The Returns of Private Equity: Skills or Pure Luck?

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ABSTRACT

Purpose. The main interest of this thesis lies in investigating if, and in that case to what extent, the fund manager's skills affect return of private equity funds.

Methodology. A regression analysis based on performance data of private and public equity is undertaken and used to determine the value added through skills provided by fund managers.

Findings. The results indicate that skills do in fact affect returns in private equity with up to 10% annually. In addition, the results show that venture capital funds are more closely linked to the performance of the stock market, whereas buyout funds are more affected by the manager's skills.

Implications. An important practical implication arising from this study is the suggestion that practitioners take skills into account when evaluating the return prospects of various funds. By doing so, investors can more easily distinguish between winning and losing funds.

Contribution. This study contributes to a greater understanding of what drives returns, but also tries to fill the knowledge gap on how skills play a driving role.

ARTICLE INFORMATION

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1 Introduction

The recent turmoil in the macroeconomic environment has required large rescue operations in many countries in order to save banks and insurance companies from bankruptcy. To jumpstart stalling economies central banks have employed quantitative easing programmes, and along with it comes declining interest rates that are now approaching zero (and even negative in some countries). These macroeconomic forces urge investors to carefully evaluate different alternatives across a range of asset classes before investing. For those looking for a high return private equity investments appear to be an attractive alternative with fund managers promising returns of 10-20% p.a. through investments with active ownership in non-public companies. The magnitude of the potential returns has resulted in a steady annual growth of the private equity industry of 10-11% and a total value of private equity and venture capital assets under management amounting to $3.8 trillion spread across 2,235 funds according to the data provider Preqin's annual report (2015). Private equity investing has also flourished in media, where deals such as the $2.4 billion fundraise for the taxi-service Uber has caught investors' attention. The amounts of capital involved in private equity deals are great in themselves, yet as the majority of the investments are highly levered the economic impact is even greater than the invested capital suggests (Phalippou and Zollo, 2005a).

Despite being a major group of financial assets, with exceptional returns as one of the key characteristics, there are significant challenges in measuring fund performance. The capital asset pricing model (CAPM) that often is used to describe the relationship between risk and expected return of publicly traded assets relies on a number of assumptions which do not hold for privately traded assets, and therefore alternative performance measures, such as internal rate of return (IRR) and multiple of invested capital (MOIC) have emerged (Ang and Sorenson, 2013). Both these measures are absolute measures of performance, and therefore many researchers argue that they do not reflect the *true* performance. Instead they argue that in order to fully capture the *true* performance of private equity, one must look at the performance relative to that of the public equity. The discrepancy in performance measures makes it difficult to compare returns in both markets to one another, and consequently, researchers have failed to reach consensus regarding the *true* performance of private equity. Some academics argue that it has outperformed public markets by 3% per year on average over the life time of the fund (Harris, Jenkinson, and Kaplan, 2014), whereas others argue that

private equity performance is very close to that of the public market (Phalippou, 2011; Gottschalg and Phalippou, 2007).

Before deciding whether to invest in private equity or not, it is important that an investor understands what this lack of consensus means to them and how they, if choosing to invest, can select the right fund that will maximise returns. To answer this question we must return to an underlying assumption of many economic models (including CAPM) – market efficiency. In private equity, where there are no requirements to publicly report deals transactions, there are often significant information asymmetry, hence the private equity market cannot be considered efficient. In fact, for most fund managers the ability to acquire non-public information lays the foundation for the fund's competitive advantage. Consequently, a fund manager's skills come to play a significant role in the acquisition and interpretation of information, and thereby also affect the fund's performance (Anson, 2007). Several researchers report evidence for persistence – fund managers with previous experience perform better than their more inexperienced peers (Kaplan and Schoar, 2005; Phalippou and Gottschalg, 2009; Hochberg, Ljungqvist, and Vissing-Jorgensen, 2010). With the increasing number of funds, and the different investment alternatives thereof, previous research suggests that investors may want to take the fund manager's specific skills and experience into account to better differentiate between the attractiveness of various funds.

The main interest of this thesis therein lies in investigating if, and in that case to what extent, the fund manager's skills affect return. To do so, a regression analysis based on performance data of private and public equity is undertaken and used to determine the value added through skills that fund managers provide. Private equity data is accessed from Private Equity Intelligence Ltd. (Preqin) comprising 20 years of performance data of approximately 6900 funds located across the world. The results indicate that skills do in fact affect returns in private equity with up to 10% annually. In addition, the results show that venture capital funds are more closely linked to the performance of the stock market, whereas buyout funds are more affected by the manager's skills.

