-factor model is an extension of the Fama–French three-factor model including a momentum factor for asset pricing of stocks. Momentum in a stock is described as the tendency for the stock price to continue rising if it is going up and to continue declining if it is going down.

[9] One of the objectives of this paper was to study the impact that market liquidity has on the performance of PE returns. This correlation explains the availability of funding for the purchase of target assets to the better returns experienced in the industry as a consequence.

suggest that effecting a sustained change in capital structure is a conscious objective of the LBO structure.

The ongoing debate in PE literature has been whether funds really do add real value to the economy. Much of the literature supports and states that once a company is in the hands of the PE funds its free cash flow increases[10]. However, PE funds may pay too much for companies and suffer in large transaction costs when buying and selling respective business units. Therefore, the benefits they bring to companies that have been invested in may not translate into superior returns for the principal investors of the PE fund. In that case value is captured by other agents. A related issue is that fees charged by funds to the LPs may be too large, this means that the fund may be outperforming benchmarks net of fees but then go on to underperform after fees due to the fee inclusion effect during the fund's lifespan. In this case value is being added but investors would be paying too much for this financial intermediation by the respective GP. In a study[11] on the relationship between management contract terms and the performance of PE funds, that utilised a proprietary database to gather fund cash flow behaviours and other metrics from 1984 to 2010, concluded that there is no evidence to suggest that higher fees or lower managerial ownership are associated with lower net-of-fee performance of the respective funds. Nevertheless, compensation rises and shifts to performance insensitive components during fundraising booms. The evidence suggests that managers with higher fees deliver higher gross performance, and highlights that agency costs are an inevitable consequence of the information frictions prevalent in these agency relations. This further supports their findings that net-of-fee performance is strongly negatively correlated with management fees of private equity funds, charged by the general partner.

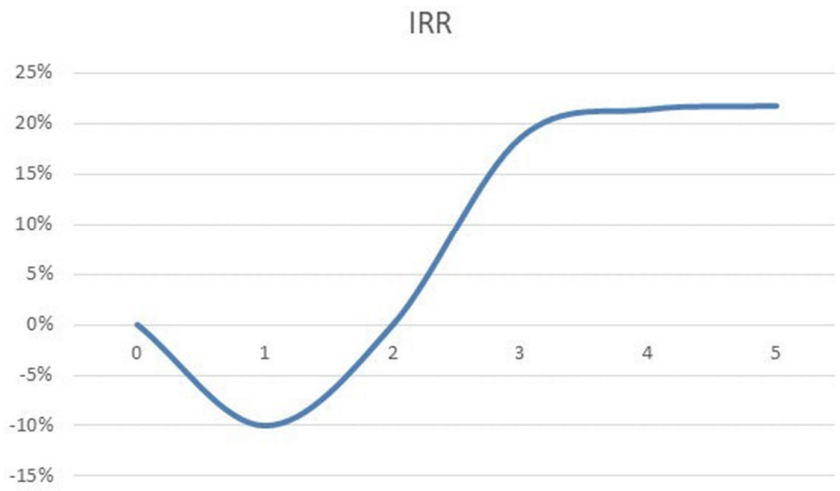
3. **Methodology**

Private Equity investments are considered riskier and more illiquid than many other asset classes, for this reason institutional investors that have the risk profile to withstand such investment characteristics expect their returns to be sufficiently high to compensate for this same risk. In this paper publicly available information was utilised in order to find the returns for the limited partners in the private equity limited partnerships to examine the returns over their respective investment horizon.

[10] See Cumming, Siegel and Wright (2007)
[11] See Robinson and Sensoy (2013)

The industry standard measure for performance is the Internal Rate of Return (IRR) from the creation of the PE fund. IRR measures PE fund returns based on all the cash flows that have gone in and out of the fund, including the Net Asset Value of the fund, and most closely reflect the return an investor may expect to achieve if they invest at the start of a fund. The returns are time-weighted and are expressed in percentage values.

Figure 2: PE Fund Internal Rate of Return J-Curve



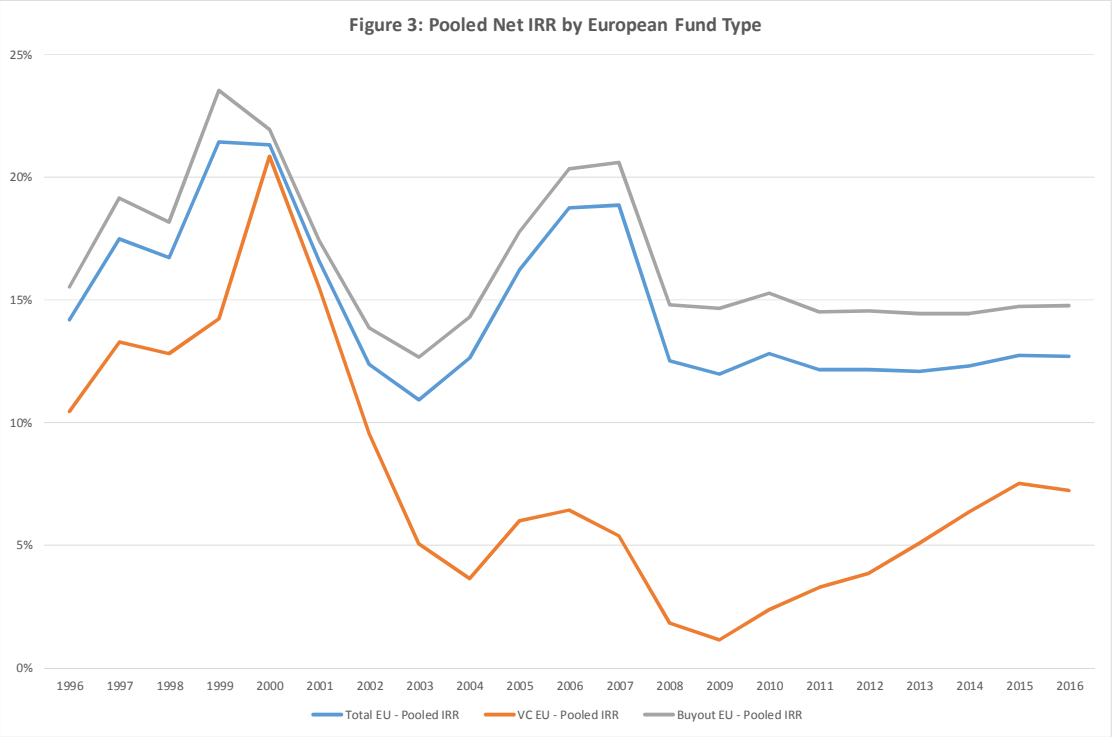
As demonstrated in the graph above, even though hypothetical in shape, it is typical for a LP in a limited partnership agreement to expect the fund's IRR to be negative initially. This is due to capital call contributions that are required at moment zero (even though PE funds are not required to call all committed capital at this stage). Why does this weigh negatively for fund returns? Put simply, this is linked to fund organisation expenses, management fees charged by the GP, fund expenses, and portfolio expenses. Fund structures are expensive as there are many different requirements that must be fulfilled and these will vary by local requirements and specificities (examples include legal, accounting, tax, and other miscellaneous expenses involved in this phase of a fund's life cycle). Management fees and fund expenses are charged regardless of fund performance. Finally, there is the interesting practice of recognising losses early on in the cycle - this means that GPs will mark-down or write-off the carry value of poor investments as they are recognised by the fund. This in turn results in early performance to suffer. Therefore, a J-Curve appears along individual funds return graphs and they will be more pronounced early on, especially for VC funds where 50%-60% of the funds seed and early-stage investments may not return capital. However, B&G Funds experience shallower J-Curves as their investments are typically in larger companies with good cash flows.

End-to-End IRR allows for the computation of the return of groups of PE funds with differing inception dates. Inception dates are also known as the vintage year of a fund, meaning that it is the year in which a fund first draws down capital from its investors. This allows for better comparison of PE returns to those of other asset classes over a similar period of time and for the returns of funds at different life cycles to be combined. These long-term IRRs are considered to be the most indicative of PE performance across different stages of the economic cycles and are considered as headline measurements of performance. Whilst for short-term considerations returns should be viewed with caution, as PE is a long-term investment. However, shorter period returns may be indicative of the general performance of PE over this short period. In this paper I considered the Pooled-IRR (P-IRR), and this reflects the aggregate ("pooled") of all cash flows and ending Net-Asset Values (NAV) to calculate a money-weighted return.

The P-IRR is the measurement method that is generally considered as extracting the most accurate calculation. The P-IRR is the standard method used for a group of funds, as opposed to the average rate of return across funds. P-IRR utilises the actual cash flows of private equity funds, rather than the simply using average levels of cash flows. The equal weighted returns, as the name suggests, allows for return method to give equal importance to all components that make up a fund's performance. This means that equal weighting is given from the smallest companies to the largest ones. Capitalisation weighted rates of return is a type of IRR that allocates more weight to those components with larger total market capitalisation. Therefore, the higher the market capitalisation of a company, i.e. the larger the market value of the company, the more weight the results will have as a component for calculating capital weighted returns, and vice-versa.

Characteristics on PE fund performance are not readily available due to the limited disclosures of financial information from these funds being readily available to the public. Access to financial data is restrictive in the sense that normally one needs to request this information directly from funds, or be willing to go through extensive paywalls on professional financial platforms (like Thomson Reuters Eikon or Bloomberg terminals). Information regarding VC, B&G and the general European PE funds returns and performances were extracted through Thomson Reuter's Eikon platform. With Eikon, generalised information on returns to LPs, net of management fees, was extracted between 1996 and 2016. Returns are measured by their IRR, and each partnership is based on the capital contributions made into the fund (considered as negative cash flows by LPs), distributions to LPs (positive cash flows), and the valuation of assets that remain in the partnership (known as the terminal value). As previously stated, distributions to LPs are net of management fees and other partnership expenses that may have been incurred. They presented a capitalisation weighted IRR which weigh the

partnership's internal rate of return by the size of the partnerships as well as the median IRR. The industry statistics extracted from Thomson Reuters Eikon are an aggregation of data figures according to the country of origin of the PE fund, i.e. the GP in the fund partnership structure in charge of the investment. At a European level, this relates to investments made by European PE funds regardless of the location of the target company, i.e. the companies in which funds invested into may be in any location around the globe. The equity value is the amount of capital invested to acquire shares in an enterprise. The equity value includes equity, quasi-equity[12], mezzanine, unsecured debt and secured debt to be provided by the private equity firm.



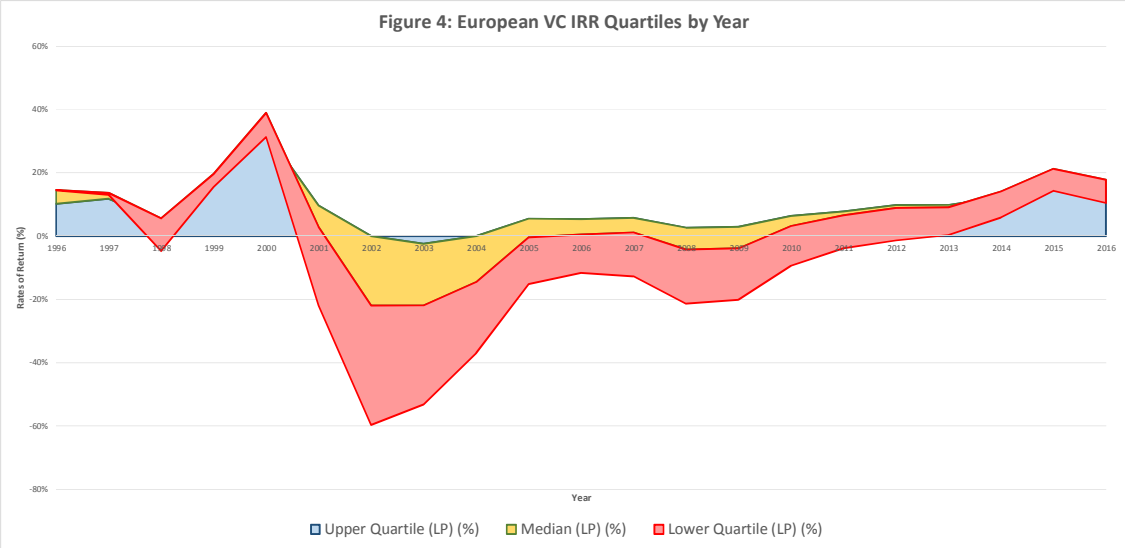
1. All data shown as net to Limited Partners, unless otherwise noted.
2. All IRRs greater than one year are annualized.
3. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank Selected Sample.
4. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

In Figure 3, one is able to visualise an introductory view into the performance of the European PE industry based on its P-IRR. This demonstrates that over this 20-year sample horizon B&G funds have tended to outperform the general industry, and produce much better returns in comparison to

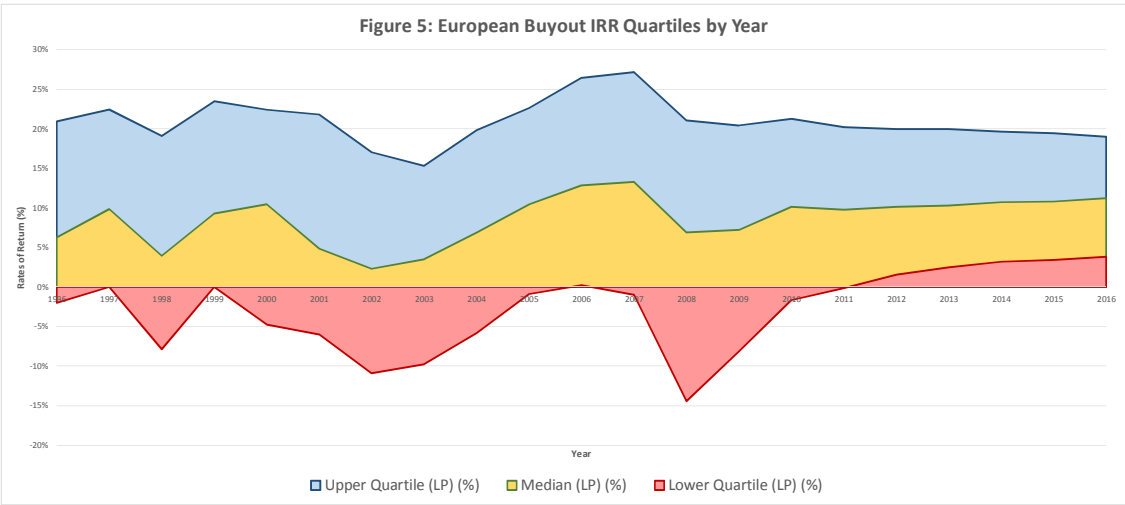
[12] Category of debt that has partial equity characteristics, examples of quasi-equity include mezzanine debt and subordinated debt. See The National Council for Voluntary Organisations (NVCO) article: *QUASI-EQUITY / REVENUE PARTICIPATION* https://knowhownonprofit.org/funding/social-investment-1/investment-types/quasi-equity-revenue-participation#

VCs. Even following the financial crisis of 2008, P-IRR in B&G funds remained constant around the 15% level.

The variance measures the dispersion of a set of data points around that data's mean value, this is a measure of risk so this statistic can help determine the risk an investor may undertake when investing in a specific asset class. Standard deviation is also relevant due to two major factors, being that, firstly, it measures the dispersion of a data set from the mean. The more the spread is in the data, the higher the deviation will be. Secondly, in finance especially, the standard deviation is applied to the annual rate of return of an investment to measure the investment's inherent volatility. Leading to the standard deviation also being known as the historical volatility, and is used as a gauge by investors for the amount of expected volatility that one may find from investing in a certain asset class, i.e. a volatile stock will have a very high standard deviation number while a stable stock will have a lower standard deviation. The large dispersion will allow one to conclude on how much the fund's return is deviating from the expected normal returns.



Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bottom - 25%	0%	-1%	-10%	-4%	-8%	-25%	-38%	-31%	-22%	-15%	-12%	-14%	-17%	-16%	-13%	-10%	-10%	-9%	-8%	-7%	-7%
Median	4%	2%	1%	3%	6%	-7%	-22%	-19%	-15%	-6%	-5%	-5%	-7%	-7%	-3%	-1%	-1%	-1%	2%	3%	2%
Top - 75%	10%	12%	5%	17%	33%	10%	0%	-2%	0%	5%	5%	6%	3%	3%	6%	8%	10%	10%	12%	19%	15%



Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bottom - 25%	-2%	0%	-8%	0%	-5%	-6%	-11%	-10%	-6%	-1%	0%	-1%	-14%	-8%	-2%	0%	2%	3%	3%	3%	4%
Median	6%	10%	4%	9%	10%	5%	2%	4%	7%	10%	13%	13%	7%	7%	10%	10%	10%	10%	11%	11%	11%
Top - 75%	21%	22%	19%	23%	22%	22%	17%	15%	20%	23%	26%	27%	21%	20%	21%	20%	20%	20%	20%	19%	19%

Through Figures 4 and 5 the visualisation of IRR by quartiles for the sampled time horizon, B&G funds have performed better than VC during this period, including the top 25th-percentile. The difference in performance may be due to more buyout funds reaching the capital distribution phase earlier. Due to the higher risk nature of VC funds, demonstrated in standard deviation data, more funds are at risk of entering default. VC funds have grown more in popularity compared to B&G in Europe. This is shown by the increase in the compounded annual growth rate of VCs (11.59%), whilst the number of buyout funds was lower (9.74%), this however reinforces the argument that VCs are simply more fashionable but that not enough capital distribution is received by LPs (due to invested

start-up companies never passing to a mature stage in their lifecycle). As demonstrated by the above figures the performance of B&G funds has been absolute in all facets of each class' demography.

The public equity market is a significant factor when considering benchmarking PE performance. The PME (public market equivalent) seeks to equate the heavily time dependent returns of the PE funds with the returns of public market indices. The measure is a ratio of the net outflows from PE funds re-invested into the public index to the end of the fund's life divided by the inflows into the PE funds invested in the public index until the end of the fund's life. A ratio above 1 indicates that an outperformance of the PE has occurred, whereas a ratio under 1 reflects an under performance by the Stock Index versus a PE fund. The data indicates at times that PE returns exceed substantially the returns of the stock Index, especially funds with a buyout strategy implemented. To a certain extent, returns are determined by the availability of capital. For both venture and non-venture capital investments have been greatest on investments made during periods when relatively small amounts of capital were available, but other factors exist that can explain high returns during these periods. Conversely, concern that greater capital availability may depress future returns. Data also suggests that returns for B&G and later-stage VC are higher than early-stage partnerships. This pattern may partly explain the faster growth of later-stage and particularly, non-venture sectors of the private equity market over the past fifteen years.

It is important to consider that returns on cash flows and portfolio value data are disclosed by the PE managers (additionally, the IRR performance calculation solves for the discount rate that makes the Net Present Value of a set of cash flows equal to zero). The calculation is based on cash-on-cash returns over equal periods modified for the residual value of a fund's equity (i.e. NAV). The residual value attributed to each respective group being measured is its ending value. The Eikon database accounts for cash flows on a daily basis, or otherwise on a monthly basis, and the NAVs are considered on a quarterly basis. End-to-end performance calculation is similar to since inception IRR, however, it measures the return between two points in time. The calculation takes into account the opening NAV, the in-period cash flows and the closing NAV. Returns are then annualised for comparability.

Multiple ratio considerations from private equity statistical data are known as the Total Value to Paid-In (TVPI), Distributed to Paid-In (DPI) and the Residual Value to Paid-In (RVPI). The TVPI is the ratio of the current value of remaining investments within a fund, plus the total value of all distributions to date, relative to the total amount of capital paid into the fund to date. The Global

Investment Performance Standards was developed by the Chartered Financial Analyst Institute[13] and it states that any recallable distributions should be included in the numerator of this ratio. Also, any reinvested capital, resulting from recallable distributions, should be included in the denominator. This performance measurement is preferred and considered as the best available measure to consider before the end of a fund's life. TVPI is an aggregate performance metric that is measured after pooling cash flows from the net-asset values of a sample. The DPI is the ratio of money that is distributed to the limited partner, of the partnership, by the invested fund relative to the contribution made. In the case of the RVPI the ratio of the current value of all remaining investments within a fund to the total contributions of Limited Partners to date. The standards also dictate that any reinvested capital (resulting from recallable distributions) should be included in the denominator of this ratio. With these performance metrics it allows for informed investors to determine what their outlook is for their investments. There are many ways to do this and to evaluate the performance of funds. The main methods considered are via: absolute returns; comparative returns to other similar funds (via a quartile analysis); or a comparative return to the public markets (via PME analysis).

4. **Performance**

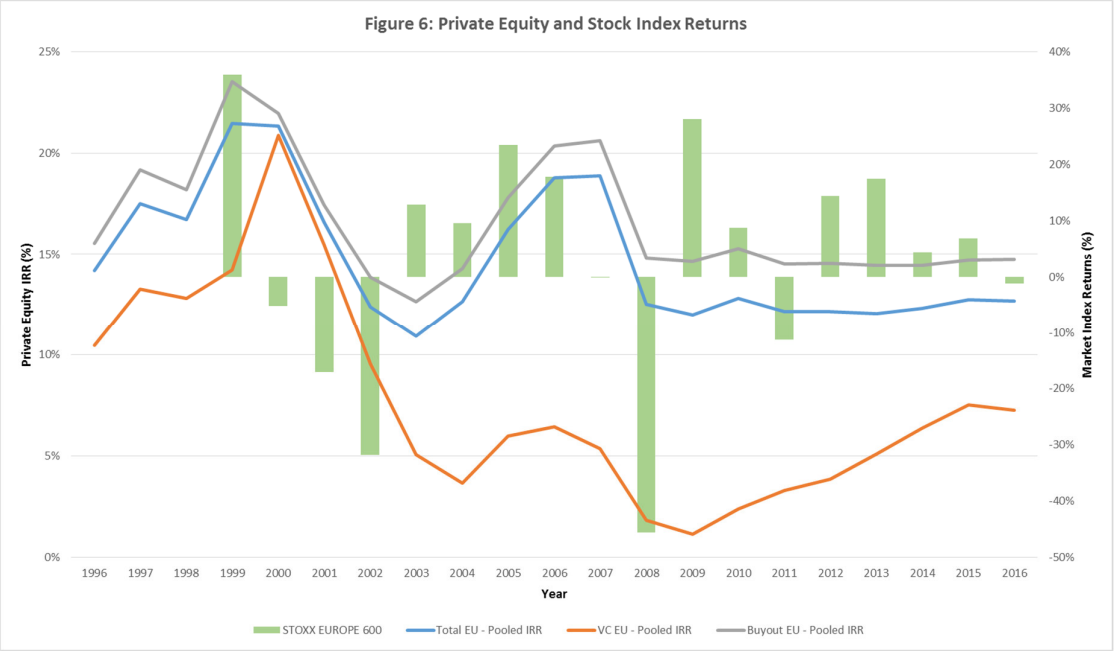
The STOXX Europe 600 index was initiated in 1998, and as the figure shows there is a temporal difference between the PE industry and its P-IRR index (this is due to the PE industry activity preceding that of the STOXX Europe 600), first transaction date year noted by Thomson Reuters Eikon was registered in 1986 and this was a Venture Capital fund transaction that was established (first buyout fund registered was in 1987)[14]. In a general sense, I found that the European PE fund industry has outperformed the market index during most of the period from 1999 to 2016, two thirds of the sample period used in the benchmark resulted in P-IRR for the funds generating better returns than that of the STOXX 600 index. The average return for European PE funds since 1996 to 2016 has been of 14,7%, whilst for the stock index the average return from 1998 to 2016 has been of 4%. The best performance year for the European index was 2009, but this is justified due to adverse market conditions for European PE sector having experienced a slow-down in growth from the financial crisis that (e.g. the Greek economic collapse) affected fund performance and the European highs pre-Sovereign Debt Crisis that caused turmoil in European markets. However, European funds still experienced double-digit growth of 12%, due mostly to the strong performance experienced in the PE buyout markets, for 2009. The strong performance from the PE funds was underlined from the buyout funds having had a

[13] Please refer to the CFA Global Investment Performance Standards website, *Global Investment Performance Standards (GIPS) Handbook (3rd edition – 2012), Chapter 3 – Explanation of the Provisions of the GIPS Standards, 3-7 Private Equity, page 276*: https://www.gipsstandards.org/standards/pages/currentedition.aspx

[14] See Thomson Reuters Eikon Data set in Appendix A

very strong result during this sample period. It was found that buyout funds out performed the stock index for 72% of the time during this 18-year period sample; best years having been 2001 (outperforming by 35%), 2003 (with an outperformance of 46%), and the best year having been 2008 (outperforming STOXX EU 600 by 60%). The average pooled return for buyout funds from 1996 was 17%, and 16% from 1999 to 2016. This means that the buyout funds performed four times better than the Stoxx 600 returns for this sample period. The worst years of performance for buyout funds were 1999 (-12%), 2005 (-6%), and the worst having been 2009 (-13%). However, this story does not carry over for the venture capital funds. It was found that the stock index outperformed the VC funds 56% of the time in our sample period. The best performance of the European VC funds having been 2000 (+25% versus Stoxx 600), 2001 (+32% versus Stoxx 600), and 2002 (+41% versus Stoxx 600) this strong performance may be justified by the strong results coming from invested companies in the dot com boom period of the early 2000s. Unfortunately, immediately after this strong period of results we find that the VC funds underperformed constantly for four years. Peak year for VC funds was 2008 (+49% outperformance versus Stoxx 600). Poorest years for the VC funds were 1999 (-22% versus Stoxx 600), 2005 (-17% versus Stoxx 600), and 2009 (with -25% versus Stoxx 600).

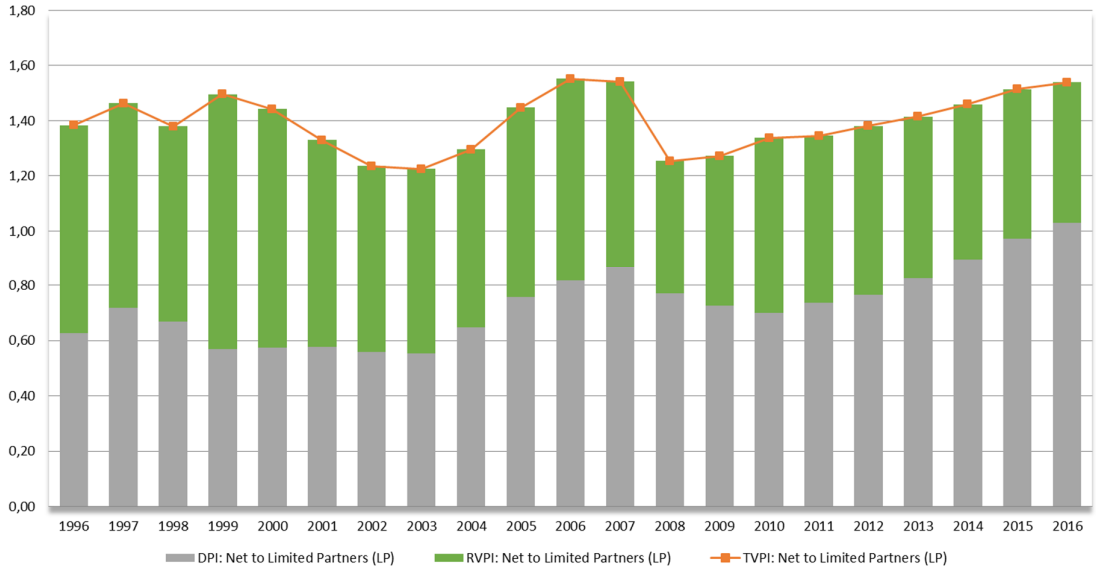
Figure 6: Private Equity and Stock Index Returns



The total average PE standard deviation for the sample period was 28% for the LP investor returns, standard deviation was never below 20%, this demonstrates the inherent risk and diverging results that different fund strategies yield for the respective stakeholders. Going deeper into the different investing strategies performed, for the VC funds it was found that overall standard deviation numbers were exactly in line with that of the industry as a whole. However, buyout focused funds are

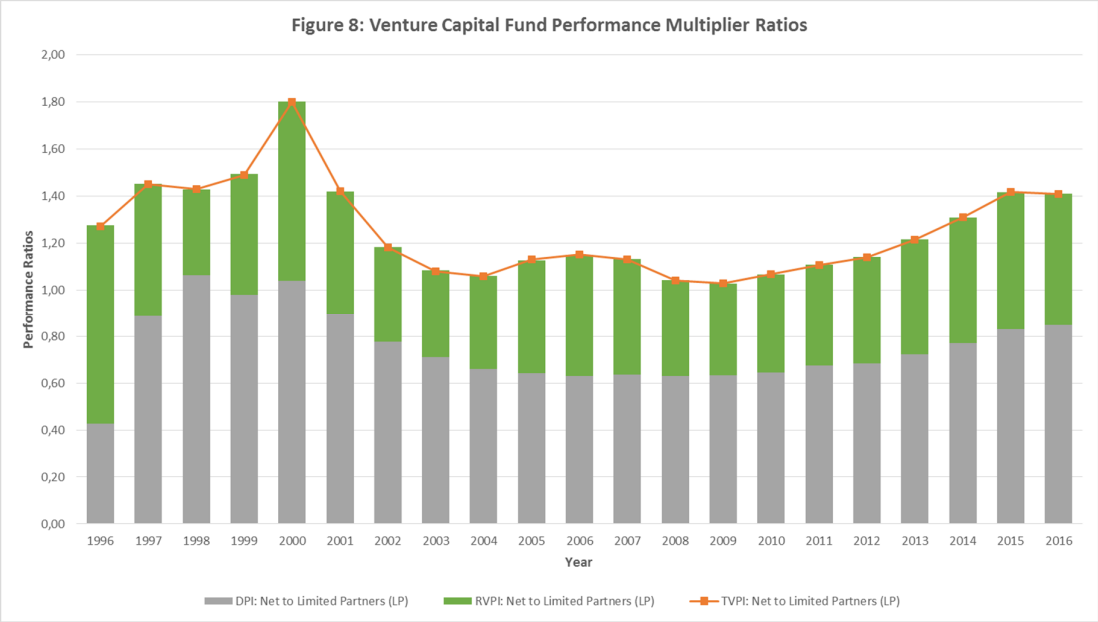
seen to be much more volatile, with an average standard deviation of 29%, and the most volatile years having been 1999 (35%) and 2008 (35%). After performing a standard deviation measurement for the stock index returns it was found that, from the 31st of December 1999 until the 31st of December 2016 (period end of sample), the STOXX Europe 600 Index had a standard deviation value of 20%. This further demonstrates the risky nature of private equity investing, as traditional stocks are less volatile in nature than investing in either start-ups or buyout struggling businesses, therefore justifying the higher returns that these funds generate as alternative assets for risk seeking investors that are short on volatility.

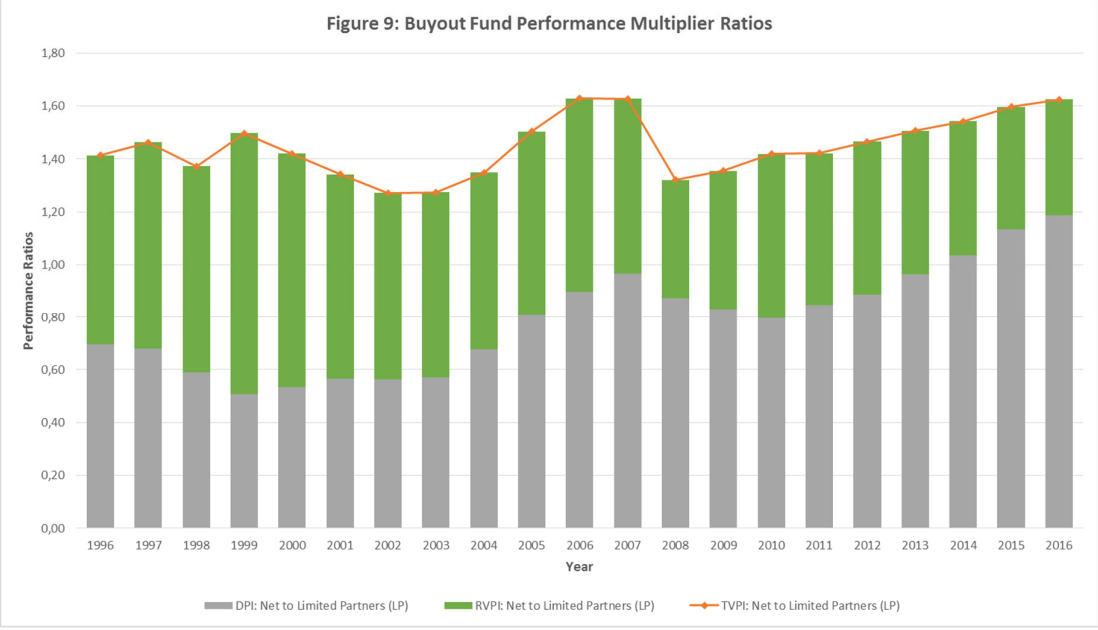
Figure 7: General European PE Fund Performance Multiplier Ratios



As shown in Figure 7, this graphic was derived from the performance measures for the European PE Fund industry as a whole. This means that my consideration included all available strategies, through the Thomson Reuters Eikon platform (i.e. Buyout & Growth Equity, Venture Capital, Mezzanine & Distressed, Natural Resources, Real Estate, Infrastructure, and Fund of Funds & Secondary Funds). From this we interpret that TVPI returns have always been above 1.2x for the European PE fund industry, over the sampled horizon. In my interpretation, this graphic is important to notice the high levels of DPI, which stands at roughly above 0,6x through the period. This is relevant, once more, as DPI is the figure that represents money that is paid out to the LPs in these fund structures, and therefore the higher the DPI the better the performance and returns of these investments for involved investors. RVPI is the residual value that remains invested within the fund and the portfolio company investments. The graph in figure 5 demonstrates the best performing period for European PE funds was in 2006, with the lowest point being in 2003. Highest DPI

performance metric for this general group at 0,87x, whilst the lowest multiple was also in 2003 at 0,55x. The RVPI metric stands with the highest period being in 1999 as 0,93x, and the lowest point being at year 2008 with the metric at 0,48x. For a LP it is important that funds have high DPIs and low RVPI. The low RVPI value in 2008 may be a consequence of the financial crisis where there where GPs preferred to distribute values and not risk investing in an uncertain environment.





The performance statistics for VC funds in Figure 8, however, are not as cheerful. With the highest reaching TVPI reaching 1,8x in 2000, bear in mind that this was during the heights of the tech bubble and many companies had extremely high valuations hence providing interesting conditions for exit

opportunities to VC funds (DPI performance for LPs invested at the time was of 1,04x). This period was followed by a significant reduction in fund performance, as the bubble burst in 2001, leading to a substantial recovery in performance only occurring in 2013 where TVPI was at 1,2x (and DPI performance stagnated at 0,6x for LPs). The lowest point during this period of stagnation for VC funds was in 2009 where TVPI reached only 1,03x. B&G Funds, in Figure 9, performed relatively better when compared to the VC counterpart. Even though the best performing years for B&G funds was on the lead up to the Great Financial Recession, where valuations where at highs and weighed favourably on results for funds, at just 1,63x (0,17x comparative difference to VC best performing year), overall, this strategy has consistently outperformed VC. The only exception was in 1998 where VC TVPI performance came in at 1,43x and B&G funds was at 1,37 (slight underperformance to peer in direct comparison of -4%). Even with distributions to B&G funds did outperform VCs, however, it is interesting to note that VCs increased and have higher distribution ratios versus B&G (and from highs of 74% of TVPI being distributed, this tendency continued until 2006 with distribution levels above 63% consistently). This is only interrupted during the financial crisis (2007-08) and once more since 2013 to 2016.

In terms of overall performance, both VC and B&G strategies had moments of outperformance comparative to the general market (VC only outperformed categorically in 2000, with B&G on average producing results better than the general European PE fund industry more than 3% in TVPI terms). This situation is somewhat repeated when considering only DPI values, as B&G only began to outperform the industry from 2002 and onwards, until the end of the sampled horizon.

Figures 10: Benchmark Statistics by Vintage Year and Fund Strategy

	PE Funds	VC Funds	Buyout Funds
Strategy	All	Venture Capital	Buyout & Growth Equity
Vintage Year	1989	1989	1989
Vintage Year by	First Cash Flow	First Cash Flow	First Cash Flow
Geographic Focus	Europe	Europe	Europe
Measurement Date	31-12-2016	31-12-2016	31-12-2016
Net IRR	19%	18%	19%
TVPI	2,04x	2,02x	1,95x
DPI	2,04x	2,02x	1,95x
RVPI	0,00x	0,00x	0,00x

	PE Funds	VC Funds	Buyout Funds
Strategy	All	Venture Capital	Buyout & Growth Equity
Vintage Year	2006	2006	2006
Vintage Year by	First Cash Flow	First Cash Flow	First Cash Flow
Geographic Focus	Europe	Europe	Europe
Measurement Date	31-12-2016	31-12-2016	31-12-2016
Net IRR	6%	5%	7%
TVPI	1,44x	1,42x	1,49x
DPI	0,98x	0,64x	1,15x
RVPI	0,46x	0,78x	0,34x

	PE Funds	VC Funds	Buyout Funds
Strategy	All	Venture Capital	Buyout & Growth Equity
Vintage Year	2016	2016	2016
Vintage Year by	First Cash Flow	First Cash Flow	First Cash Flow
Geographic Focus	Europe	Europe	Europe
Measurement Date	31-12-2016	31-12-2016	31-12-2016
Net IRR	2%	-25%	-22%
TVPI	1,01x	0,84x	0,91x
DPI	0,01x	0,00x	0,00x
RVPI	1,00x	0,84x	0,91x

Figure 10 above demonstrates returns and performance for European funds, as of the 31st of December of 2016; however, the defining characteristic is the vintage of each fund category. These vintages are only considered at the moment where the first cash flow events from funds take place. In these tables we have returns and multiples calculated in pooled terms, thus taking into consideration the individual cash flows of several different funds in the final values. In the figure above three vintages where chosen in order to perform a straight comparison of the performance of the different strategies. The choice was based on the oldest group, the youngest group, and the most populace group within the sample of European PE Funds.

When performing an absolute analysis of these figures it is easier to deduce that the worst performing strategy has been VC funds. According to the J-curve assumption mentioned beforehand, we see that older vintages are the best performers as of the 31st of December of 2016. This is due to the stage of investments that are now more mature and producing constant above public market returns for the funds, the case for younger vintages are that of subdued rates of returns as lifecycle of investments are still in the contributing phase for most funds. The best performing funds are

those found in the general European PE fund grouping (that includes all different strategies of PE investing) with a vintage of 1989, this may be explained due to the benefits of a large and diversified portfolio that is not too heavily exposed into one strategy, sector, or fund size (and etc.). On the other side of the coin, and with little surprise, the worst performer are VC funds grouped into the 2016 vintage. It can also be mentioned that this reinforces the argument that the VC industry, through its predominant position in the tech sector, is more volatile and demanding of sunken costs that way especially negatively on early rates of return for investors.