The remainder of this thesis discusses the theoretical underpinnings of private equity investments and their respective performance, the research methodology employed to conduct the study, followed by an analysis of the results of the empirical data collection. The limitations and implications of the research are then presented. Finally, the study ends by

providing recommendations for private equity investors, as well as researchers, and closes with some final conclusions.

2 Theoretical Framework

2.1 Private Equity – What Do We Know?

Private equity has been around as an investment alternative for a long time, but has grown remarkably since the 1970s when more favourable tax and regulatory changes were introduced (Fenn et al., 1995). The industry has a limited partnership structure, meaning that institutional investors serve as limited partners (LPs) and private equity managers as general partners (GPs). The general partner has broad discretion to invest on behalf of the limited partner, and also to determine the values of the investments. Limited partnerships have been found to be the most efficient way to organise private equity investments, as they help tackle the "extreme information asymmetry and potential incentive problems that arise in the market" (Fenn et al., 1995).

Because they take an active role in developing the portfolio company, the general partner often only manages a few individual investments at the same time (Jones and Rhodes-Kropf, 2004). A small portfolio reduces the diversification possibilities, and therefore firms tend to develop specific investment strategies that allow them to specialise on certain types of investments. By doing so they can better manage and control the risks involved, as they gain a deeper understanding of the area in which they invest. The two most common strategies are buyouts and venture capital, but there are many more. However, as these two strategies represent the majority of private equity deals (Preqin, 2015), as well as data being more readily available for them, this study will only be concerned with them. Most previous research on private equity uses the same rationale, and therefore it seems acceptable to do so even here (e.g. Anson, 2007; Phalippou and Zollo, 2005). Appendix I provides an excerpt from the data provider's glossary, with definitions of the two types as well as the sub-categories within them.

Once selected which investment strategy to follow, the next choice for the limited partner is which of the funds within that category to invest its capital into. There are often hundreds of different alternatives, and investors evaluate and compare fund in the hope of selecting the

one which will maximise returns. Investors look at different factors that are thought to drive returns, yet there is no established industry standard what to look for. Private equity professionals often claim that it is their active role and therein direct influence on business strategies that drive the high returns in the industry (Wilmes, 2007). There are also several academics that have sought to empirically determine such drivers of private equity returns, yet few have managed to develop a model with high explanatory power. Phalippou and Zollo (2005) regressed returns against bond yield, return on public stock market, length of investment, size of the fund and experience of the fund family. The results indicated that these variables explain 11% of the variation in fund performance, with experience of the fund family as the most important driver. In a similar study, Wilmes (2007) regressed returns against vintage year, size of investment, return on the stock market, geographical location, and fund type. The author found that only 2.7% of the variation in returns could be explained by those variables.

This study hopes to contribute to this gap of knowledge on performance drivers, but to do so we must first understand how return is measured in both private and public equity, and how the performance of the two markets are related.

2.2 Measuring Private and Public Equity Performance

2.2.1 Private Equity Performance

There is no industry established rule on how general partners should value and price their portfolios. The private nature causes the securities to be illiquid and often requires intensive research to determine if they are priced fairly. As such the prices often do not reflect all available public information. As already introduced in the former chapter, the lack of market efficiency is both a challenge for managers, but also adds to their competitive advantage (Anson, 2007). Despite the challenges, there are a few measures that are commonly used in industry.

Internal rate of return (IRR) is the most common performance measure used by practitioners and is based on cash flow data of the fund. IRR is the discount rate that makes the present value of all cash flows equal to zero (Ellis, Pattni, and Tailor, 2012). IRR is an absolute measure, and does not reflect the performance of the fund compared to other asset classes. Therefore, some argue that IRR does not reflect the *true* performance and that we need a better measure that is relative to other asset classes, such as public equity.