For the LPs the most critical metric is the DPI, therefore the higher this value is the better the distributions that flow to LPs within fund structures. TVPI = DPI + RVPI, in this formula the RVPI represents the residual value that remains within the fund structure and the portfolio company investments. The residual value is a moving target for investors, and evaluation depends on the vintage of a fund. As the portfolio of companies ages it may not perform as expected and so may sell for less than the value the fund is reporting. For 2006 vintage of VC funds have a DPI of 0,64x, which means that almost 45% (0,64 / 1,42 = 45%) of the face value of these investments have been distributed to their respective LPs. Whilst the best performing distributions were by the oldest vintage category, but this is purely as 100% of portfolio face value has already been distributed to LPs. This may be due to these funds possibly being close to end of life. This consideration aside, from the 'active' groups, the best performing metric are the B&G Funds from 2006 (where the DPI represents 77% of this vintage's TVPI). Overall, comparing VC funds of the same vintage one may draw the conclusion that its investment portfolio is probably not as developed, and possibly still climbing the J-curve (both in terms of the -2% in Net IRR and -32% in the DPI, differentials compared to B&G Funds of the same 2006 vintage). Therefore, B&G Funds from an absolute return approach seem to be the better choice when limited to these two strategy options.

Figures 11: Benchmark Statistics by Vintage Year and Fund Strategy - Quartile Analysis

Benchmark Statistics - European PE Funds as of the 31st of December 2016						
Vintage Year	IRR			TVPI		
	Upper Quartile	Median	Lower Quartile	Upper Quartile	Median	Lower Quartile
1989	19%	17%	6%	2,04x	1,84x	1,66x
2016	-3%	-14%	-25%	0,97x	0,89x	0,84x
Vintage Year	DPI			RVPI		
	Upper Quartile	Median	Lower Quartile	Upper Quartile	Median	Lower Quartile
1989	2,04x	1,84x	1,66x	0,00x	0,00x	0,00x
2016	0,00x	0,00x	0,00x	0,97x	0,89x	0,84x

Benchmark Statistics - European Venture Capital Funds as of the 31st of December 2016						
Vintage Year	IRR			TVPI		
	Upper Quartile	Median	Lower Quartile	Upper Quartile	Median	Lower Quartile
1999	-2%	-7%	-8%	0,84x	0,59x	0,47x
2014	38%	26%	14%	1,47x	1,34x	1,24x
Vintage Year	DPI			RVPI		
	Upper Quartile	Median	Lower Quartile	Upper Quartile	Median	Lower Quartile
1999	0,82x	0,50x	0,42x	0,07x	0,02x	0,00x
2014	0,10x	0,00x	0,00x	1,45x	1,24x	0,96x

Benchmark Statistics - European Buyout Funds as of the 31st of December 2016						
Vintage Year	IRR			TVPI		
	Upper Quartile	Median	Lower Quartile	Upper Quartile	Median	Lower Quartile
1990	27%	21%	14%	2,88x	2,69x	1,79x
2016	-4%	-12%	-21%	0,96x	0,92x	0,85x
Vintage Year	DPI			RVPI		
	Upper Quartile	Median	Lower Quartile	Upper Quartile	Median	Lower Quartile
1990	2,88x	2,69x	1,79x	0,00x	0,00x	0,00x
2016	0,00x	0,00x	0,00x	0,96x	0,92x	0,85x

The act of comparing funds with other funds is a very common method to evaluate its performance. In brochures and other prospectuses, it is normal to find that GPs call themselves 'top-quartile', this means that they are considering their fund to be in the top 75th percentile amongst peers within the same vintage. Therefore, the objective of the following was to obtain and display the statistical outcomes for the sampled funds[15]. This information aides in the comparison of performance according to their vintages, using IRR, TVPI, and DPI. Following a comparative quartile analysis of the funds by vintage year and fund strategy the first conclusion that one reaches is that the earlier the vintage of the fund the higher the IRR, TVPI, and DPI are found to be. This is justified, once more, is validated by the J-curve assumption that is prominent in PE returns, given the lifespan characteristics and dynamics (distributions and contributions) within funds. In Figure 11, the time differential is due to the lack of readily available information by the PE funds themselves or a lack of funds associated to a specific vintage year. Even so, the higher levels of the TVPI and DPI demonstrate that the better performing funds are found once a certain level of maturity is reached. In the sampled period of this paper it seems that only vintages 7 years older than 2016 start to perform favourably for LPs, as

[15] It is important to note that there is the risk of reporting lags. This is due to financial information is transmitted to LPs only after the reporting period. Therefore, as consequence the industry benchmark reports will lag potentially by several months. However, in this sample only the same reporting periods were considered (2nd Quarter of June 2017).

distributions from funds starts to compensate their investments. This once again demonstrates the criticality of DPI considerations when analysing the PE industry. However, only VC funds with 1999 vintage had negative IRR but this effect is mute as distributions to LPs continued at higher multiples as opposed to younger vintages in this sample. By focusing only on 2016 vintages, upper quartile IRR returns for general European PE Fund group underperforms relative to pooled IRR figures, -3% versus 2% respectively, representing a 5% unfavourable differential for the sampled upper quartile difference. Whilst for the 1989 vintage for the same group category have the same IRR values (19%). For the B&G Fund 2016 vintage group the upper quartile is producing returns of -4% which is better compared to the pooled returns that show negative gains of -22%, hence demonstrating a better performance for the upper quartile.

Comparing pooled IRR for VC (2016)[16] versus the 2014 vintage performance for the upper quartile (in 2016) the upper quartile outperforms the pooled IRR by 31% (pooled IRR of 7% versus upper quartile 38%). Moving to TVPI analysis, both upper quartiles in B&G and general group are roughly similar (standing at 0,96x and 0,97x). An important consideration is here is that RVPI is at a maximum in the 2016 vintage as most of the value remains within the portfolio. In the beginning of a fund's life this is expected, however later on the optimum choice is one where the DPI is high and the RVPI is low.

5. **Market Dynamics and Entry of Funds**

There are three premises that lie beneath the PE boom. Firstly, PE funds are profitable when they improve purchased company's performance. Secondly, it is a common belief PE funds have less risk exposure than public markets. Thirdly, it is believed that PE funds will outperform any other comparative asset class investments, in terms of returns offered.

The banking sector does not make superior equity investments compared to those of stand-alone PE groups. Instead, banks will rather use these PE engagements to take advantage of the credit market booms, and get the private benefits of cross-selling other services. Banks can, and on occasion do, invest in PE as equity investors, or equity and debt financiers. The former are knowns as 'bank-affiliated', whilst the latter are known as 'parent-financed' deals. The Volcker Rule covered banks that used their position as a 'bank-affiliated' partner to grow revenues and in consequence increase volatility. They have the incentives to do so, because of equity values increasing volatility, and large banks enjoy implicit bail-out guarantees. Banks also enjoy information collaborations from combining

[16] See Appendix - table 4

different activities, which may be considered a positive externality for the market in general, because bank involvement is a positive signal on the quality of the deal to other outside investors. However, it cannot be understated that banks do have a cross selling motivation behind their involvement[17]. Therefore, parent-financing is a concern for policy makers as a source to 'originate and distribute' debt in debt markets, as considered risky during the peak of the market and may amplify the cyclicality of investments to the credit market.

Asymmetric information may lead to the operating improvements and value creation potentially consistent with PE investors having superior quality of information on future company performance. Asymmetric information suggests that actual performance should beat forecast but the opposite takes place. Notwithstanding the strength of asymmetric information effects on returns may be mitigated by the fact that PE firms usually bring in new management[18].

6. **PE Firms, Funds, and Transactions**

Besides the most prominent firms, such as Blackstone, Carlyle, and KKR, there has been an explosion of private equity activity around the globe. Europe has not been left behind from this growth in activity, with thousands of funds having been created since the mid-1990s. The top five largest funds[19] this papers found in our search parameter over the past twenty years were CVC Capital Partners Ltd (United Kingdom– Buyout fund, invested in 202 companies since inception), European Investment Fund (Luxembourg – Fund-of-funds, invested in 180 companies), Wendel SA (France – Buyout Fund, invested in 19), Permira Europe IV (United Kingdom– Buyout fund, invested in 24 companies), and lastly SoftBank Vision Fund L.P. (United Kingdom– Generalist fund, invested in 10 companies). CVC Capital Partners invested a total of 5.8 billion euros during this paper's sample time horizon, whilst Ardian SA (France) with 1.4 billion euros was the fund that invested the least.

Funds will normally have a lifespan of 13 years[20], with a possible extension of 3 years. The management of these funds are based on basic covenants of operation, that cover a range of issues of concern ranging from investment amount limits allowed in each company, the debt level allowed at firm level (opposed to the debt level on a portfolio level for the fund, which is unlimited), and

[17] See Hellmann, Lindsay, and Puri (2008): Building relationships early: Banks in Venture Capital
[18] See Acharya, Gottshalg, Hahn, & Kahoe (2009), Corporate Governance and Value Creation: Evidence from Private Equity
[19] Largest by the sum of equity invested in paper's search range, see Appendix – Table 12
[20] See Financial News article: *Average private equity fund life span exceeds 13 years* https://www.fnlondon.com/articles/average-private-equity-fund-life-span-exceeds-13-years-20150327

whether the fund is a closed end one (where investors cannot remove values invested into the fund until it is terminated). CVC European Equity Partners V, L.P. (UK)[21] was the fund with the highest average amount invested in by LPs, with an average of 385 million euros per investor (/company). The fund with the highest number of investors was Bpifrance Investissement SAS (France)[22], with 432. The highest spender per deal on average, during our sample investment horizon, was found to be Spinnaker Capital, Ltd. (UK)[23]. The fund with the most deals done in our search range was 3i[24] (captive from published accounts) with a total of 712 deals completed.

According to Metrich & Yasuda (2007), GPs will be compensated in the following three ways. Firstly, an annual management fee, determined with investors as a percentage of the capital committed. A share of the fund's profits is reserved for the GP. This value is in excess to the amount that the GP contributes to the partnership. It is also known as the carried interest, or simply the carry. Lastly, it is common for deal and monitoring fees to also be charged based on the fund's portfolio investments undertaken. Buyouts are typically financed with between 60% to 90% debt, generally a mix in finance sourcing is used and a portion of which is senior and secured, arranged through investment/ corporate banks, and another portion would involve junior debt that is unsecured, and included in the mix would be high yielding bonds created specifically for fund financing. PE firms from investors to cover 10% to 40% of purchase price. New management team of bought out company would typically contribute to the equity of their respective firm, although the amounts could be considered small factors.

Overall, in an expected sense, the PE industry transactions and fundraising exhibit similar cyclicality. Both being sensitive to the economic climate of the source region. Since the start of the century large amount of deal flows and fundraising activities have increased considerably recently.

7. **Performance Data Analysis**

An important question to ask is whether PE firms actually do influence the firms' performance that they invest in - this may seem like a complicated question to answer because PE firms will turn their companies' private and consequentially mask their financial data from the public scrutiny. The industry would have us believe simply that we must consider their results thus far demonstrations of outperformance by GP managers, who steer funds towards superior growth and produce superior

[21] See Appendix – table 13
[22] See Appendix - table 14
[23] See Appendix – table 15
[24] See Appendix – table 16

performance for both the invested companies as well as their fund investors. A solution to this obstacle for investors is to consider the Fama-French Three-Factor[25] Regression.

Figure 12: PE Industry and Stoxx 600 Fama-French 3 Factor Regression, 1999-2016

Variables	Total European Private Equity	European Venture Capital Funds	European Buyout and Growth Funds	Stoxx 600 Europe Index
Alpha	13,963***	5,753***	16,076***	-2,98***
	(0,4568)	(0,5142)	(0,4323)	(0,3444)
Mkt-Rf	0,079	-0,025	0,084***	0,967***
	(0,0215)	(0,0242)	(0,0204)	(0,0162)
SMB	-0,135	0,054	-0,136	-0,115
	(0,0633)	(0,0712)	(0,0599)	(0,0477)
HML	-0,046	0,053	-0,079	-0,047
	(0,0267)	(0,03)	(0,0253)	(0,0201)
Observations	18	18	18	18
R-squared	0,531	0,220	0,646	0,998

Standard Errors are in parenthesis
***p<0,01; **p<0,05; *p<0,1

In Figure 12, to measure PE industry versus the public market the regression model was employed. The data used was extracted from two principal sources – Thompson Reuters Eikon and Professor Kenneth French's Dartmouth University Data Library[26] (that is updated regularly) was extracted. Factor coefficients and Risk-Free return values were extracted for the European Fama-French Three-Factor model, data is specific for the developed European countries (16 countries), all returns are denominated in American Dollars (USD), and the market is the region's value weighted portfolio minus the US one-month T-bill rate[27].

PE returns are once more P-IRR, however denominated in USD. Stoxx Europe 600 prices have also been converted into USD, respective expected returns were used, for this model. Due to PE data constraints, yearly returns for Fama-French regression modelling and Sharpe Ratio analysis were extracted from respective platforms and data list. In total only 18 observations were possible, as Stoxx Europe 600 was only established in the latter stages of 1998. SMB factor stands for 'Small minus Big' and HML factor stands for 'High minus Low'. Representing beta coefficients, β_s and β_h are variables representing small cap and large cap portfolios that are between 0 and 1 in value.

Results from the Fama-French Regression model were possible after calculating the excess returns for each variable. Firstly, the difference in R-squared between the European PE industry (Total, VC and B&G) and the public market index is quite significant. This is specifically notable with VC versus

[25]The formula for the Fama-French Three-Factor Model: $[R(t) - Rf(t)] = \alpha + \beta[Rm(t) - Rf(t)] + \beta_s SMB(t) + \beta_h HML(t)$

[26] Refer to the following website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[27] Further information on Fama-French Factor data found in the following website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_3developed.html
European countries within scope include: Austria; Belgium; Switzerland; Germany; Denmark; Spain; Finland; France; Great Britain; Greece; Ireland; Italy; Netherlands; Norway; Portugal; Sweden

Stoxx Europe 600 (at 0,22 and 0,998 respectively). Meaning the stock market index has a higher proportion of variance that is predictable from this model. Adjusted R-squared figures are similar in outcome, this time biggest differences are found between Total European PE (0,43) versus the Stoxx 600 (0,997). Regard p-values of each coefficient, all variables in the model experienced their intercept coefficient being no higher than the 1% level (therefore not statistically relevant or interpretable). The Market variable coefficient was also found to be below the 1% mark in both the B&G funds and Stoxx Europe 600. All other remaining variables were considered statistically significant, and interpretable, in this regression model. Another consideration that stands out are the intercept coefficient in each PE segment being much larger than the public market equivalent – this indicated that alpha constant is a major reason behind much of the performance of European PE funds. It is not clear why the other coefficients, especially SMB and HML, do not influence PE returns significantly.

The results in Figure 12 also show that 99,8% of the public market results can be justified through this model, unlike general PE returns that can only be explained by 53,1%. Most of the dependent variations in PE returns seem to be determined by other unobserved determinants, justifying the 46,9% difference. Alternative considerations are asymmetric information within the industry, as most funds are not forced to make public their financial information, and management bias.

Sharpe ratio[28] indications are demonstrated in Figure 13, this has the purpose to illustrate the returns per each unit of risk an investor would need to undertake. Overall, throughout the sampled time horizon, the PE industry in general (Total, VC, and B&G) far outperform the public market equivalent. This result is expected due to the impactful returns PE funds are able to extract when using leverage buyouts, for example, in their targeted investments. VC funds are found to be the closest to the European stock market index, confirming previously stated observations of tempered growth in European VC funds (due to tougher conditions in the sector). Looking at the mean results for each segment, the European PE industry went against preliminary expectations. This is because the larger the fund sample size the higher the standard deviations are (which goes against anticipation, as opposite is normally found to be true). The overall European PE industry shows the second highest upswing potential, considering the Min – Max gap, this may explain that there are other segments within the European PE industry that have demonstrated stronger growth potential when compared to VC and B&G funds.

[28]The formula to calculate the Sharpe Ratio is the following: $\mathrm{SR} = \frac{E[R-Rf]}{\sigma} = \frac{E[R-Rf]}{\sqrt{var[R-Rf]}}$,
negative Sharpe ratio indicates that risk-free asset would outperform comparative alternative's returns

Figure 13: Overview of Mean Sharpe Ratios, 1999-2016

Variables	Obs.	Mean	Min	Max
Total European Private Equity	18	0,48	0,30	0,61
European Venture Capital Funds	18	0,05	0,03	0,07
European Buyout and Growth Funds	18	0,12	0,09	0,14
Stoxx 600 Europe Index	18	-0,30	-14,40	5,59

Finally, in order to test return result under stressed conditions the sampled model criteria was altered to only study the time horizon during financial crisis (2007 to 2011). Even though the sample was effectively shortened (to only 5 observations), the model reflected that all p-values of each coefficient is above the 1% threshold (hence, significant and interpretable). The alpha intercept remains much larger in the PE industry as a whole, reflecting the expected large excess returns in the industry being justified by this variable. Other variables continue to not explain PE returns, as shown under previously (particular emphasis on SMB producing the lowest values across the board, including the stock market index). The negative return values for the public market index is justified due to the consequences of the financial crisis to the stock market, this event weighed especially heavily in Europe and many of the costs are still being felt today.

Figure 14: PE Industry and Stoxx 600 Fama-French 3 Factor Regression, 2007-11 (Financial Crisis)

Variables	Total European Private Equity	European Venture Capital Funds	European Buyout and Growth Funds	Stoxx 600 Europe Index
Alpha	15,494	4,096	17,583	-3,611
	(0,9721)	(0,0572)	(0,7551)	(1,2486)
Mkt-Rf	0,043	0,025	0,039	0,996
	(0,0378)	(0,0022)	(0,0294)	(0,0486)
SMB	-0,123	-0,030	-0,086	-0,164
	(0,0993)	(0,0058)	(0,0772)	(0,1276)
HML	0,145	-0,071	0,098	-0,081
	(0,1494)	(0,0088)	(0,1160)	(0,1919)
Observations	5	5	5	5
R-squared	0,772	0,993	0,783	0,999

Standard Errors are in parenthesis
***p<0,01; **p<0,05; *p<0,1

Under financial crisis conditions, PE returns are better explained by the Fama-French model. VC fund results can be explained by 99,3% (versus 22% in Figure 12) and the public market index improved further (99,9%). In Figure 15, we have the Sharpe Ratios for this same period. The findings replicate to a certain extent the values seen previously. With the Min-Max gap the largest upside potential overall is found in the stock market index, but the second largest upside is found in the general European PE industry. This means that other segments within the European PE space have interesting potential for large gains.

Figure 15: Overview of Mean Sharpe Ratios, 2007-2011 (Financial Crisis)

Variables	Obs.	Mean	Min	Max
Total European Private Equity	5	0,47	0,36	0,55
European Venture Capital Funds	5	0,04	0,03	0,04
European Buyout and Growth Funds	5	0,13	0,12	0,14
Stoxx 600 Europe Index	5	-2,36	-14,40	1,95

However, relying on historical returns should be done with a pinch of salt. This is due to PE funds illiquid investments tending to lower the standard deviation of their results, causing these same investments to appear less volatile (and potentially justifying the 'smoothed' results in the PE industry during the financial crisis versus the public market index). Additionally, it is important to bear in mind that these ratios may be distorted if investment returns are not normally distributed.