The measure also relies on a number of assumptions that are not always true. For instance, IRR implicitly assumes that any cash proceeds have been reinvested at IRR over the entire investment period, and this is not always realistic (Gottschalg and Phalippou, 2007). For this reason, Long and Nickels (1996) devised a measure called Public Market Equivalent (PME). The PME expresses the ratio of "terminal wealth obtained when investing in a private equity fund and reinvesting intermediate cash flows in a given public market benchmark compared to the terminal wealth obtained when investing the same amount of money in the benchmark." (Diller and Kaserer, 2004). However, some of the issues from IRR remain, such as the problem with calculating the values of non-liquidated funds (Wilmes, 2007). Furthermore, IRR is relatively easy to manipulate as higher cash flows early in the investment life cycle tend to boost IRR, but an equal loss later on will have much smaller negative effect (Singh, n.d.). Such limitations have caused a debate in literature whether IRR really is the best measure fore private equity performance, despite the improvements offered by the PME scholars are searching for a new, more holistic measure. The validity of performance measures is a whole separate research topic and, as IRR is still the most commonly reported performance indicator used in practice, performance will be measured using IRR in this study. This leaves potential for improvements once a better measurement has been developed and validated.

2.2.2 Market Indices

When comparing the returns of private equity to the public market, the most common method is by using market indices (Anson, 2007; Coggin, Fabozzi, and Rahman, 1993). There are a number of different indices that exhibit different characteristics (e.g. S&P 500, Nasdaq and Russell 2000). Depending on the fund certain market indices may be more appropriate to use as benchmarks. Previous literature has tended to use S&P 500 or Russell 1000 when benchmarking buyout funds because of their larger capitalisation, whereas small-cap indices such as Russell 2000 are used for Venture Capital (Anson, 2007; Coggin, Fabozzi, and Rahman, 1993; Ellis, Pattni, and Tailor, 2012). However, these studies do not test if these selections are appropriate for their data, meaning that there is no clear evidence in literature that this is the preferred way. Furthermore, Gottschalg, Talmor, and Vasvari (2010) suggests that it may be more appropriate to construct a specific and more representative index based on the industry mixes of the public market rather than using a published index as a whole. For simplicity, however, I use four published indices to represent the public market return. I then seek to test whether there is any preferred index for each type of fund, as well as for the

categories within them. Hence, in this aspect this study will contribute to closing this knowledge gap in literature and encourage future researchers to make more informed decisions regarding which index appropriate for different types of funds.

2.2.3 The Private-Public Equity Return Relationship

Many investors invest heavily in private equity for portfolio diversification purposes, believing that private equity returns are not correlated to the public market. Studies report evidence of large institutional investors believing that private equity funds can "generate incremental returns independent of how the broader markets were performing" (Lerner, Hardymon, and Leamon, 2004). Yet researchers have found that the performance of private equity fund are in fact strongly correlated to the public market in a pro-cyclical manner, positively co-varying with both business cycles and the stock markets (Phalippou and Zollo, 2005b; Robinson and Sensoy, 2011; Sommer, 2012). The current performance measures of private equity are often sufficient for comparing assets within private equity, yet the difficulties in marking private equity portfolios make it inherently difficult to compare the returns to those of other asset classes. Consequently, the results from previous studies of the relationship between private and public equity are somewhat ambiguous and researchers have failed to reach a clear consensus regarding whether the private equity market outperform the public market or not. However, from the observations made during the research for this study, it seems as if the majority of researchers argue for an outperformance of private equity compared to public equity (Harris et al., 2013; Kaplan and Schoar, 2005; Ellis, Pattni, and Tailor, 2012; Ang and Sorenson, 2013). With literature supporting no apparent driver for this outperformance, the question that arises is whether it may be the skills of the general partner and its team or if it is it simply down to luck?

2.3 Skills or Pure Luck?

The specific characteristics of the private equity market suggests that the skills of the fund manager and its team could have more significant effect on fund performance than is the case for investments in public equity. In fact, there is no clear evidence in literature that mutual fund performance may be driven by the manager's skills (Kaserer and Diller, 2007) and therefore an investor's investment strategy should not depend on the track record of the team itself. For reasons introduced in the former chapter of this thesis, knowledge and information about investment opportunities is considered as competitive advantage for fund managers in private equity (Anson, 2007). Therefore, we would expect the fund manager's skills to

acquire and behold such information as much more important in private equity than in public funds.

If true that manager skills do affect fund returns and that skills are unequally distributed, there is a systematic difference in knowledge and information about investment opportunities amongst private equity managers. Inherently we would expect the good private equity deals to be concentrated to a smaller number of skilled fund managers. If so is the case, private equity returns should have much more skewed distribution than those of the public equity market and Kaserer and Diller (2007) do in fact show evidence of such a skewness. Following the suggestion that skills are unequally distributed amongst managers, the authors also argue that this distribution may not be independent over time, and that we therefore may find correlations between the returns of subsequent funds run by the same manager. In literature this phenomenon is referred to as *persistence,* and is supported by many scholars (e.g. Ljungqvist and Richardson, 2003; Kaplan and Schoar, 2005; Gottschalg et al., 2004). In their study Kaserer and Diller (2007) classified funds as winners or losers, and using the contingency table methodology they found that the majority of funds remain within their categorical status throughout the lifetime of the fund. Their results show that only 18% of follow-on funds is a winner if the preceding fund was a loser, when managed by the same GP.

Based on the argument that skills may have a significant effect on fund return, persistence give rise to a practical implication that is valuable for investors when deciding on their strategy: "never change a winning team" (Kaserer and Diller, 2007) Consequently, it would make good sense to consider the track record of skills and experience of the fund manager when selecting which fund to invest in. For this reason, there is often high demand for successful fund managers and they are therefore often granted the luxury of choosing its investors themselves. In order for investors to get around this issue, Kaserer and Diller suggest to identify successful managers and their teams at the start of their GP career and thereafter stick to that winning team. However, the authors do not suggest how this identification or selection is to be made, but rather seek to pinpoint the importance of the relationship between manager skills and fund return.

Certain previous studies have included skill, or more correctly, experience in their analyses of performance drivers in private equity and found that it has had a significant effect on return, yet sometimes a marginal one (Phalippou and Zollo, 2005; Gompers and Lerner, 1999; Kaplan and Schoar, 2005). The studies have used a number of different measures of

experience – number of years in the industry, number of funds managed etc. – but I argue that the number of years or the number of funds run does not necessarily translate into skills and therefore they fail to capture the true skill of the general partner in their studies. Skills is a very subjective concept and can be expressed in different ways, and thereby including it in a regression analysis as a number is a very simplified truth.

There are some researchers that have tried to overcome this issue, and suggest that the skills added by the private equity fund manager is the excess return received when compared to the public market (Anson, 2007; Coggin, Fabozzi, and Rahman, 1993; Jensen, 1968; Jensen, 1969). This inherently means that there are no other factors, e.g. industry, size and location, that drive returns, but only the general partner's skills. In fact, the same (or at least very similar) industry, size and location can be targeted when investing in public equity, so it should not drive returns on the market. However, the time, expertise and commitment of the fund manager is not something that investors obtain when investing in the public stock market and, as such, this may give rise to a difference in returns. Hence, by assuming that the variation in skills provided by the general partner is the principal difference between the two equity markets' returns, there is no need to quantify skills as the number of years or similar. Instead, this measure captures aspects of skills that otherwise are very difficult to quantify, such as ability to select the appropriate portfolio and timings of investments.

3 Research Methodology and Data

This chapter seeks to justify the use of methods for data sampling, analysis and interpretation. The chapter commences by outlining the research design that underpins this study after which the data set is accounted for, including the choice of data provider. The methodology further encompasses the selected methodology for data analysis.

3.1 Research Design

To address the question "to what extent does a fund manager's skill affect private equity performance?" one has to decide between two alternative research approaches. First, through case studies, surveys and interviews with private equity firms and their limited partners one could investigate the drivers of fund performance, and the role played by skills and experience, in a qualitative research design. Second, using a quantitative research design, fund performance could be studied through time-series analysis of performance data. According to Punch (2005, p. 235), qualitative research is more favourable for theory generation in areas of research which are relatively immature, whereas quantitative research is favourable for research in areas in which initial hypotheses are awaiting validation. Although private equity as a research field is relatively young, initial hypotheses have been formulated regarding the effects of the manager's skills on fund performance and therefore a quantitative approach is taken in this study. Another argument for choosing a quantitative approach is that asking fund managers to report their own skills may result in significant deviations from their true skills, as some managers may understate and others overstate their abilities.