8. Conclusions

Following an in depth look into the mechanisms and strategies that are involved in the Private Equity space, we are able to visualise the defining characteristics that determine the benchmarking of this alternative asset class of investment to other more traditional investment classes, most notably the stock market. The European PE fund market is the second largest destination for limited partners' investment into PE funds. The most important thing to acknowledge is that these investors have a choice in the market and they need to weigh up the pros and the cons, this means that benchmarks need to be established in order to make sound investment decisions.

By comparing directly, head-to-head, the European PE industry versus the largest, and most commonly monitored, stock market index in Europe one is able to gain a superficial overview as to the historical positions of the two. In this paper, we found that European PE fund market exceeds the STOXX Europe 600 for the majority of the sampled period horizon. By repeating this process, and utilising various methods of measuring fund results, one was able compare categorically that both Venture Capital strategy focused and Buyout Strategy funds generated overall excessive returns to their respective LPs. However, it was shown that the buyout funds were the overall champions, as they were found to of produced larger growth than the VC funds as well as the total PE fund market in as a whole.

These positive results however do not come without consequence. It was found that the overall PE fund market is more volatile than that of traditional stocks. STOXX Europe 600 did have a high standard deviation number since its inception, this being justified by various economic events that brought with its volatility for this traditional asset class. These events were not contained to the stock markets, as ordinary companies where PE funds invested, and had equity stake in, also felt the

tumultuous events that where unfolding. For example, buyout funds normally enter into gearing practice in order to fully exploit the equity ratios of the company. If the company is not performing well then strategies need to alter, leading to returns that are lacklustre. Psychologists Kahneman and Tversky established that humans are twice as sensitive to having losses as they are to gains. This is known as cognitive bias "loss aversion" [29] Welch (2017) argues in "Private Equity's Diversification Illusion"[30] that PE fund accounting, handled by the portfolio managers "have incentives to obfuscate systematic risk and to choose investments that appear low-risk". Thus, whilst public markets may take a dive, portfolio managers with large PE holdings might not have to book large losses.

As an industry, PE firms will control businesses and then increase debt levels, to redirect spending that would have gone towards capital expenditures and other forms of investment, to pay down the initial financing debt. Consequentially, the growth of the business will slow. This occurs from a simple structural change that does not really demonstrate any expertise from the responsible management of the affected company. This does not mean at all that the debt, and its use, is always a bad thing – as an optimal capital-to-debt structure is important to maximize the value of the interest tax shield while at the same time reducing risks of potential financial distress. The case remains that many SME companies have too little debt in their balance sheets. The effective use of leverage was key to private equity's historical success. Axelson, Jenkinson, et al. (2013) found that the average debt-to-enterprise value in the PE industry was around the 70% mark when pursuing a buyout transaction, whilst the equivalent within the public listed companies was of 35%.[31] A 2013 study of 317 LBOs by researchers at the University of Texas found "little evidence of operating improvements subsequent to an LBO… Our results suggest that effecting a sustained change in capital structure is a conscious objective of the LBO structure."[32] Bain & Company's 2017 Global Private Equity Report[33] arrived to comparable conclusions. This report compares a deal model that forecasted revenues and EBITDA with the results from PE deals in their own proprietary database. The results demonstrated that more than two-thirds of the time, PE deals underperformed the EBITDA forecasts made at the time of purchase. This underperformance was masked, however, by almost two turns of multiple expansion at sale. "GPs had

[29] See American Psychological Association article: The psychology of gains and losses: More complicated than previously thought http://www.apa.org/science/about/psa/2015/01/gains-losses.aspx

[30] See Welch (2017), Private Equity's Diversification Illusion: Evidence from Fair Value Accounting. Available at SSRN: https://ssrn.com/abstract=2379170

[31] See L'Her, Stoyanova, et al. (2016), A Bottom-up Approach to the Risk-Adjusted Performance of the Buyout Fund Market

[32] See Cohn, Mills, and Towery (2013)

[33] See Bain & Company, Global Private Equity Report 2017: http://www.bain.com/publications/articles/global-private-equity-report-2017.aspx

the good fortune to make up the shortfall in margin expansion through unforeseen multiple expansion," according to the Bain report. Here once more, this report showed evidence suggesting that performance improvements are more superficial than concrete fact.

An institutional still has entrenched expectations from PE returns that are entrenched in performances from the 1980s until the early 2000s. These premeditated expectations do not reflect the recent underperformance that has been cause be higher purchase prices. A bottom-up analysis of 3,492 buyout transactions, from 1993 to 2014, to understand the risk characteristics of underlying companies[34]. Firstly, PE firms target and purchase companies that are meaningfully smaller than the public entities. With Thomson Reuters Eikon platform, it was found that no investment by a European PE fund has ever exceeded the average value of the STOXX 600 market capitalisation. Only 42 out of a sample of 7548 funds disclosed some financial information on Eikon. Their European PE industry's total investments were only superior to the market capitalization of the smallest company in the index (Capita PLC), and yet only nine of the 'larger' funds disclosed full financials to the Eikon platform. Second, PE deals are significantly more levered via the use of debt for deal financing than is typical in public equity transactions. These two characteristics have existed continuously since the 1980s.

This is alarming and market observers should give more importance PE's price sensitivity to the use of debt. Higher prices require more debt, hence higher interest costs are undertaken (leading to higher solvency risk). A Preqin[35] survey found that according to 70% of the participants their biggest challenge that they face was company valuations. Due to the high company valuations that industry experts are witnessing, there is a high level of 'dry powder'[36] and increased competition for assets (target companies), this has led to investors being concerned about the obtainable returns in the future. This has meant that the second biggest challenge that they were facing at were, somewhat worrisomely for the industry, the exit environment that are ongoing. Joe Baratta, Blackstone's global head of private equity, said "this is the most difficult period we've ever experienced . . . You have historically high multiples of cash flows, low yields. I've never seen it in my career. It's the most

[34] See L'Her, Stoyanova, et al. (2016), A Bottom-up Approach to the Risk-Adjusted Performance of the Buyout Fund Market

[35] See the 2017 Preqin Global Private Equity & Venture Capital Report, sample pages http://docs.preqin.com/samples/2017-Preqin-Global-Private_Equity-and-Venture-Capital-Report-Sample-Pages.pdf

[36] Dry powder is the informal term used to describe the amount of capital that is available to PE funds for the investment in strategic acquisitions for their portfolio of companies.

treacherous moment"[37]. In spite of being considered a difficult period for investors, Blackstone Capital was able to raise $18 billion in 2015 for their Partners VII fund (making it the largest fund had ever raised).

Yet the unanimous thinking amongst institutional investors is leading them to shift money from public equity markets (which they consider overpriced and overly volatile) into PE markets. David Swensen, Yale's chief investment officer, compares the short-term investment sentiment of public listed market to the five to seven-year time horizon of PE industry[38]. He believes that when you have PE firms who are the "hands-on operators that are going to improve the quality of the companies, there's no pressure for quarter-to-quarter performance". This is a common denunciation for big listed companies: they have no real owner protecting the long-term viability of a firm, or controlling managers by holding them accountable. Rather, CEOs respond to shareholders from time to time overtly focused on short-term events and reacting to movements in the stock price over the last year. PE firms, by contrast, are the direct owners that are forced to make the tough choices that are best for the long-term health of the company (at least in principle).

This all leaves us with very important questions concerning the PE industry, especially in the European context: What is the contribution of PE to the current situation of ever-rising asset prices while GDP figures have been lacklustre at best compared to other geopolitical regions. And will today's strong PE performance continue even through the next economic crisis or slowdown that may hit the region. If history is to serve as an indicator of future events, I believe that the European PE industry still has many years of attractive returns, and that these past results have solidified this alternative asset class as a significant destination for the investors.

[37] See Bloomberg Article: Blackstone's Top Dealmaker Says Now Is The Most Difficult Period He's Ever Experienced https://www.bloomberg.com/news/articles/2016-09-27/blackstone-s-baratta-says-now-is-the-most-treacherous-time-ever

[38]See Council on Foreign Relations article: https://www.cfr.org/event/conversation-david-swensen

9. Appendix A: Tables and Graphics

Table 1

TOTAL EUROPEAN PRIVATE EQUITY
EUR (million €)

				IRR: Net to Limited Partners (LP)									
First Transaction Period	As of Date	Year	Fund Count	Pooled Return (LP) (%)	Equal Weighted (LP) (%)	Capital Weighted (LP) (%)	Average (LP) (%)	Top 5% (LP) (%)	Upper Quartile (LP) (%)	Median (LP) (%)	Lower Quartile (LP) (%)	Bottom 5% (LP) (%)	Standard Deviation (LP) (%)
1980 Q4	31-12-1986	1986	83	14.2%	12.2%	20.8%	11.4%	47.8%	20.9%	7.5%	-1%	-27%	29%
1980 Q4	31-12-1987	1987	114	17.5%	14.6%	9.8%	9.2%	44.2%	20.3%	7.5%	0%	-26%	23%
1980 Q4	31-12-1988	1988	145	16.7%	13.7%	-5.7%	3.5%	46.8%	16.2%	2.7%	-9%	-33%	26%
1980 Q4	31-12-1989	1989	181	18.1%	14.4%	9.7%	13.2%	64.4%	20.9%	7.5%	-1%	-25%	34%
1980 Q4	31-12-2000	2000	234	21.3%	19.5%	4.7%	9.7%	69.3%	22.1%	6.0%	-6%	-37%	32%
1980 Q4	31-12-2001	2001	278	16.6%	17.4%	-9.7%	0.9%	53.8%	16.2%	0.4%	-14%	-54%	30%
1980 Q4	31-12-2002	2002	299	12.4%	14.4%	-6.7%	-2.8%	40.6%	13.7%	-1.2%	-21%	-48%	28%
1980 Q4	31-12-2003	2003	332	10.9%	13.0%	-2.9%	-2.5%	42.4%	12.3%	-2.8%	-17%	-45%	27%
1980 Q4	31-12-2004	2004	362	12.6%	13.3%	1.2%	1.9%	46.8%	15.0%	1.4%	-13%	-36%	27%
1980 Q4	31-12-2005	2005	429	16.2%	14.7%	9.9%	8.0%	51.2%	19.7%	7.1%	-6%	-29%	29%
1980 Q4	31-12-2006	2006	501	18.8%	15.8%	6.9%	9.3%	54.9%	22.7%	9.7%	-5%	-30%	31%
1980 Q4	31-12-2007	2007	570	18.9%	16.1%	7.5%	9.6%	51.9%	22.7%	9.2%	-6%	-35%	31%
1980 Q4	31-12-2008	2008	631	12.5%	14.0%	-10.9%	-2.5%	38.0%	15.6%	2.2%	-18%	-58%	32%
1980 Q4	31-12-2009	2009	664	12.0%	13.5%	-2.7%	2.4%	45.6%	15.4%	3.1%	-13%	-43%	40%
1980 Q4	31-12-2010	2010	691	12.8%	13.6%	4.5%	5.7%	41.5%	16.7%	6.0%	-4%	-29%	27%
1980 Q4	31-12-2011	2011	729	12.1%	13.3%	4.6%	6.4%	37.0%	16.4%	6.7%	-2%	-23%	26%
1980 Q4	31-12-2012	2012	775	12.2%	13.1%	6.3%	7.2%	34.5%	15.6%	7.1%	-1%	-23%	29%
1980 Q4	31-12-2013	2013	817	13.0%	13.0%	141.0%	8.1%	35.1%	16.8%	8.0%	0%	-20%	23%
1980 Q4	31-12-2014	2014	862	12.3%	13.1%	8.1%	8.9%	38.2%	17.1%	8.9%	1%	-20%	24%
1980 Q4	31-12-2015	2015	903	13.2%	13.2%	8.1%	9.9%	39.0%	17.7%	9.8%	2%	-19%	25%
1980 Q4	31-12-2016	2016	925	12.7%	13.0%	10.9%	10.0%	37.8%	16.7%	9.5%	2%	-15%	22%

1. All data shown as net to Limited Partners, unless otherwise noted.
2. All IRRs greater than one year are annualized.
3. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank, Selected Sample.
4. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

TOTAL EUROPEAN PRIVATE EQUITY

EUR (million €)

TVPI: Net to Limited Partners (LP)									DPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)	Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
1,38	1,31	1,28	2,00	1,52	1,15	0,98	0,80	0,41	0,63	0,50	0,39	1,50	0,65	0,08	0,00	0,00	0,92
1,46	1,23	1,30	2,17	1,58	1,13	1,00	0,85	0,44	0,72	0,39	0,44	1,71	0,88	0,10	0,00	0,00	0,99
1,38	1,12	1,24	2,36	1,47	1,05	0,92	0,69	0,54	0,67	0,32	0,47	1,79	0,84	0,07	0,00	0,00	0,66
1,50	1,26	1,43	2,83	1,74	1,12	0,99	0,74	0,75	0,57	0,31	0,54	2,16	0,86	0,07	0,00	0,00	0,77
1,44	1,23	1,46	3,12	1,74	1,10	0,95	0,72	0,87	0,57	0,34	0,61	2,29	1,11	0,11	0,00	0,00	0,87
1,33	1,05	1,33	3,00	1,62	1,00	0,85	0,54	0,87	0,58	0,30	0,63	2,32	1,20	0,06	0,00	0,00	1,00
1,24	1,06	1,23	2,85	1,48	0,98	0,73	0,48	0,86	0,56	0,33	0,64	2,56	1,13	0,10	0,00	0,00	1,02
1,23	1,09	1,20	2,75	1,41	0,96	0,73	0,43	0,84	0,55	0,36	0,62	2,60	0,95	0,10	0,00	0,00	1,00
1,30	1,16	1,26	2,81	1,52	1,03	0,79	0,45	0,82	0,65	0,46	0,69	2,67	0,99	0,25	0,00	0,00	0,99
1,45	1,27	1,36	2,84	1,63	1,18	0,91	0,57	0,78	0,76	0,50	0,72	2,63	1,10	0,38	0,00	0,00	0,96
1,55	1,28	1,41	2,84	1,70	1,24	0,94	0,57	0,80	0,82	0,52	0,76	2,67	1,22	0,42	0,00	0,00	0,96
1,54	1,33	1,43	2,86	1,79	1,24	0,91	0,52	0,83	0,87	0,59	0,81	2,64	1,35	0,45	0,00	0,00	0,98
1,25	1,66	4,82	2,72	1,60	1,05	0,74	0,40	89,25	0,77	0,53	0,80	2,65	1,37	0,39	0,00	0,00	1,00
1,27	234,92	134,51	2,73	1,59	1,07	0,78	0,39	3.430,58	0,73	0,52	0,78	2,64	1,35	0,38	0,00	0,00	1,00
1,34	1,25	1,34	2,70	1,62	1,17	0,90	0,47	0,80	0,70	0,55	0,79	2,61	1,37	0,43	0,01	0,00	0,99
1,35	1,26	1,36	2,69	1,63	1,19	0,96	0,47	0,78	0,74	0,59	0,82	2,63	1,38	0,45	0,05	0,00	0,98
1,38	1,30	1,37	2,69	1,63	1,22	0,97	0,49	0,77	0,77	0,63	0,82	2,62	1,37	0,45	0,07	0,00	0,97
1,42	2,68	3,15	2,69	1,66	1,27	0,99	0,49	50,10	0,83	0,69	0,85	2,62	1,38	0,54	0,09	0,00	0,95
1,46	1,38	1,43	2,68	1,70	1,35	1,04	0,48	0,74	0,90	0,76	0,91	2,64	1,40	0,70	0,14	0,00	0,94
1,51	1,43	1,48	2,73	1,76	1,41	1,05	0,48	0,76	0,97	0,83	0,97	2,65	1,47	0,84	0,18	0,00	0,93
1,54	1,49	1,50	2,75	1,77	1,43	1,06	0,50	0,77	1,03	0,91	1,03	2,66	1,53	0,97	0,25	0,00	0,94

1. All data shown as net to Limited Partners, unless otherwise noted.

2. All IRRs greater than one year are annualized.

3. Vintage Year definition: First Cash Flow, Quartile Methoddogy: Rank Selected Sample.

4. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

Table 3

TOTAL EUROPEAN PRIVATE EQUITY
EUR (million €)

RVPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
0,75	0,81	0,89	1,56	1,06	0,88	0,66	0,25	0,39
0,74	0,84	0,86	1,49	1,03	0,93	0,72	0,11	0,37
0,71	0,80	0,77	1,32	0,97	0,85	0,60	0,01	0,36
0,93	0,95	0,89	1,80	1,05	0,93	0,61	0,00	0,56
0,87	0,89	0,85	1,59	1,00	0,89	0,63	0,00	0,58
0,75	0,75	0,70	1,22	0,97	0,77	0,50	0,00	0,38
0,68	0,73	0,59	1,10	0,85	0,64	0,40	0,00	0,33
0,67	0,72	0,58	1,08	0,84	0,62	0,32	0,00	0,35
0,65	0,70	0,57	1,11	0,85	0,61	0,26	0,00	0,36
0,69	0,78	0,64	1,22	0,96	0,71	0,24	0,00	0,43
0,73	0,76	0,65	1,41	0,96	0,71	0,18	0,00	0,50
0,67	0,73	0,62	1,38	0,94	0,66	0,12	0,00	0,52
0,48	1,13	4,01	1,03	0,74	0,49	0,08	0,00	89,28
0,55	234,40	133,73	1,12	0,81	0,49	0,07	0,00	3.430,61
0,64	0,70	0,55	1,27	0,92	0,55	0,07	0,00	0,45
0,61	0,67	0,54	1,23	0,92	0,52	0,05	0,00	0,46
0,62	0,67	0,55	1,26	0,96	0,53	0,02	0,00	0,49
0,59	1,99	2,30	1,29	0,96	0,50	0,01	0,00	50,12
0,56	0,63	0,52	1,38	0,93	0,43	0,00	0,00	0,50
0,54	0,60	0,51	1,40	0,93	0,35	0,00	0,00	0,52
0,51	0,58	0,47	1,36	0,90	0,26	0,00	0,00	0,51

1. All data shown as net to Limited Partners, unless otherwise noted.
2. All IRRs greater than one year are annualized.
3. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank Selected Sample.
4. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

VENTURE CAPITAL EUROPE

EUR (million €)

VC EU - Pooled IRR

				IRR: Net to Limited Partners (LP)										
First Transaction Period	As of Date	Year	Fund Count	Pooled Return (LP) (%)	Equal Weighted (LP) (%)	Capital Weighted (LP) (%)	Average (LP) (%)	Top 5% (LP) (%)	Upper Quartile (LP) (%)	Median (LP) (%)	Lower Quartile (LP) (%)	Bottom 5% (LP) (%)	Standard Deviation (LP) (%)	
1986 Q4	31-12-1996	1996	14	10%	9%	10%	9%	42%	10%	4%	0%	-6%	16%	
1986 Q4	31-12-1997	1997	19	13%	9%	11%	2%	17%	12%	2%	-1%	-21%	14%	
1986 Q4	31-12-1998	1998	26	13%	7%	3%	-6%	14%	5%	1%	-10%	-49%	20%	
1986 Q4	31-12-1999	1999	37	14%	14%	13%	9%	55%	17%	3%	-4%	-20%	28%	
1986 Q4	31-12-2000	2000	54	21%	19%	6%	14%	83%	33%	6%	-8%	-33%	36%	
1986 Q4	31-12-2001	2001	67	15%	15%	-13%	-7%	32%	10%	-7%	-25%	-58%	28%	
1986 Q4	31-12-2002	2002	70	10%	9%	-21%	-17%	26%	0%	-22%	-38%	-57%	28%	
1986 Q4	31-12-2003	2003	72	5%	6%	-18%	-16%	25%	-2%	-19%	-31%	-47%	25%	
1986 Q4	31-12-2004	2004	72	4%	5%	-10%	-9%	25%	0%	-15%	-22%	-32%	20%	
1986 Q4	31-12-2005	2005	81	6%	7%	-6%	-6%	27%	5%	-6%	-15%	-34%	22%	
1986 Q4	31-12-2006	2006	90	6%	7%	-3%	-4%	25%	5%	-5%	-12%	-30%	21%	
1986 Q4	31-12-2007	2007	97	5%	6%	-3%	-4%	29%	6%	-5%	-14%	-37%	20%	
1986 Q4	31-12-2008	2008	98	2%	4%	-6%	-7%	24%	3%	-7%	-17%	-41%	20%	
1986 Q4	31-12-2009	2009	102	1%	3%	-5%	-6%	23%	3%	-7%	-16%	-34%	20%	
1986 Q4	31-12-2010	2010	105	2%	3%	-2%	-2%	25%	6%	-3%	-13%	-22%	19%	
1986 Q4	31-12-2011	2011	108	3%	4%	0%	-1%	27%	8%	-1%	-10%	-23%	21%	
1986 Q4	31-12-2012	2012	116	4%	4%	-1%	-2%	25%	10%	-1%	-10%	-36%	22%	
1986 Q4	31-12-2013	2013	119	5%	5%	3%	1%	32%	10%	-1%	-9%	-26%	22%	
1986 Q4	31-12-2014	2014	127	6%	6%	5%	2%	32%	12%	2%	-8%	-26%	23%	
1986 Q4	31-12-2015	2015	134	8%	7%	7%	7%	44%	19%	3%	-7%	-22%	31%	
1986 Q4	31-12-2016	2016	140	7%	7%	7%	5%	37%	15%	2%	-7%	-26%	29%	

1. All data shown as net to Limited Partners, unless otherwise noted.

2. Values are "--" where they might otherwise expose sensitive information.

3. All IRRs greater than one year are annualized.

4. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank Selected Sample.

5. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

VENTURE CAPITAL EUROPE

EUR (million €)

TVPI: Net to Limited Partners (LP)									DPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)	Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
1,27	1,26	1,27	2,06	1,49	1,06	0,99	0,95	0,41	0,43	0,41	0,33	1,34	0,41	0,07	0,00	0,00	0,54
1,45	1,41	1,21	1,94	1,31	1,11	0,99	0,85	0,39	0,89	0,82	0,35	1,23	0,57	0,00	0,00	0,00	0,58
1,43	1,27	1,07	1,91	1,17	1,03	0,93	0,44	0,43	1,06	0,81	0,32	1,57	0,42	0,00	0,00	0,00	0,59
1,49	1,36	1,33	2,21	1,52	1,06	0,96	0,79	0,67	0,98	0,71	0,30	1,45	0,34	0,00	0,00	0,00	0,58
1,80	1,45	1,55	3,94	1,58	1,11	0,92	0,75	1,06	1,04	0,65	0,37	1,89	0,57	0,00	0,00	0,00	0,62
1,42	1,12	1,27	3,17	1,42	0,94	0,77	0,53	1,04	0,90	0,49	0,48	2,12	0,44	0,00	0,00	0,00	1,07
1,18	0,95	1,06	2,85	1,00	0,77	0,54	0,34	1,07	0,78	0,47	0,50	2,19	0,44	0,00	0,00	0,00	1,15
1,08	0,91	1,00	2,80	0,94	0,68	0,55	0,25	1,07	0,71	0,47	0,51	2,30	0,38	0,00	0,00	0,00	1,16
1,06	0,97	1,03	2,90	1,00	0,68	0,58	0,28	1,06	0,66	0,51	0,55	2,56	0,38	0,07	0,00	0,00	1,18
1,13	1,06	1,12	2,91	1,13	0,81	0,67	0,41	1,03	0,64	0,49	0,57	2,64	0,51	0,09	0,00	0,00	1,13
1,15	1,09	1,15	2,68	1,08	0,91	0,73	0,40	0,98	0,63	0,48	0,58	2,45	0,59	0,13	0,00	0,00	1,12
1,13	1,08	1,13	2,57	1,30	0,84	0,67	0,45	0,96	0,64	0,50	0,61	2,30	0,79	0,17	0,00	0,00	1,11
1,04	1,00	1,04	2,70	1,09	0,79	0,59	0,38	0,97	0,63	0,53	0,64	2,52	0,78	0,24	0,00	0,00	1,10
1,03	0,99	1,04	2,63	1,11	0,80	0,56	0,38	0,96	0,63	0,53	0,64	2,48	0,72	0,26	0,00	0,00	1,08
1,07	1,05	1,09	2,55	1,25	0,85	0,59	0,36	0,95	0,64	0,56	0,66	2,47	0,75	0,32	0,06	0,00	1,06
1,11	1,10	1,11	2,48	1,35	0,93	0,58	0,31	0,94	0,68	0,62	0,70	2,42	0,84	0,35	0,13	0,00	1,05
1,14	1,11	1,13	2,45	1,40	0,96	0,57	0,32	0,93	0,68	0,59	0,68	2,29	0,85	0,37	0,06	0,00	1,02
1,21	1,20	1,20	2,42	1,50	0,98	0,64	0,34	0,93	0,72	0,65	0,71	2,24	0,90	0,41	0,14	0,00	1,00
1,31	1,29	1,26	2,63	1,60	1,07	0,64	0,36	0,94	0,77	0,69	0,75	2,20	1,03	0,49	0,13	0,00	0,99
1,42	1,38	1,35	2,94	1,78	1,15	0,69	0,29	0,98	0,83	0,75	0,80	2,22	1,14	0,53	0,15	0,00	0,98
1,41	1,38	1,34	2,91	1,74	1,10	0,71	0,35	0,97	0,85	0,75	0,81	2,21	1,17	0,49	0,14	0,00	0,98

Table 6

VENTURE CAPITAL EUROPE
EUR (million €)

RVPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
0,85	0,85	0,94	1,68	1,05	0,91	0,70	0,46	0,40
0,57	0,59	0,85	1,18	1,00	0,87	0,75	0,32	0,29
0,37	0,46	0,75	1,10	0,99	0,89	0,46	0,27	0,32
0,51	0,65	1,03	1,97	1,30	1,00	0,72	0,21	0,58
0,76	0,80	1,18	3,01	1,23	0,97	0,78	0,24	0,90
0,52	0,63	0,79	1,29	0,99	0,84	0,58	0,08	0,39
0,41	0,49	0,56	1,00	0,74	0,58	0,43	0,01	0,29
0,37	0,44	0,49	0,94	0,65	0,53	0,30	0,01	0,29
0,40	0,46	0,48	0,95	0,64	0,52	0,28	0,00	0,27
0,48	0,56	0,55	1,00	0,79	0,61	0,27	0,00	0,37
0,52	0,61	0,57	1,03	0,83	0,66	0,24	0,00	0,36
0,49	0,57	0,52	1,03	0,81	0,58	0,19	0,00	0,36
0,41	0,47	0,41	0,90	0,65	0,38	0,13	0,00	0,32
0,39	0,47	0,40	0,98	0,72	0,38	0,09	0,00	0,34
0,42	0,49	0,42	1,12	0,75	0,30	0,06	0,00	0,40
0,43	0,48	0,42	1,21	0,73	0,23	0,04	0,00	0,42
0,46	0,52	0,45	1,26	0,69	0,23	0,02	0,00	0,49
0,49	0,55	0,48	1,55	0,81	0,31	0,01	0,00	0,53
0,54	0,60	0,51	1,52	0,88	0,29	0,00	0,00	0,57
0,59	0,63	0,54	1,82	0,93	0,29	0,00	0,00	0,63
0,56	0,63	0,53	1,79	0,90	0,30	0,00	0,00	0,62

BUYOUT EUROPE

EUR (million €)

Buyout EU - Pooled IRR

				IRR: Net to Limited Partners (LP)									
First Transaction Period	As of Date	Year	Fund Count	Pooled Return (LP) (%)	Equal Weighted (LP) (%)	Capital Weighted (LP) (%)	Average (LP) (%)	Top 5% (LP) (%)	Upper Quartile (LP) (%)	Median (LP) (%)	Lower Quartile (LP) (%)	Bottom 5% (LP) (%)	Standard Deviation (LP) (%)
1987 Q3	31-12-1996	1996	63	16%	13%	26%	12%	48%	21%	6%	-2%	-27%	31%
1987 Q3	31-12-1997	1997	88	19%	16%	10%	11%	51%	22%	10%	0%	-22%	24%
1987 Q3	31-12-1998	1998	108	18%	16%	-6%	6%	50%	19%	4%	-8%	-31%	28%
1987 Q3	31-12-1999	1999	126	24%	19%	10%	16%	64%	23%	9%	0%	-21%	35%
1987 Q3	31-12-2000	2000	151	22%	20%	6%	10%	62%	22%	10%	-5%	-35%	31%
1987 Q3	31-12-2001	2001	170	17%	19%	-7%	7%	59%	22%	5%	-6%	-33%	30%
1987 Q3	31-12-2002	2002	179	14%	17%	-3%	5%	55%	17%	2%	-11%	-29%	26%
1987 Q3	31-12-2003	2003	198	13%	16%	0%	3%	55%	15%	4%	-10%	-34%	28%
1987 Q3	31-12-2004	2004	215	14%	16%	3%	7%	55%	20%	7%	-6%	-45%	30%
1987 Q3	31-12-2005	2005	244	18%	17%	12%	12%	55%	23%	10%	-1%	-22%	29%
1987 Q3	31-12-2006	2006	274	20%	18%	8%	13%	59%	26%	13%	0%	-31%	33%
1987 Q3	31-12-2007	2007	309	21%	19%	9%	13%	58%	27%	13%	-1%	-28%	34%
1987 Q3	31-12-2008	2008	335	15%	17%	-10%	2%	52%	21%	7%	-14%	-58%	35%
1987 Q3	31-12-2009	2009	350	15%	17%	0%	6%	50%	20%	7%	-8%	-38%	29%
1987 Q3	31-12-2010	2010	358	15%	17%	7%	10%	52%	21%	10%	-2%	-24%	27%
1987 Q3	31-12-2011	2011	372	15%	17%	6%	10%	49%	20%	10%	0%	-20%	26%
1987 Q3	31-12-2012	2012	390	15%	17%	8%	11%	47%	20%	10%	2%	-19%	34%
1987 Q3	31-12-2013	2013	401	14%	17%	10%	12%	48%	20%	10%	3%	-18%	23%
1987 Q3	31-12-2014	2014	418	14%	17%	9%	12%	48%	20%	11%	3%	-18%	24%
1987 Q3	31-12-2015	2015	433	15%	17%	9%	11%	45%	19%	11%	3%	-19%	24%
1987 Q3	31-12-2016	2016	444	15%	17%	12%	12%	45%	19%	11%	4%	-12%	22%

1. All data shown as net to Limited Partners, unless otherwise noted.

2. All IRRs greater than one year are annualized.

3. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank Selected Sample.

4. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

BUYOUT EUROPE

EUR (million €)

TVPI: Net to Limited Partners (LP)									DPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5%(LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5%(LP)	Standard Deviation (LP)	Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5%(LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5%(LP)	Standard Deviation (LP)
1,41	1,33	1,28	2,00	1,52	1,13	0,98	0,80	41%	0,70	0,53	0,40	1,50	0,69	0,08	0,00	0,00	52%
1,46	1,20	1,31	2,17	1,63	1,13	1,00	0,87	45%	0,68	0,32	0,46	1,71	0,90	0,12	0,00	0,00	60%
1,37	1,11	1,29	2,42	1,51	1,08	0,93	0,74	56%	0,59	0,27	0,51	1,89	0,97	0,15	0,00	0,00	68%
1,50	1,28	1,49	3,04	1,83	1,16	1,00	0,75	79%	0,51	0,29	0,64	2,25	1,04	0,23	0,00	0,00	82%
1,42	1,24	1,49	2,90	1,84	1,17	0,96	0,68	84%	0,53	0,33	0,75	2,65	1,33	0,28	0,00	0,00	95%
1,34	1,06	1,43	3,02	1,81	1,11	0,92	0,60	85%	0,57	0,30	0,77	2,69	1,43	0,23	0,00	0,00	101%
1,27	1,11	1,37	3,04	1,77	1,05	0,85	0,58	83%	0,56	0,35	0,80	2,74	1,42	0,29	0,00	0,00	102%
1,27	1,14	1,34	2,88	1,71	1,08	0,85	0,53	82%	0,57	0,39	0,78	2,73	1,33	0,29	0,00	0,00	102%
1,35	1,21	1,40	2,88	1,75	1,19	0,89	0,54	81%	0,68	0,50	0,86	2,82	1,40	0,47	0,06	0,00	100%
1,50	1,32	1,50	2,88	1,81	1,31	0,99	0,71	78%	0,81	0,55	0,93	2,77	1,48	0,66	0,06	0,00	98%
1,63	1,33	1,58	3,14	1,91	1,42	1,00	0,63	83%	0,90	0,59	1,01	2,79	1,60	0,84	0,07	0,00	99%
1,63	1,41	1,62	3,09	2,00	1,48	0,98	0,70	87%	0,97	0,69	1,06	2,79	1,71	0,95	0,07	0,00	102%
1,32	1,12	1,44	2,98	1,85	1,22	0,80	0,48	92%	0,87	0,62	1,06	2,85	1,71	0,91	0,00	0,00	107%
1,36	326,24	253,83	2,98	1,86	1,24	0,86	0,50	4721 60%	0,83	0,60	1,03	2,82	1,71	0,86	0,00	0,00	109%
1,42	1,33	1,53	2,87	1,89	1,34	0,97	0,63	85%	0,80	0,64	1,06	2,80	1,72	0,90	0,01	0,00	108%
1,42	1,33	1,53	2,85	1,89	1,35	1,00	0,64	86%	0,85	0,69	1,09	2,82	1,73	0,91	0,11	0,00	107%
1,47	1,39	1,55	2,85	1,86	1,38	1,04	0,63	85%	0,89	0,75	1,09	2,82	1,74	0,90	0,13	0,00	106%
1,51	1,45	1,59	2,85	1,87	1,44	1,09	0,68	84%	0,96	0,84	1,14	2,79	1,74	0,98	0,22	0,00	105%
1,54	1,45	1,59	2,85	1,86	1,48	1,10	0,63	81%	1,04	0,88	1,17	2,78	1,76	1,04	0,31	0,00	103%
1,60	1,49	1,61	2,85	1,90	1,52	1,10	0,63	82%	1,13	0,97	1,23	2,80	1,77	1,16	0,40	0,00	102%
1,63	1,55	1,63	2,84	1,94	1,55	1,14	0,69	80%	1,19	1,05	1,26	2,79	1,78	1,22	0,46	0,00	101%

Table 9

BUYOUT EUROPE

EUR (million €)

RVPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
0,72	0,81	0,88	1,49	1,05	0,89	0,67	0,19	0,39
0,78	0,87	0,86	1,52	1,03	0,94	0,70	0,09	0,38
0,78	0,84	0,77	1,37	0,97	0,85	0,60	0,01	0,37
0,99	0,99	0,85	1,72	1,05	0,92	0,59	0,00	0,57
0,89	0,91	0,74	1,36	0,98	0,86	0,50	0,00	0,41
0,78	0,76	0,66	1,21	0,95	0,72	0,42	0,00	0,39
0,71	0,76	0,57	1,07	0,87	0,64	0,29	0,00	0,35
0,70	0,75	0,56	1,06	0,87	0,62	0,25	0,00	0,37
0,67	0,71	0,54	1,12	0,85	0,58	0,18	0,00	0,39
0,70	0,78	0,57	1,24	0,92	0,63	0,10	0,00	0,44
0,73	0,74	0,57	1,40	0,93	0,51	0,05	0,00	0,55
0,66	0,73	0,56	1,49	0,92	0,44	0,02	0,00	0,60
0,45	0,50	0,38	0,97	0,67	0,31	0,01	0,00	0,36
0,53	325,65	252,80	1,05	0,77	0,36	0,00	0,00	4.721,65
0,62	0,69	0,47	1,25	0,85	0,38	0,00	0,00	0,46
0,58	0,64	0,45	1,14	0,85	0,32	0,00	0,00	0,47
0,58	0,64	0,46	1,26	0,87	0,30	0,00	0,00	0,51
0,54	0,61	0,45	1,27	0,86	0,26	0,00	0,00	0,49
0,51	0,57	0,41	1,25	0,79	0,22	0,00	0,00	0,47
0,46	0,52	0,38	1,28	0,76	0,13	0,00	0,00	0,46
0,44	0,50	0,37	1,20	0,75	0,08	0,00	0,00	0,46

1. All data shown as net to Limited Partners, unless otherwise noted.

2. All IRRs greater than one year are annualized.

3. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank Selected Sample.

4. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

Table 10

STOXX Europe 600 EUR Price Index | Price History | Thomson Reuters Eikon

.STOXX
Interval: Quarterly
History Period: 20 Years

VAP: Total 953,77B

Price	Volume	Count
350 - 400	268,2629B	14
300 - 350	267,2317B	14
250 - 300	266,6684B	14
200 - 250	106,8506B	5
150 - 200	44,7582B	2

.STOXX Price Statistics Quarterly 20 Years

Price			Volume					Up/Down (C-C)		Price Change	Close - Close		Turnover		
High	415,18	30-Jun-2015	Max	28,75B	30-Jun-2007	Advancing	526,92B	Up	50	Up	+24,87%	31-Dec-1999	Max	23,39T	31-Mar-2018
Low	155,38	31-Mar-2009	Min	12,07B	31-Mar-2006	Declining	426,85B	Down	30	Down	-23,33%	30-Sep-2002	Min	2,37B	31-Mar-2014
Avg	299,81		Avg	11,82B		Total	953,77B	Unch	0	Period	+32,36%	20 Years	Avg	2,16T	

.STOXX Price History Quarterly 20 Years

Exchange Date	Close	Net	%Chg	Open	Low	High	Volume	Turnover	Approx VWAP	O-C	H-L	%CVol	%CTurn
31-Mar-2018	381,10	-8,08	-2,08%	389,15	367,50	403,72	8.224.463.859	23.394.521.280.000,00		-8,05	36,22	-37,79%	+30,65%
31-Dec-2017	389,18	+1,02	+0,26%	388,43	379,94	398,05	13.219.789.587	17.906.419.880.000,00		0,75	18,11	+7,56%	+1.070,58%
30-Sep-2017	388,16	+8,79	+2,32%	379,96	365,99	388,16	12.290.203.739	1.529.705.310.000,00		8,20	22,17	-23,70%	-13,59%
30-Jun-2017	379,37	-1,77	-0,46%	382,19	376,23	396,55	16.107.839.190	1.770.312.860.000,00		-2,82	20,32	+0,37%	+5,58%
31-Mar-2017	381,14	+19,72	+5,46%	361,24	359,92	381,50	16.049.170.584	1.676.803.160.000,00		19,90	21,58	-7,45%	+6,07%
31-Dec-2016	361,42	+18,50	+5,39%	342,18	327,02	361,66	17.341.554.070	1.580.785.600.000,00		19,24	34,64	-2,74%	+12,57%
30-Sep-2016	342,92	+13,04	+3,95%	330,51	317,24	351,77	17.830.747.280	1.404.249.540.000,00		12,41	34,53	-16,23%	-13,52%
30-Jun-2016	329,88	-7,66	-2,27%	335,88	307,81	351,51	21.284.891.677	1.623.786.270.000,00		-6,00	43,70	+3,43%	-7,66%
31-Mar-2016	337,54	-28,27	-7,73%	365,48	302,59	365,48	20.578.512.819	1.758.471.360.000,00		-27,94	62,89	+26,81%	+8,71%
31-Dec-2015	365,81	+18,04	+5,19%	349,73	343,21	387,43	16.228.370.801	1.617.650.880.000,00		16,08	44,22	-8,29%	-12,85%
30-Sep-2015	347,77	-33,54	-8,80%	382,76	331,98	408,73	17.694.854.110	1.856.225.620.000,00		-34,99	76,75	+1,07%	+0,56%
30-Jun-2015	381,31	-15,99	-4,02%	396,39	378,07	415,18	17.507.401.705	1.845.910.440.000,00		-15,08	37,11	-15,48%	+2,82%
31-Mar-2015	397,30	+54,76	+15,99%	343,95	330,85	404,51	20.712.749.666	1.795.212.470.000,00		53,35	73,66	+5,40%	+11,39%
31-Dec-2014	342,54	-0,54	-0,16%	342,70	302,48	350,99	19.652.010.972	1.611.659.110.000,00		-0,16	48,51	+17,03%	+497,95%
30-Sep-2014	343,08	+1,22	+0,36%	342,36	322,40	350,85	16.791.898.562	269.528.770.700,00		0,72	28,45	-1,42%	+1.766,78%
30-Jun-2014	341,86	+7,55	+2,26%	334,98	325,50	349,71	17.033.954.941	14.438.202.600,00		6,88	24,21	-13,47%	+510,05%
31-Mar-2014	334,31	+6,05	+1,84%	328,99	315,61	338,90	19.686.275.246	2.366.728.700,00		5,32	23,29	+21,64%	-99,84%
31-Dec-2013	328,26	+17,80	+5,73%	310,68	304,45	328,42	16.184.633.269	1.461.403.852.800,00		17,58	23,97	+1,40%	
30-Sep-2013	310,46	+25,44	+8,93%	286,60	282,65	317,18	15.961.636.964			23,86	34,53	-13,82%	
30-Jun-2013	285,02	-8,76	-2,98%	293,87	274,97	310,59	18.522.008.732			-8,85	35,62	+1,13%	
31-Mar-2013	293,78	+14,10	+5,04%	281,56	281,56	298,90	18.314.179.746	548.522.700.800,00		12,22	17,34	+25,64%	-28,24%
31-Dec-2012	279,68	+11,20	+4,17%	268,35	262,86	282,11	14.576.367.498	764.396.748.800,00		11,33	19,25	-9,93%	
30-Sep-2012	268,48	+17,31	+6,89%	251,69	249,77	276,56	16.183.493.348			16,79	26,79	-17,54%	
30-Jun-2012	251,17	-12,15	-4,61%	263,85	233,48	267,62	19.625.435.396			-12,68	34,14	-0,87%	
31-Mar-2012	263,32	+18,78	+7,68%	244,54	244,54	272,86	19.797.815.724			18,78	28,32	+6,64%	
31-Dec-2011	244,54	+18,36	+8,12%	226,55	214,58	251,45	18.565.151.454	2.776.296.499.200,00		17,99	36,87	-20,26%	+456,08%
30-Sep-2011	226,18	-46,68	-17,11%	272,82	209,26	278,01	23.281.772.530	499.261.248.300,00		-46,64	68,75	+25,15%	-67,34%
30-Jun-2011	272,86	-3,04	-1,10%	276,12	263,22	285,18	18.602.426.181	1.528.787.405.800,00		-3,26	21,96	-5,26%	-11,95%
31-Mar-2011	275,90	+0,09	+0,03%	276,28	262,13	292,16	19.634.964.763	1.736.359.798.700,00		-0,38	30,03	+19,59%	+22,25%
31-Dec-2010	275,81	+16,09	+6,20%	259,54	256,62	282,00	16.418.516.290	1.420.346.882.400,00		16,27	25,38	-5,72%	+0,03%
30-Sep-2010	259,72	+16,40	+6,74%	241,77	236,29	267,78	17.415.269.558	1.419.962.397.000,00		17,95	31,49	-29,81%	-25,07%
30-Jun-2010	243,32	-20,25	-7,68%	264,63	229,74	272,62	24.810.070.063	1.895.075.814.900,00		-21,31	42,88	+26,18%	+21,15%
31-Mar-2010	263,57	+9,68	+3,81%	254,24	235,38	265,48	19.663.174.908	1.564.269.483.900,00		9,33	30,10	+11,01%	+10,28%
31-Dec-2009	253,89	+11,42	+4,71%	242,74	232,54	254,60	17.713.160.009	1.418.404.836.200,00		11,15	22,06	-7,22%	-0,35%
30-Sep-2009	242,47	+36,64	+17,80%	206,01	195,24	246,74	19.092.080.008	1.423.386.903.900,00		36,46	51,50	-9,52%	-3,74%
30-Jun-2009	205,83	+29,37	+16,64%	176,52	173,43	215,37	21.101.573.666	1.478.669.918.300,00		29,31	41,94	-1,00%	+6,62%
31-Mar-2009	176,46	-21,90	-11,04%	199,30	155,38	214,21	21.314.043.083	1.386.884.504.000,00		-22,84	58,83	-9,09%	-30,73%
31-Dec-2008	198,36	-57,69	-22,53%	256,98	179,72	263,92	23.444.140.062	2.002.175.027.600,00		-58,62	84,20	-9,68%	-23,96%
30-Sep-2008	256,05	-33,34	-11,52%	288,88	244,73	293,71	25.957.833.447	2.633.205.494.300,00		-32,83	48,98	+7,07%	+1,14%
30-Jun-2008	289,39	-16,57	-5,42%	305,80	283,92	332,87	24.243.730.430	2.603.531.207.100,00		-16,41	48,95	-12,11%	-20,38%
31-Mar-2008	305,96	-58,68	-16,09%	363,55	290,26	365,44	27.582.887.866	3.270.084.676.200,00		-57,59	75,18	+8,13%	-6,26%
31-Dec-2007	364,64	-13,22	-3,50%	377,30	347,72	391,30	25.509.899.154	3.488.338.396.100,00		-12,66	43,58	-9,74%	-8,79%
30-Sep-2007	377,86	-15,85	-4,03%	392,59	348,90	400,99	28.261.411.369	3.824.503.495.800,00		-14,73	52,09	-1,69%	+1,39%
30-Jun-2007	393,71	+19,49	+5,21%	374,32	373,29	400,73	28.747.901.178	3.771.993.449.300,00		19,39	27,44	+12,50%	+7,74%
31-Mar-2007	374,22	+8,96	+2,45%	365,74	351,35	382,85	25.553.838.409	3.500.953.410.900,00		8,48	31,50	+13,53%	+26,34%
31-Dec-2006	365,26	+23,83	+6,98%	341,93	338,79	366,84	22.508.309.840	2.771.016.076.000,00		23,33	28,05	+11,26%	+17,70%
30-Sep-2006	341,43	+20,77	+6,48%	320,72	308,30	343,18	20.230.238.245	2.354.284.110.300,00		20,71	34,88	-17,91%	-20,16%
30-Jun-2006	320,66	-13,78	-4,12%	334,93	299,71	344,39	24.644.337.456	2.948.803.310.200,00		-14,27	44,68	+104,10%	+3.454,13%
31-Mar-2006	334,44	+24,41	+7,87%	310,01	309,29	338,11	12.074.839.699	82.968.410.000,00		24,43	28,82		
31-Dec-2005	310,03	+12,63	+4,25%	297,63	280,91	311,86				12,40	30,95		
30-Sep-2005	297,40	+21,48	+7,78%	275,85	267,88	297,75				21,55	29,87		
30-Jun-2005	275,92	+13,73	+5,24%	262,29	254,38	278,65				13,63	24,27		
31-Mar-2005	262,19	+11,08	+4,41%	251,24	250,04	268,30				10,95	18,26		
31-Dec-2004	251,11	+13,37	+5,62%	237,89	235,77	251,66				13,22	15,89		
30-Sep-2004	237,74	-3,12	-1,30%	241,34	225,18	242,82				-3,60	17,64		
30-Jun-2004	240,86	+4,27	+1,80%	236,89	228,88	248,15				3,97	19,27		
31-Mar-2004	236,59	+7,28	+3,17%	229,41	229,41	247,57				7,18	18,16		
31-Dec-2003	229,31	+22,45	+10,85%	206,77	206,32	229,63				22,54	23,31		
30-Sep-2003	206,86	+3,92	+1,93%	202,61	198,26	223,11				4,25	24,85		
30-Jun-2003	202,94	+26,53	+15,04%	176,38	176,05	210,98				26,56	34,93		
31-Mar-2003	176,41	-26,84	-13,21%	203,18	162,24	211,97				-26,77	49,73		
31-Dec-2002	203,25	+8,49	+4,36%	194,94	186,84	226,67				8,31	39,83		
30-Sep-2002	194,76	-59,28	-23,33%	253,43	188,26	257,37				-58,67	69,11		
30-Jun-2002	254,04	-49,00	-16,17%	302,67	236,87	302,82				-48,63	65,95		
31-Mar-2002	303,04	+4,88	+1,64%	296,87	279,18	303,20				6,17	24,02		
31-Dec-2001	298,16	+31,87	+11,97%	266,24	255,89	302,16				31,92	46,27		
30-Sep-2001	266,29	-63,06	-19,15%	329,35	225,46	334,10				-63,06	108,64		
30-Jun-2001	329,35	+7,65	+2,38%	321,96	302,63	351,65				7,39	49,02		
31-Mar-2001	321,70	-38,09	-10,59%	357,39	299,34	365,04				-35,69	65,70		
31-Dec-2000	359,79	-17,65	-4,68%	377,04	349,72	390,20				-17,25	40,48		
30-Sep-2000	377,44	+0,70	+0,19%	377,72	369,43	404,97				-0,28	35,54		
30-Jun-2000	376,74	-17,36	-4,40%	394,47	355,64	401,77				-17,73	46,13		
31-Mar-2000	394,10	+14,61	+3,85%	383,54	349,67	407,56				10,56	57,89		
31-Dec-1999	379,49	+75,58	+24,87%	303,48	293,08	380,11				76,01	87,03		
30-Sep-1999	303,91	-5,78	-1,87%	313,92	291,11	326,09				-10,01	34,98		
30-Jun-1999	309,69	+12,54	+4,22%	295,83	295,23	319,63				13,86	24,40		
31-Mar-1999	297,15	+17,84	+6,39%	279,92	271,98	301,29				17,23	29,31		
31-Dec-1998	279,31	+43,45	+18,42%	230,19	209,75	281,33				49,12	71,58		
30-Sep-1998	235,86	-61,66	-20,72%	299,07	230,76	315,72				-63,21	84,96		
30-Jun-1998	297,52	+9,60	+3,33%	288,01	276,33	301,67				9,51	25,34		
31-Mar-1998	287,92			259,40	258,74	293,93				28,52	35,19		

Table 11

Euro 1 Year EURIBOR | Price History | Thomson Reuters Eikon

EURIBOR 12M
Interval: Yearly
History Period: 20 Years

EURIBOR1YD= Price Statistics Yearly 20 Years

Price			Up/		Price Change		Close - Close
High	-0,191	31-Dec-2018	Up	9	Up	+41,63%	31-Dec-2006
Low	-0,192	31-Dec-2018	Down	11	Down	-236,67%	31-Dec-2016
Avg	2,047		Unch	0	Period	-105,94%	20 Years

EURIBOR1YD= Price History Yearly 20 Years

Exchange Date	Year	Bid	Ask	High	Low	Open	RefreshRate	BidNet	Bid%Chg
31-Dec-1998	1998	3,2							
31-Dec-1999	1999	3,9						+0,663	+20,63%
31-Dec-2000	2000	4,7						+0,873	+22,52%
31-Dec-2001	2001	3,3						-1,408	-29,65%
31-Dec-2002	2002	2,7						-0,592	-17,72%
31-Dec-2003	2003	2,3						-0,444	-16,15%
31-Dec-2004	2004	2,4						+0,051	+2,21%
31-Dec-2005	2005	2,8						+0,488	+20,71%
31-Dec-2006	2006	4,0						+1,184	+41,63%
31-Dec-2007	2007	4,7						+0,717	+17,80%
31-Dec-2008	2008	3,0						-1,696	-35,74%
31-Dec-2009	2009	1,2						-1,801	-59,07%
31-Dec-2010	2010	1,5						+0,259	+20,75%
31-Dec-2011	2011	1,9						+0,440	+29,20%
31-Dec-2012	2012	0,5						-1,405	-72,16%
31-Dec-2013	2013	0,6						+0,014	+2,58%
31-Dec-2014	2014	0,3						-0,231	-41,55%
31-Dec-2015	2015	0,1						-0,265	-81,54%
31-Dec-2016	2016	-0,1						-0,142	-236,67%
31-Dec-2017	2017	-0,2						-0,104	-126,83%
31-Dec-2018	2018	-0,2		-0,191	-0,192	-0,192		-0,005	-2,69%

Table 12

Fund Name	Sum of Equity Invested in Search Range (EUR)
CVC Capital Partners Ltd - Unspecified Fund	5.797.225.271
European Investment Fund - Unspecified Fund	3.421.309.357
Wendel SA - Unspecified Fund	2.850.147.927
Permira Europe IV	2.733.013.000
SoftBank Vision Fund L.P.	2.695.593.128

Table 13

Fund Name	Avg Equity Per Company in Search Range (EUR)
CVC European Equity Partners V, L.P.	385.424.802
BC European Capital VI	275.889.108
Spinnaker Capital, Ltd. - Unspecified Fund	271.064.936
SoftBank Vision Fund L.P.	269.559.313
Peninsula Participacoes SA- Unspecified Fund	262.415.561

Table 14

Fund Name	Avg Equity Per Deal in Search Range (EUR)
Spinnaker Capital, Ltd. - Unspecified Fund	271.064.935,65
CVC European Equity Partners V, L.P.	256.949.868,23
BC European Capital VI	248.300.196,97
FCPR Fund IV	232.113.599,13
SoftBank Vision Fund L.P.	224.632.760,67

Table 15

Fund Name	No. of Companies in Search Range
Bpifrance Investissement SAS - Unspecified Fund	432
High-Tech Gruenderfonds Management GmbH - Unspecified Fund	414
3i (from published accounts)	403
3i UK MBO Fund II	396
BNP Paribas Developpement SA - Unspecified Fund	281

Table 16

Fund Name	No. of Deals in Search Range
3i (from published accounts)	712
High-Tech Gruenderfonds Management GmbH - Unspecified Fund	588
3i UK MBO Fund II	475
Index Ventures - Unspecified Fund	475
Bpifrance Investissement SAS - Unspecified Fund	457

Returns Report - ALL EUROPEAN FUNDS BY VINTAGE AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

					IRR: Net to Limited Partners (LP)										
Vintage Year	First Transaction Period	As of Date	Fund Count	Pooled Return (LP) (%)	Equal Weighted (LP) (%)	Capital Weighted (LP) (%)	Average (LP) (%)	Top 5% (LP) (%)	Upper Quartile (LP) (%)	Median (LP) (%)	Lower Quartile (LP) (%)	Bottom 5% (LP) (%)	Standard Deviation (LP) (%)
1986	1986 Q4	31-12-2016	1	---	---	---	---	---	---	---	---	---	---
1987	1987 Q3	31-12-2016	2	---	---	---	---	---	---	---	---	---	---
1988	1988 Q1	31-12-2016	4	10%	9%	9%	8%	---	---	---	---	---	---
1989	1989 Q1	31-12-2016	9	19%	14%	19%	15%	25%	19%	17%	6%	6%	8%
1990	1990 Q1	31-12-2016	9	19%	19%	19%	---	30%	26%	19%	15%	8%	9%
1991	1991 Q2	31-12-2016	2	---	---	---	---	---	---	---	---	---	---
1992	1992 Q1	31-12-2016	5	17%	14%	19%	15%	---	---	12%	---	---	---
1993	1993 Q1	31-12-2016	6	22%	20%	20%	17%	---	---	18%	---	---	---
1994	1994 Q1	31-12-2016	21	37%	24%	39%	24%	55%	38%	17%	10%	0%	20%
1995	1995 Q1	31-12-2016	10	51%	23%	41%	---	78%	26%	9%	-5%	-9%	34%
1996	1996 Q1	31-12-2016	14	19%	18%	19%	18%	40%	24%	18%	11%	-5%	17%
1997	1997 Q1	31-12-2016	31	15%	23%	19%	---	78%	33%	15%	0%	-16%	29%
1998	1998 Q1	31-12-2016	31	12%	10%	11%	8%	26%	14%	6%	4%	-7%	10%
1999	1999 Q1	31-12-2016	36	11%	5%	11%	5%	20%	13%	6%	-6%	-10%	11%
2000	2000 Q1	31-12-2016	53	12%	6%	12%	5%	31%	13%	7%	-2%	-24%	20%
2001	2001 Q1	31-12-2016	44	21%	12%	21%	13%	34%	22%	11%	4%	-13%	16%
2002	2002 Q1	31-12-2016	21	20%	14%	22%	17%	32%	24%	17%	12%	0%	12%
2003	2003 Q1	31-12-2016	33	15%	14%	15%	14%	48%	20%	10%	8%	-4%	28%
2004	2004 Q1	31-12-2016	30	14%	11%	15%	17%	26%	17%	10%	7%	-4%	40%
2005	2005 Q1	31-12-2016	67	7%	6%	4%	2%	17%	9%	5%	-5%	-16%	22%
2006	2006 Q1	31-12-2016	72	6%	5%	4%	---	16%	10%	6%	1%	-15%	19%
2007	2007 Q1	31-12-2016	69	8%	8%	7%	8%	21%	14%	9%	-1%	-14%	14%
2008	2008 Q1	31-12-2016	61	13%	8%	13%	7%	19%	14%	10%	5%	-11%	12%
2009	2009 Q1	31-12-2016	33	16%	19%	16%	---	57%	18%	14%	11%	6%	21%
2010	2010 Q1	31-12-2016	27	15%	17%	15%	16%	27%	20%	15%	12%	10%	6%
2011	2011 Q1	31-12-2016	38	16%	17%	16%	16%	46%	19%	15%	11%	-6%	14%
2012	2012 Q1	31-12-2016	46	16%	17%	15%	15%	33%	23%	14%	8%	-10%	17%
2013	2013 Q1	31-12-2016	42	11%	11%	11%	11%	39%	14%	7%	4%	-5%	14%
2014	2014 Q1	31-12-2016	45	12%	12%	9%	9%	47%	15%	10%	-3%	-18%	21%
2015	2015 Q1	31-12-2016	41	6%	6%	8%	4%	53%	10%	1%	-7%	-60%	47%
2016	2016 Q1	31-12-2016	22	2%	-13%	3%	-15%	14%	-3%	-14%	-25%	-46%	27%
Total	**1986 Q4**	**31-12-2016**	**925**	**13%**	**13%**	**11%**	**10%**	**38%**	**17%**	**10%**	**2%**	**-15%**	**22%**