Furthermore, inherent in any research design is a trade-off between internal and external validity of the study (Sekaran and Bougie, 2010, p. 149). Internal validity reflects on the causality of the study's conclusions, i.e. in which direction the effects of performance characteristics are moving, whereas external validity is concerned with the extent to which the results of a study can be generalised (Gibbert, Rugirok, and Wicki, 2008). At the expense of internal validity, I favour external validity in this study by studying a large set of cross-sectional fund performance data. Regression analysis is an appropriate tool to investigate the correlation between two or more variables (Hair, Black, Babin, and Andersson, 2009), yet by using cross-sectional data the regression model alone cannot explain the cause-effect relationship (Gujarati and Porter, 2009, p. 22). However, the fact that other researchers have

found evidence of persistence, suggesting that it is the skills that affect performance and not the other way around, reduces these limitations. In fact, the objective of this research is not to quantify the effects of fund managers' skills on performance *over time*, but rather to investigate the relationship at a set point in time. Hence, a cross-sectional study is justified (Bryman and Bell, 2011).

3.2 Data

The data used in this study is a compilation of data from several independent sources. On the one hand, a commercial database for private equity data has been used. On the other hand, public databases comprising of stock market performance was consulted.

3.2.1 Private Equity Data

Data availability is one of the largest challenges in private equity research, and it arises for two main reasons: the lack of legal obligation to disclose information regarding private equity deals (McCahery and Vermeulen, 2010) and the deal confidentiality kept by the funds' general and limited partners. As previously discussed, this data limitation causes several challenges when measuring private equity performance. Nonetheless, there are standard industry practices for performance reporting, and this research draws upon these pre-defined performance measures to map the relationship between skills and private equity performance. There are also discrepancies in data availability between different geographical regions, largely due to differences in maturity of the private equity industry across the world. Private equity as an industry has enjoyed significant growth globally since the 1970s, yet the United States have historically served as headquarters for the majority of funds. Nevertheless, as the industry has progressed over recent years, databases have come to incorporate European funds to a larger extent, reducing the implications of this issue (Strömberg, 2009, p. 2).

The set of private equity data on which this study is based is provided by Private Equity Intelligence Ltd. (Preqin). Preqin is one of the largest private equity data providers globally, and is used by industry professionals. The database was accessed July 31 2015, serving as the reference date for this study, at which point in time it contained information about 6923 funds. However, this study only looks at buyout and venture capital funds, funds with other strategies were neglected. This resulted in a dataset of 2896 funds, with vintage year 1980 or later and ranging between $100 million and $6 billion in managed assets. The performance characteristics of the dataset is an average fund reporting an annual return (IRR) of 14.0%

(median of 12.7%). The best performing fund reported a return of 65.0%, in comparison to the worst performing fund at -18.7%. However, there were instances of incomplete data for a number of funds and therefore 204 funds were excluded from the study. The final data set comprised of 2692 funds with vintage years from 1992 to date. The performance characteristics increased slightly from the initial data set, with average return being 15.2% (median of 13.6%) and best and worst observations remaining unchanged. As seen in Figure 1, the data set shows that returns are slightly skewed (1.34), and also characterised by a kurtosis of 3.17. The skewness of four public return indices ranges between -.95 to.27, indicating that our data supports Kaserer and Diller's (2007) suggestion that private equity returns are more skewed than public ones due to the higher importance of the manager's skills.
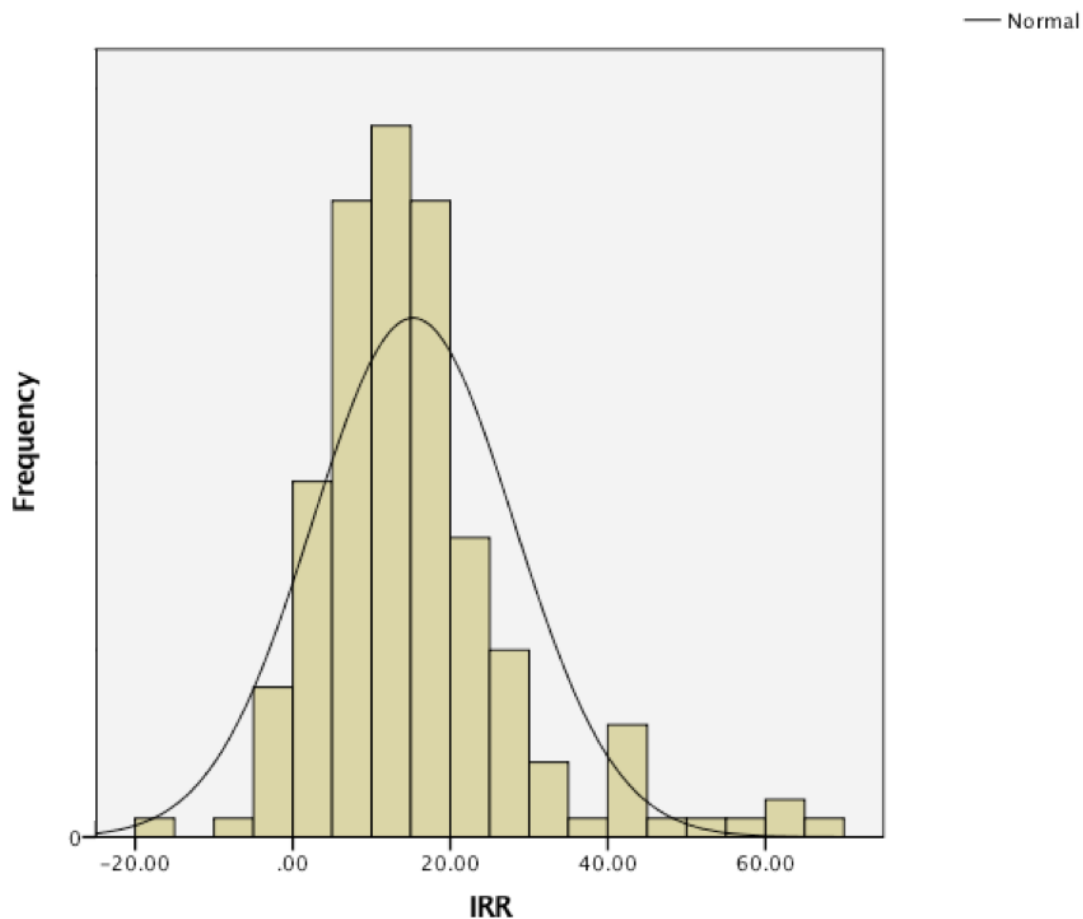

Figure 1: Return Distribution of Private Equity Funds

The database contained a range of different data, but the information withdrawn for the purpose of this study was: vintage year, fund size, strategy, and net IRR. Table 1 shows the distribution of number of funds and the respective return for each strategy, based on the final dataset employed in this study. Venture Capital is split into three sub-categories depending on when in the company's life-cycle the investments are made. Buyout is categorised according to the size of the investment. For further definitions of each fund type and their sub-categories, please refer to Appendix I.

Table 1: Distribution of Data Across Investment Strategies

Strategy	Number of funds	Average weighted return (p.a.)
Buyout	**1187**	**16.2%**
Small	*573*	*17.5%*
Medium	*360*	*16.6%*
Large	*180*	*16.7%*
Mega	*74*	*9.2%*
Venture Capital	**1605**	**13.62%**
Early Stage	*326*	*13.1%*
Growth	*68*	*13.1%*
Late Stage	*1211*	*14.0%*
Total	**2692**	**15.2%**

A problem in private equity research is the risk for selection bias that, in turn, arises due to survivorship bias – the better performing funds are more likely to be reported than the poor performing ones. This is an inherent risk when using the database, but Preqin assures that they gather their data from several different sources and thereby reduce this possibility. However, the private nature of the database does not allow for scrutiny of this claim and therefore this risk is inherent in the study.

3.2.2 Public Equity Data

A challenge in measuring true private equity performance is determining the appropriate benchmark against which private equity performance is to be compared. Different investment strategies link the returns more closely to certain sectors of the the public market. For instance, the returns to venture capital exhibit a close link to the OTC stock market and therefore it may be more appropriate to benchmark it against the Nasdaq index (Anson, 2007).

On the other hand, leveraged buyouts involve private established companies that often suffer from inefficiencies in one form or the other. These companies are relatively mature, and as such a stock market index with larger capitalisation may be more appropriate as benchmark.

To account for the difference in investment strategies between buyouts and venture capital, along with their respective sub-strategies, four stock market indices are used as benchmarks in this study. These are:

- *S&P 500:* Tracks the performance of the 500 largest U.S. players on the stock market. It is a broad equity market index with larger capitalised stocks.
- *Nasdaq:* Tracks the performance of the roughly 3000 companies traded on the Nasdaq exchange. Most companies are very innovative and within the tech-sector, making it an appropriate public benchmark for Venture Capital performance.
- *Russell 2000:* Tracks the performance of the 2000 smallest companies on the stock market. Appropriate for smaller capitalised stocks.
- *Russell 1000:* Tracks the performance of the 1000 largest companies on the stock market. It is a broad equity market index with larger capitalised stocks.