1. All data shown as net to Limited Partners, unless otherwise noted.

2. Values are "---" where they might otherwise expose sensitive information.

3. All IRRs greater than one year are annualized.

4. Vintage Year definition: First Cash Flow. Quartile Methodology: Rank Selected Sample.

5. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

6. This report was generated on 30-01-2019 at 10:14AM GMT.

Returns Report - ALL EUROPEAN FUNDS BY VINTAGE AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

TVPI: Net to Limited Partners (LP)									DPI: Netto Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)	Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1,60	1,60	1,62	---	---	---	---	---	---	1,60	1,60	1,62	---	---	---	---	---	---
2,04	2,03	2,04	3,14	2,04	1,84	1,66	1,47	0,65	2,04	2,03	2,04	3,14	2,04	1,84	1,66	1,47	0,65
2,25	2,22	---	3,05	2,85	2,60	1,89	1,38	0,68	2,25	2,22	---	3,05	2,85	2,60	1,89	1,38	0,68
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1,93	1,94	1,86	---	---	2,03	---	---	---	1,93	1,94	1,86	---	---	2,03	---	---	---
2,53	2,54	2,32	---	---	2,24	---	---	---	2,53	2,54	2,32	---	---	2,24	---	---	---
3,15	3,17	2,35	4,15	2,95	1,86	1,64	1,01	1,14	3,15	3,17	2,35	4,15	2,95	1,86	1,62	1,01	1,14
2,39	2,43	---	4,74	2,08	1,27	0,81	0,72	1,70	2,39	2,43	---	4,74	2,08	1,27	0,81	0,71	1,70
2,06	2,06	1,94	3,58	2,14	1,71	1,55	0,74	0,91	2,06	2,06	1,94	3,58	2,14	1,71	1,55	0,74	0,91
1,75	1,73	---	3,10	2,22	1,79	1,00	0,56	1,35	1,67	1,65	---	2,96	2,22	1,79	1,00	0,56	1,34
1,74	1,74	1,60	2,93	1,70	1,37	1,17	0,67	0,99	1,73	1,73	1,58	2,93	1,70	1,36	1,17	0,63	0,96
1,58	1,61	1,34	2,65	1,78	1,26	0,68	0,44	0,71	1,58	1,61	1,32	2,64	1,75	1,25	0,68	0,35	0,72
1,61	1,62	1,34	2,44	1,74	1,36	0,90	0,26	0,71	1,58	1,59	1,28	2,44	1,72	1,22	0,73	0,23	0,74
1,91	1,90	1,63	2,75	1,98	1,59	1,30	0,37	0,74	1,87	1,86	1,53	2,74	1,98	1,50	1,07	0,29	0,78
1,83	1,83	1,65	2,23	1,91	1,75	1,58	0,51	0,52	1,71	1,71	1,57	2,23	1,88	1,68	1,52	0,51	0,58
1,81	1,81	1,70	2,96	1,99	1,53	1,34	0,80	0,70	1,72	1,72	1,62	2,92	1,99	1,43	1,22	0,74	0,72
1,66	1,66	1,56	2,17	1,64	1,50	1,35	0,98	0,42	1,59	1,59	1,43	2,16	1,56	1,43	1,13	0,86	0,45
1,42	1,42	1,36	2,54	1,61	1,35	0,79	0,26	1,01	1,20	1,20	1,09	1,84	1,44	1,02	0,61	0,05	1,00
1,44	1,44	---	2,27	1,68	1,40	1,05	0,37	0,59	0,98	0,98	---	1,68	1,17	0,99	0,41	0,06	0,53
1,45	1,45	1,44	2,29	1,81	1,51	0,96	0,54	0,58	1,04	1,05	0,92	1,94	1,33	0,80	0,39	0,10	0,65
1,68	1,67	1,43	2,06	1,64	1,48	1,24	0,60	0,47	0,98	0,99	0,81	1,48	1,11	0,86	0,46	0,07	0,45
1,74	1,85	---	3,47	1,95	1,59	1,47	1,22	0,85	0,93	1,03	---	2,98	1,31	0,67	0,37	0,13	0,93
1,61	1,83	1,89	2,73	1,86	1,63	1,42	1,30	1,14	0,73	0,94	1,13	2,71	1,40	0,95	0,40	0,25	1,23
1,52	1,56	1,54	2,17	1,64	1,50	1,30	0,84	0,46	0,40	0,40	0,59	1,74	0,85	0,41	0,12	0,00	0,60
1,38	1,38	1,40	2,15	1,54	1,31	1,18	0,82	0,45	0,26	0,27	0,31	1,14	0,40	0,16	0,02	0,00	0,43
1,21	1,21	1,21	1,68	1,29	1,15	1,07	0,86	0,26	0,17	0,15	0,19	0,51	0,26	0,11	0,00	0,00	0,28
1,17	1,15	1,17	1,82	1,26	1,13	0,96	0,88	0,30	0,04	0,06	0,09	0,39	0,10	0,00	0,00	0,00	0,17
1,05	0,99	1,01	1,37	1,09	1,00	0,92	0,50	0,39	0,05	0,06	0,03	0,15	0,02	0,00	0,00	0,00	0,09
1,01	1,07	0,90	1,10	0,97	0,89	0,84	0,71	0,23	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01
1,54	**1,49**	**1,50**	**2,75**	**1,77**	**1,43**	**1,06**	**0,50**	**0,77**	**1,03**	**0,91**	**1,03**	**2,66**	**1,53**	**0,97**	**0,25**	**0,00**	**0,94**

Table 19

Returns Report - ALL EUROPEAN FUNDS BY VINTAGE AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

RVPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---
0,00	0,00	0,00	---	---	---	---	---	---
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
0,00	0,00	---	0,00	0,00	0,00	0,00	0,00	0,00
---	---	---	---	---	---	---	---	---
0,00	0,00	0,00	---	---	0,00	---	---	---
0,00	0,00	0,00	---	---	0,00	---	---	---
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
0,00	0,00	---	0,00	0,00	0,00	0,00	0,00	0,00
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
0,08	0,08	---	0,14	0,00	0,00	0,00	0,00	0,07
0,01	0,01	0,02	0,10	0,01	0,00	0,00	0,00	0,05
0,01	0,01	0,02	0,09	0,02	0,00	0,00	0,00	0,03
0,03	0,03	0,06	0,28	0,08	0,00	0,00	0,00	0,10
0,04	0,04	0,10	0,48	0,10	0,02	0,00	0,00	0,16
0,12	0,11	0,08	0,37	0,11	0,01	0,00	0,00	0,13
0,09	0,09	0,08	0,30	0,12	0,04	0,00	0,00	0,10
0,07	0,07	0,13	0,45	0,19	0,07	0,03	0,00	0,15
0,22	0,22	0,27	0,83	0,35	0,18	0,06	0,00	0,34
0,46	0,46	---	1,28	0,64	0,41	0,21	0,00	0,39
0,42	0,40	0,52	1,09	0,78	0,52	0,23	0,01	0,37
0,69	0,69	0,62	1,21	0,88	0,59	0,23	0,01	0,42
0,81	0,82	---	1,77	1,16	0,92	0,68	0,02	0,52
0,88	0,89	0,76	1,56	1,08	0,77	0,20	0,01	0,54
1,13	1,15	0,94	1,75	1,17	0,95	0,69	0,01	0,49
1,12	1,11	1,09	1,73	1,19	1,07	0,87	0,59	0,45
1,04	1,06	1,02	1,42	1,10	1,02	0,89	0,69	0,22
1,12	1,09	1,08	1,73	1,22	1,01	0,91	0,76	0,34
0,99	0,93	0,98	1,37	1,02	0,96	0,90	0,50	0,39
1,01	1,07	0,90	1,08	0,97	0,89	0,84	0,71	0,23
0,51	**0,58**	**0,47**	**1,36**	**0,90**	**0,26**	**0,00**	**0,00**	**0,51**

Returns Report - VENTURE CAPITAL FUNDS BY VINTAGE YEAR AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

				IRR: Net to Limited Partners (LP)										
Vintage Year	First Transaction Period	As of Date	Fund Count	Pooled Return (LP) (%)	Equal Weighted (LP) (%)	Capital Weighted (LP) (%)	Average (LP) (%)	Top 5% (LP) (%)	Upper Quartile (LP) (%)	Median (LP) (%)	Lower Quartile (LP) (%)	Bottom 5% (LP) (%)	Standard Deviation (LP) (%)	
1986	1986 Q4	31-12-2016	1	---	---	---	---	---	---	---	---	---	---	
1988	1988 Q4	31-12-2016	1	---	---	---	---	---	---	---	---	---	---	
1989	1989 Q2	31-12-2016	4	18%	8%	19%	9%	---	---	---	---	---	---	
1993	1993 Q1	31-12-2016	1	---	---	---	---	---	---	---	---	---	---	
1994	1994 Q3	31-12-2016	4	19%	17%	16%	13%	---	---	---	---	---	---	
1995	1995 Q1	31-12-2016	3	3%	9%	-1%	4%	---	---	---	---	---	---	
1997	1997 Q1	31-12-2016	5	21%	42%	16%	25%	---	---	30%	---	---	---	
1998	1998 Q1	31-12-2016	7	-4%	-1%	-5%	-1%	---	---	-1%	---	---	---	
1999	1999 Q3	31-12-2016	11	-3%	-3%	4%	-4%	8%	-2%	-7%	-8%	-11%	8%	
2000	2000 Q1	31-12-2016	17	-4%	-5%	-7%	-13%	3%	1%	-6%	-12%	-41%	24%	
2001	2001 Q1	31-12-2016	13	1%	1%	2%	1%	20%	6%	3%	-10%	-16%	12%	
2002	2002 Q1	31-12-2016	3	1%	-1%	1%	-1%	---	---	---	---	---	---	
2003	2003 Q1	31-12-2016	2	---	---	---	---	---	---	---	---	---	---	
2005	2005 Q1	31-12-2016	9	9%	7%	7%	4%	18%	14%	8%	-5%	-14%	13%	
2006	2006 Q2	31-12-2016	9	5%	8%	4%	6%	16%	14%	9%	-4%	-7%	9%	
2007	2007 Q2	31-12-2016	7	11%	8%	9%	6%	---	---	8%	---	---	---	
2008	2008 Q2	31-12-2016	1	---	---	---	---	---	---	---	---	---	---	
2009	2009 Q1	31-12-2016	4	25%	22%	25%	22%	---	---	---	---	---	---	
2010	2010 Q1	31-12-2016	3	19%	19%	20%	19%	---	---	---	---	---	---	
2011	2011 Q2	31-12-2016	3	23%	24%	14%	18%	---	---	---	---	---	---	
2012	2012 Q1	31-12-2016	8	27%	30%	27%	29%	74%	37%	24%	18%	-5%	29%	
2013	2013 Q1	31-12-2016	3	2%	6%	1%	4%	---	---	---	---	---	---	
2014	2014 Q1	31-12-2016	8	16%	26%	15%	28%	62%	38%	26%	14%	-2%	24%	
2015	2015 Q1	31-12-2016	7	23%	4%	43%	---	---	---	-6%	---	---	---	
2016	2016 Q1	31-12-2016	6	-25%	-31%	-22%	---	---	---	-26%	---	---	---	
Total	**1986 Q4**	**31-12-2016**	**140**	**7%**	**7%**	**7%**	**5%**	**37%**	**15%**	**2%**	**-7%**	**-26%**	**29%**	

1. All data shown as net to Limited Partners, unless otherwise noted.

2. Values are "---" where they might otherwise expose sensitive information.

3. All IRRs greater than one year are annualized.

4. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank Selected Sample.

5. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

6. This report was generated on 30-01-2019 at 09:59AM GMT.

Returns Report - VENTURE CAPITAL FUNDS BY VINTAGE YEAR AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

TVPI: Net to Limited Partners (LP)									DPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)	Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2,02	2,02	1,67	---	---	---	---	---	---	2,02	2,02	1,67	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2,55	2,56	2,34	---	---	---	---	---	---	2,54	2,55	2,33	---	---	---	---	---	---
1,12	1,12	1,48	---	---	---	---	---	---	1,12	1,12	1,48	---	---	---	---	---	---
1,79	1,86	2,88	---	---	2,02	---	---	---	1,79	1,86	2,87	---	---	2,01	---	---	---
0,82	0,82	0,97	---	---	0,98	---	---	---	0,81	0,81	0,96	---	---	0,98	---	---	---
0,76	0,76	0,81	1,88	0,84	0,59	0,47	0,40	0,66	0,72	0,71	0,77	1,86	0,82	0,50	0,42	0,32	0,67
0,73	0,74	0,66	1,19	1,07	0,60	0,46	0,13	0,39	0,62	0,62	0,57	1,08	0,93	0,49	0,29	0,13	0,36
1,06	1,09	1,09	1,91	1,54	1,17	0,46	0,25	0,63	0,87	0,90	0,92	1,90	1,15	0,91	0,44	0,21	0,62
1,08	1,08	0,93	---	---	---	---	---	---	0,89	0,89	0,67	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1,70	1,71	1,51	2,83	2,15	1,69	0,75	0,37	0,97	1,25	1,26	1,10	2,13	1,75	1,23	0,35	0,04	0,84
1,42	1,42	1,61	2,81	2,05	1,61	0,71	0,68	0,84	0,64	0,63	0,72	1,61	1,11	0,59	0,21	0,09	0,59
1,68	1,68	1,44	---	---	1,46	---	---	---	0,85	0,86	0,59	---	---	0,56	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2,80	2,83	2,56	---	---	---	---	---	---	1,03	1,06	0,87	---	---	---	---	---	---
2,03	2,03	1,94	---	---	---	---	---	---	0,99	0,99	1,05	---	---	---	---	---	---
1,52	1,36	1,56	---	---	---	---	---	---	0,56	0,44	0,36	---	---	---	---	---	---
1,75	1,72	1,74	2,81	1,96	1,63	1,42	0,92	0,72	0,25	0,28	0,34	1,09	0,42	0,20	0,05	0,00	0,47
1,03	1,03	1,09	---	---	---	---	---	---	0,00	0,00	0,00	---	---	---	---	---	---
1,27	1,25	1,39	1,87	1,47	1,34	1,24	1,00	0,33	0,01	0,02	0,10	0,40	0,10	0,00	0,00	0,00	0,19
1,22	1,33	---	---	---	0,91	---	---	---	0,02	0,01	---	---	---	0,00	---	---	---
0,84	0,84	---	---	---	0,84	---	---	---	0,00	0,00	---	---	---	0,00	---	---	---
1,41	**1,38**	**1,34**	**2,91**	**1,74**	**1,10**	**0,71**	**0,35**	**0,97**	**0,85**	**0,75**	**0,81**	**2,21**	**1,17**	**0,49**	**0,14**	**0,00**	**0,98**

Table 22

Returns Report - VENTURE CAPITAL FUNDS BY VINTAGE YEAR AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

RVPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
---	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---
0,00	0,00	0,00	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---
0,01	0,01	0,00	---	---	---	---	---	---
0,00	0,00	0,00	---	---	---	---	---	---
0,00	0,00	0,00	---	---	0,00	---	---	---
0,01	0,01	0,02	---	---	0,00	---	---	---
0,04	0,04	0,04	0,12	0,07	0,02	0,00	0,00	0,05
0,12	0,12	0,10	0,33	0,16	0,02	0,00	0,00	0,12
0,19	0,19	0,17	0,57	0,27	0,05	0,02	0,00	0,24
0,19	0,20	0,26	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---
0,45	0,45	0,42	0,84	0,49	0,40	0,20	0,18	0,26
0,78	0,79	0,89	1,39	1,19	0,70	0,54	0,50	0,38
0,83	0,81	0,85	---	---	0,84	---	---	---
---	---	---	---	---	---	---	---	---
1,77	1,77	1,69	---	---	---	---	---	---
1,05	1,03	0,89	---	---	---	---	---	---
0,96	0,92	1,20	---	---	---	---	---	---
1,50	1,44	1,39	2,47	1,62	1,24	1,00	0,69	0,69
1,03	1,03	1,09	---	---	---	---	---	---
1,26	1,23	1,29	1,87	1,45	1,24	0,96	0,90	0,39
1,20	1,32	---	---	---	0,91	---	---	---
0,84	0,84	---	---	---	0,84	---	---	---
0,56	**0,63**	**0,53**	**1,79**	**0,90**	**0,30**	**0,00**	**0,00**	**0,62**

Returns Report - BUYOUT AND GROWTH FUNDS BY VINTAGE YEAR AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

					IRR: Net to Limited Partners (LP)									
Vintage Year	First Transaction Period	As of Date	Fund Count	Pooled Return (LP) (%)	Equal Weighted (LP) (%)	Capital Weighted (LP) (%)	Average (LP) (%)	Top 5% (LP) (%)	Upper Quartile (LP) (%)	Median (LP) (%)	Lower Quartile (LP) (%)	Bottom 5% (LP) (%)	Standard Deviation (LP) (%)
1987	1987 Q3	31-12-2016	2	---	---	---	---	---	---	---	---	---	---
1988	1988 Q1	31-12-2016	3	10%	8%	9%	---	---	---	---	---	---	---
1989	1989 Q1	31-12-2016	4	19%	19%	20%	19%	---	---	---	---	---	---
1990	1990 Q1	31-12-2016	8	19%	19%	19%	20%	30%	27%	21%	14%	8%	9%
1991	1991 Q2	31-12-2016	2	---	---	---	---	---	---	---	---	---	---
1992	1992 Q1	31-12-2016	5	17%	14%	19%	15%	---	---	12%	---	---	---
1993	1993 Q2	31-12-2016	5	24%	21%	23%	---	---	---	22%	---	---	---
1994	1994 Q1	31-12-2016	15	40%	29%	41%	29%	55%	51%	25%	15%	1%	20%
1995	1995 Q1	31-12-2016	6	59%	33%	46%	25%	---	---	9%	---	---	---
1996	1996 Q1	31-12-2016	13	19%	18%	18%	---	42%	24%	15%	11%	-6%	18%
1997	1997 Q1	31-12-2016	25	15%	18%	19%	22%	78%	33%	15%	1%	-14%	29%
1998	1998 Q1	31-12-2016	20	15%	14%	14%	12%	31%	16%	10%	4%	2%	9%
1999	1999 Q1	31-12-2016	18	12%	9%	12%	9%	21%	18%	10%	2%	-9%	11%
2000	2000 Q1	31-12-2016	25	15%	14%	16%	15%	33%	24%	13%	7%	-2%	12%
2001	2001 Q1	31-12-2016	19	25%	21%	25%	22%	47%	29%	23%	11%	1%	16%
2002	2002 Q1	31-12-2016	9	22%	19%	24%	20%	30%	29%	19%	15%	9%	8%
2003	2003 Q1	31-12-2016	19	16%	14%	16%	13%	47%	31%	11%	6%	-12%	31%
2004	2004 Q1	31-12-2016	17	15%	13%	16%	---	66%	21%	10%	7%	-8%	52%
2005	2005 Q1	31-12-2016	29	8%	12%	7%	---	20%	12%	8%	2%	-9%	20%
2006	2006 Q1	31-12-2016	30	7%	7%	7%	7%	21%	11%	9%	3%	-6%	10%
2007	2007 Q1	31-12-2016	35	9%	9%	8%	---	21%	15%	10%	-1%	-11%	14%
2008	2008 Q1	31-12-2016	26	14%	8%	14%	6%	19%	15%	9%	5%	-18%	16%
2009	2009 Q1	31-12-2016	15	15%	17%	15%	16%	27%	17%	15%	12%	7%	8%
2010	2010 Q2	31-12-2016	8	15%	16%	15%	16%	26%	18%	15%	12%	10%	6%
2011	2011 Q1	31-12-2016	14	19%	21%	18%	20%	47%	20%	18%	11%	3%	16%
2012	2012 Q1	31-12-2016	18	13%	10%	12%	8%	26%	15%	9%	-3%	-11%	13%
2013	2013 Q2	31-12-2016	11	11%	14%	10%	---	36%	19%	9%	5%	-5%	14%
2014	2014 Q1	31-12-2016	17	13%	14%	10%	6%	35%	15%	11%	-6%	-22%	19%
2015	2015 Q1	31-12-2016	15	6%	0%	3%	-12%	16%	4%	-4%	-8%	-81%	32%
2016	2016 Q1	31-12-2016	11	-22%	-14%	-19%	---	2%	-4%	-12%	-21%	-56%	24%
Total	**1987 Q3**	**31-12-2016**	**444**	**15%**	**17%**	**12%**	**12%**	**45%**	**19%**	**11%**	**4%**	**-12%**	**22%**

1. All data shown as net to Limited Partners, unless otherwise noted.

2. Values are "---" where they might otherwise expose sensitive information.

3. All IRRs greater than one year are annualized.

4. Vintage Year definition: First Cash Flow, Quartile Methodology: Rank Selected Sample.

5. IRRs in excess of 1,000% are excluded from the Average and Standard Deviation calculations.

6. This report was generated on 30-01-2019 at 09:47 AM GMT.

Returns Report - BUYOUT AND GROWTH FUNDS BY VINTAGE YEAR AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

TVPI: Net to Limited Partners (LP)									DPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)	Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1,58	1,58	---	---	---	---	---	---	---	1,58	1,58	---	---	---	---	---	---	---
1,95	1,92	2,26	---	---	---	---	---	---	1,95	1,92	2,26	---	---	---	---	---	---
2,29	2,27	2,37	3,05	2,88	2,69	1,79	1,37	0,70	2,29	2,27	2,37	3,05	2,88	2,69	1,79	1,37	0,70
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1,93	1,94	1,86	---	---	2,03	---	---	---	1,93	1,94	1,86	---	---	2,03	---	---	---
2,77	2,76	---	---	---	2,67	---	---	---	2,77	2,76	---	---	---	2,67	---	---	---
3,25	3,26	2,46	4,07	2,97	2,27	1,75	1,11	1,11	3,25	3,26	2,46	4,07	2,97	2,27	1,75	1,11	1,11
2,64	2,63	2,09	---	---	1,27	---	---	---	2,64	2,63	2,09	---	---	1,27	---	---	---
1,92	1,93	---	3,20	2,05	1,67	1,55	0,73	0,84	1,92	1,93	---	3,20	2,05	1,67	1,55	0,73	0,84
1,75	1,73	1,73	2,66	2,14	1,79	1,04	0,67	0,72	1,67	1,65	1,70	2,66	2,14	1,79	1,04	0,67	0,70
1,91	1,90	1,88	3,50	1,95	1,56	1,27	1,05	1,11	1,90	1,89	1,87	3,49	1,94	1,56	1,27	1,05	1,07
1,65	1,69	1,58	2,69	1,87	1,68	1,13	0,65	0,68	1,65	1,69	1,57	2,69	1,87	1,66	1,13	0,65	0,68
1,78	1,80	1,75	2,54	2,22	1,73	1,21	0,91	0,65	1,77	1,79	1,73	2,54	2,22	1,68	1,21	0,90	0,67
2,05	2,04	2,04	2,93	2,47	1,98	1,47	1,11	0,77	2,04	2,03	2,01	2,92	2,43	1,98	1,47	0,86	0,79
1,96	1,95	1,85	2,17	2,02	1,88	1,75	1,37	0,31	1,83	1,83	1,80	2,15	2,00	1,82	1,69	1,37	0,30
1,87	1,87	1,77	2,92	2,47	1,50	1,31	0,82	0,81	1,77	1,78	1,69	2,85	2,36	1,50	1,08	0,75	0,83
1,65	1,66	---	2,30	2,02	1,58	1,40	0,90	0,51	1,60	1,61	---	2,28	1,88	1,49	1,34	0,76	0,53
1,49	1,50	---	2,12	1,65	1,46	1,11	0,53	1,29	1,31	1,32	---	1,84	1,57	1,28	0,91	0,20	1,33
1,49	1,49	1,48	2,21	1,80	1,58	1,16	0,66	0,51	1,15	1,15	1,09	1,85	1,43	1,07	0,86	0,10	0,56
1,56	1,55	---	2,27	1,86	1,55	0,95	0,63	0,58	1,16	1,16	---	2,11	1,52	1,02	0,47	0,07	0,69
1,77	1,76	1,43	2,04	1,74	1,51	1,21	0,45	0,51	1,04	1,04	0,79	1,46	1,14	0,83	0,44	0,15	0,46
1,65	1,66	1,73	2,42	1,79	1,61	1,52	1,21	0,52	0,98	0,99	0,93	1,94	1,21	0,76	0,47	0,14	0,79
1,62	1,62	1,62	1,89	1,72	1,63	1,53	1,35	0,20	0,51	0,51	0,59	1,13	0,73	0,51	0,32	0,25	0,35
1,58	1,63	1,64	2,64	1,73	1,47	1,30	1,04	0,61	0,38	0,41	0,55	1,79	0,52	0,41	0,17	0,03	0,63
1,30	1,28	1,19	1,69	1,40	1,19	0,91	0,79	0,32	0,18	0,17	0,17	0,67	0,20	0,04	0,00	0,00	0,31
1,24	1,22	---	1,64	1,35	1,17	1,12	0,91	0,25	0,04	0,04	---	0,37	0,15	0,06	0,00	0,00	0,16
1,18	1,15	1,13	1,48	1,22	1,13	0,93	0,86	0,25	0,03	0,05	0,08	0,35	0,01	0,00	0,00	0,00	0,24
1,04	0,92	0,87	1,14	1,02	0,98	0,93	0,07	0,35	0,06	0,08	0,03	0,15	0,00	0,00	0,00	0,00	0,13
0,91	0,89	---	1,01	0,96	0,92	0,85	0,52	0,22	0,00	0,00	---	0,00	0,00	0,00	0,00	0,00	0,00
1,63	**1,55**	**1,63**	**2,84**	**1,94**	**1,55**	**1,14**	**0,69**	**0,80**	**1,19**	**1,05**	**1,26**	**2,79**	**1,78**	**1,22**	**0,46**	**0,00**	**1,01**

Table 25

Returns Report - BUYOUT AND GROWTH FUNDS BY VINTAGE YEAR AS OF 31 DECEMBER 2016

Since Inception to 2016 Q4, EUR (million €)

RVPI: Net to Limited Partners (LP)								
Pooled Return (LP)	Capital Weighted (LP)	Average (LP)	Top 5% (LP)	Upper Quartile (LP)	Median (LP)	Lower Quartile (LP)	Bottom 5% (LP)	Standard Deviation (LP)
---	---	---	---	---	---	---	---	---
0,00	0,00	---	---	---	---	---	---	---
0,00	0,00	0,00	---	---	---	---	---	---
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
---	---	---	---	---	---	---	---	---
0,00	0,00	0,00	---	---	0,00	---	---	---
0,00	0,00	---	---	---	0,00	---	---	---
0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
0,00	0,00	0,00	---	---	0,00	---	---	---
0,00	0,00	---	0,00	0,00	0,00	0,00	0,00	0,00
0,08	0,08	0,02	0,22	0,00	0,00	0,00	0,00	0,08
0,01	0,01	0,01	0,03	0,00	0,00	0,00	0,00	0,05
0,00	0,00	0,01	0,03	0,00	0,00	0,00	0,00	0,01
0,01	0,01	0,02	0,12	0,01	0,00	0,00	0,00	0,05
0,01	0,01	0,03	0,11	0,03	0,01	0,00	0,00	0,07
0,13	0,12	0,05	0,24	0,00	0,00	0,00	0,00	0,13
0,09	0,09	0,08	0,34	0,12	0,02	0,00	0,00	0,12
0,06	0,06	---	0,54	0,08	0,05	0,03	0,00	0,18
0,18	0,18	---	0,59	0,23	0,13	0,04	0,00	0,22
0,34	0,34	0,39	1,04	0,52	0,33	0,13	0,00	0,34
0,40	0,38	---	0,97	0,67	0,41	0,17	0,00	0,39
0,73	0,73	0,64	1,11	0,78	0,68	0,49	0,12	0,30
0,67	0,68	0,80	1,25	1,02	0,80	0,69	0,21	0,36
1,11	1,12	1,04	1,38	1,34	1,08	0,74	0,62	0,33
1,21	1,23	1,09	1,75	1,49	1,02	0,86	0,45	0,49
1,12	1,11	1,02	1,38	1,16	1,02	0,87	0,66	0,23
1,19	1,18	---	1,39	1,25	1,11	1,03	0,88	0,18
1,15	1,10	1,04	1,44	1,20	1,12	0,91	0,64	0,34
0,98	0,84	0,84	1,05	1,01	0,96	0,88	0,07	0,33
0,91	0,89	---	1,01	0,96	0,92	0,85	0,52	0,22
0,44	**0,50**	**0,37**	**1,20**	**0,75**	**0,08**	**0,00**	**0,00**	**0,46**

10. **Appendix B: Private Equity Terminology**

Alternative investment: An asset not considered as a conventional investment (e.g. stocks, bonds, cash). Alternative investments include venture capital, private equity, hedge funds and real estate.

Asset allocation: The mix of investments in a portfolio. To balance risk and reward, asset allocation is determined by investment goals, risk tolerance and time.

Asset-based lending: Any form of lending to a business that is collateralized or secured by a balance sheet asset. Pledged assets can include inventory, equipment or the accounts receivable that will be transferred in the event of default by the debtor.

Asset deal: When the assets of a company are acquired instead of shares.

Benchmark: Comparing a funds returns to the performance of similar funds and/or a Public Market Equivalent.

Board of directors: A group that is selected to represent shareholders' interests with regard to company policies or significant company decisions. VC and PE investors will often have places as executives in the boards of their portfolio companies.

Book runner: The main entity responsible for the issuance of new equity, debt and other securities.

Buyout/Leveraged buyout: A buyout is the private equity transaction method that involves a target company being acquired in its entirety, or by a significant amount. A leveraged buyout involves the use of a mix of cash and debt to acquire equity.

Capital call: When a general partner is ready to make an investment, it will ask its limited partners for the capital they've already committed to the fund.

Capital overhang/Dry powder: The amount of capital available in a fund for investors to invest.

Carried interest: A general partner's share of the capital gains from a fund, usually 20%.

Chapter 11: The section of the US Bankruptcy Code that outlines the process for asset reorganization.

Co-investment: When a limited partner invests directly in a company alongside a general partner, instead of through a general partner.

Condition precedent: A condition for closing a negotiated agreement such as securing approval from regulators.

Convertible debt: Debt that can be converted to equity when certain conditions are met, like a specific valuation or date.

Corporate acquisition: When a corporation purchases another company for strategic purposes.

Corporate venture capital: When a corporation has a venture capital team that invests in early-stage companies that align with the corporation's goals.

Crowdfunding: The process of raising small amounts of capital from many people to fund a venture.

Data room: A secure, digital location where potential investors can review the confidential information of a target company. This includes for example financial statements, company intellectual property and client contracts.

Deal flow: The number of transactions that have closed during a given period.

Debt pushdown: When the acquisition debt is transferred to the operating company rather than the company that generates the operating cash flow, if such a distinction exists.

Disbursement: The capital investors give to companies.

Distressed investment: An investment made into a company experiencing liquidity, capitalization and/or underperformance issues.

Distributed to Paid-In (DPI): The value of all distributions divided by the amount limited partners have contributed to the fund.

Distribution: The capital limited partners receive from general partners after they exit an investment.

Due diligence: The vetting, analysing and assessing of individuals, companies and investors before engaging in a transaction.

Early stage: The period of venture capital investment between seed and late stage deals, when companies have a proven concept and little revenue.

EBITDA (earnings before interest, taxes, depreciation and amortization): A company's net profit plus interest, taxes, depreciation and amortization.

Enterprise value (EV): A company's value calculated as market capitalization, including all debt and equity interests, minus excess cash.

Exit: When an investor sells its equity in a portfolio company.

Family office: A firm that manages assets, investments and trusts for a wealthy family.

Final close: When a general partner stops fundraising.

Fund: An investment vehicle for limited partners, managed by general partners. Limited partners commit capital to funds, and general partners invest the capital into assets.

Fund-of-funds: A fund that invests in other funds. A fund-of-funds devotes all its time to evaluating fund managers, which usually leads to above-average returns. However, there are extra fees associated with investing in a fund-of-funds.

Fundraising: When general partners ask for capital commitments from limited partners.

General partner (GP): An entity that raises capital from limited partners for a fund and determines which assets the fund should invest in.

Growth equity investment: When an investor gives a mature company capital it can use to expand or restructure in exchange for equity (usually a minority stake).

Institutional investor: An entity that invests on the behalf of organizations, companies and/or individuals. Common examples are university endowments, insurance companies and pension funds.

Internal rate of return (IRR): The rate at which the net present value of all cash flows from an investment will equal zero. IRR is commonly used to measurement for fund performance.

Investment bank: A financial institution that serves as an agent or underwriter for security issuances. Some investment banks also act as brokers/dealers and provide advisory services for mergers, acquisitions, restructurings and other transactions.

Late stage: The final period of venture capital investment (usually after Series C), when companies have increased revenue and are near exit.

Legal continuity: The question of whether the target company's existing contracts should be retained after an acquisition. In asset deals, prior agreements typically cease and must be entered into again. Legal continuity rarely impacts share deals.

Leverage: The use of debt in an investment, including acquisitions and capital expenditures. With leverage, general partners can expedite improvements to portfolio companies and amplify returns.

Limited partner (LP): An entity that commits capital to a general partner's fund.

Limited partnership: The relationship between a general partner and its limited partners.

Management buyout (MBO): A buyout a company's management team leads or participates in.

Management fee: The amount general partners charge limited partners to operate a fund. The fee normally is between 0.5% – 3% of the called capital amount.

Mezzanine investment: A financing round between senior and subordinated loans that typically includes equity-based options in the form of warrants.

Middle-market Company: A company with an enterprise value between $25 million and $1 billion.

Multiple arbitrage: The investment gains achieved by the increase in the sales multiple relative to the original investment multiple.

Normalized working capital: An analysis of a target company that accounts for all one-off or the non-recurring items to determine how working capital normally operates.

Paid-in capital: The amount of committed capital that has been transferred from the limited partner to the general partner.

Portfolio Company: A company that has received an investment from a venture capital or private equity firm.

Private equity: Capital that is not registered on a public stock exchange. Private equity involves investors giving private companies capital in exchange for equity.

Public market equivalent: An analysis that compares a private fund's performance to a public benchmark or index.

Residual value to paid in (RVPI): The value of all remaining investments in a fund relative to the amount limited partners have contributed the fund.

Secondary market: When one limited partner sells its alternative investments to another limited partner. Limited partners do this for a variety of reasons, including to adjust their asset allocation.

Senior debt: The debt that takes priority over other securities in the event of liquidation.

Series A to D+: The identification of venture rounds after seed.

Sovereign wealth fund: A state-owned investment fund designed to protect and/or grow a range of financial assets, including stocks, bonds and natural resources.

Strategic acquisition: When a corporation acquires a company for its technology, products or services.

Subordinated debt: Loans that have a lower priority than senior debt in the event of liquidation.

Target company: The entity purchased by an acquirer.

Target working capital: An amount recorded during negotiations to reflect a historical analysis of the working capital requirements of a target company. It reflects closing accounts as well as an increased or decreased price if a target company has more or less working capital than the target capital on the date of the closing accounts.

Total value to paid in (TVPI): The value of all remaining investments in a fund plus the value of all distributions relative to the amount limited partners have contributed to the fund.

Underwriting: When investment banks issue debt and equity securities on behalf of corporations and governments to generate investment capital.

Unicorn: A venture capital-backed company with a valuation of $1 billion (or more).

Venture capital: A type of private equity investing that focuses on start-ups and early-stage companies with long-term, high-growth potential.

Vintage year: When a fund closes and starts investing.

Warrant: A security that gives the holder the option to purchase a company's stock at a predetermined price for a specified period.

Working capital: The customers, suppliers, inventories and other assets and liabilities required for day-to-day operations of a target company.

11. **Bibliography**

1. Axelson, Jenkinson, Strömberg and Weisbach (2013), "Borrow Cheap, Buy High? The Determinants of Leverage and Pricing in Buyouts", *The Journal of Finance, Vol 68, No. 6*
2. Acharya, Gottshalg, Hahn, & Kahoe (2009), "Corporate Governance and Value Creation: Evidence from Private Equity"
3. Chung, Sensoy, Stern and Weisbach (2012), "Pay for Performance from Future Fund Flows: The Case of Private Equity", *The review of Financial Studies, Vol. 25, No. 11, pp. 3259-3304*
4. Cohn, Mills, and Towery (2013), "The evolution of capital structure and operating performance after leveraged buyouts: Evidence from U.S. corporate tax returns" *McCombs School of Business, University of Texas, Austin, USA*
5. Cumming and Walz (2010), "Private Equity returns and disclosures around the world", *Journal of International Business Studies, Vol. 41. No. 4*
6. Fang, Ivashina and Lerner (2013), "Combining Banking with Private Equity Investing", *The Review of Financial Studies, Vol. 26, No. 9*
7. Fenn, Liang and Prowse (1995), "The Economics of the Private Equity Market", *Federal Reserve Bulletin, 57 – 66*
8. Franzoni, Nowak and Phalippou (2012), "Private Equity Performance and Liquidity Risk", *The Journal of Finance, Vol. 67, No. 6*
9. Kaplan and Strömberg (2009), "Leveraged Buyouts and Private Equity", *The Journal of Economic Perspectives, Vol. 23. No. 1*
10. Kaplan, Sensoy, and Strömberg (2009), "Should investors bet on the jockey or the horse? Evidence from the evolution of firms from early business plans to public companies.", *Journal of Finance 64, 75–115*

11. Kaplan and Schoar (2005), “Private Equity Performance: Returns, Persistence and Capital Flows”, *MIT Sloan School of Management, Working Paper 4446-03*
12. Kaplan (1989) “The effects of management buyouts on operating and value” *Journal of Financial Economics 24, 217–254*
13. Kaplan (1997), “The evolution of US corporate governance: we are all Henry Kravis now”, *Journal of Private Equity 1, 7–14*
14. L’Her, Stoyanova, Shaw, Scott, and Lai (2016) “A Bottom-Up Approach to the Risk-Adjusted Performance of the Buyout Fund Market” *Financial Analysts Journal, Vol. 72, No. 4, pp. 36 – 48*
15. Phalippou and Gottschalg (2009), “The Performance of Private Equity Funds”, *The Review of Financial Studies, Vol. 22, No. 4, pp. 1747 – 1776*
16. Robinson and Sensoy (2013) “Do private equity fund managers earn their fees? Compensation, ownership, and cash flow performance”, *Review of Financial Studies 26, 2760–2797*
17. Sorensen and Jagannathan (2013), “The Public Market Equivalent and Private Equity Performance”, *Netspar – Network for Studies on Pensions, Aging and Retirement, Discussion Papers*