The annual historical index data from 1992 to date was obtained via each index provider.

3.3 Data Analysis

To determine the effect of skills on private equity return, a simple one period, one factor regression model was employed. This data analysis draws upon a model suggested by Anson (2007), which seeks to capture the *true* return added by a manager's skills. Anson argues that the only way to capture the true skill that is actually reflected in the returns of the investment is by "regressing the returns of the private equity investment on the concurrent returns of a broad-market index". In his model, the market index serves as a proxy for market risk, and the output of the regression then ultimately reveals to what extent the return is due to market exposure and what is contributed by the manager's skills. The regression takes the form of:

$$R_{i,t}(PE) = \propto + \beta R_{m,t} + \epsilon_{i,t} \qquad (1)$$

which can easily be rearranged to produce a new equation:

$$R_{i,t}(PE) - \beta R_{m,t} = \propto + \epsilon_{i,t} \qquad (2)$$

where

$R_{i,t}(PE)$ represents the annual return, net of fees, to private equity investments at time t.

$R_{m,t}$ represents the annual return on a broad-based market index at time t.

β is a measure of the systematic exposure of PE returns to the market index.

$\propto$ is the excess return earned by private equity manager; the manager's skills.

$\epsilon_{i,t}$ is the residual term, measuring variation in returns that are not explained by the data.

Now, Anson (2007) argues that in order to demonstrate an active skill, α, the manager must earn a risk-adjusted return in excess of the risk-free return he or she would obtain by investing in government bonds. The underlying reason for this is that if the manager is unable to find an attractive investment, he or she should at least invest the capital in a safe, short-term asset, such as the U.S. Treasury bills. We therefore adjust Equation (2) to take into account this risk-free return and receive at the final model used to analyse the data, together with the explanation of the variables:

$$[R_{i,t}(PE) - Tbill] - \beta[R_{m,t} - Tbill] = \propto + \epsilon_{i,t} \qquad (3)$$

where

$[R_{i,t}(PE) - Tbill]$ represents the annual risk-adjusted return, net of fees, earned by private equity at time t.

$[R_{m,t} - Tbill]$ represents the annual risk-adjusted return on the market at time t.

$\propto$ is the risk-adjusted excess return earned by private equity manager; the manager's skills.

$\epsilon_{i,t}$ is the residual effects that are not explained by the data.

In the regression analysis, return to the private equity fund is the dependent variable, and the return to the market index is the independent variable. The β-coefficient reveals the how sensitive the private equity investment is to movements in the broader stock market: if $\beta>1$ the private equity portfolio is more sensitive to movements in the stock market than a diversified stock basket, if $\beta<1$ the portfolio is less sensitive to movements in the overall stock market. The regression contains one intercept, α, and one residual term, ε. Whether the intercept of the regression should be considered as the fund manager's skill, or if it should be considered as other factors affecting returns, is determined by its significance. If the term is

statistically significant, the it indicates that it has a consistent economic effect, the manager's skills α, whereas if it is not, it represents random noise.

To determine which market index is most appropriate for each private equity type – buyout and venture capital, including their sub-categories – the regression is run for each type and category. The result is therefore nine different regression outputs. Statistical Package for the Social Sciences (SPSS) was used to analyse the 2692 observations.

4 Results and Analysis

This section presents the results and analyses of using Equation (3) as the regression model.

4.1 Leveraged Buyouts

Table 2 presents the regression results for the complete sample of buyout funds, with the different sub-category in each of the panels. Panel A shows the results for all buyout funds. The annual returns to buyouts were regressed against the annual returns to S&P 500, Nasdaq, Russell 1000, and Russell 2000 over the period 1992-2012. In all cases the β-coefficient is statistically significant at the 1% level, and so is the α-intercept. Hence the data shows evidence that venture capitalists add value beyond that of the public market return. For instance, the α-value of 8.96 for the Russell 2000 regression implies that, on average, the returns to venture capital generated a risk-adjusted return in excess of a Treasury bill of 8.96% per year. This means that the manager's skills account for almost 9% of the IRR, which is a considerable amount. The significant β-coefficients also demonstrate that the returns to buyouts are dependent on the performance of the stock market. This is could be expected, as a strong stock market generally indicates favourable conditions for a public offering. We should note that the regressions generated relatively low R-square measures[2], ranging from 13% to 27%. This implies that, for instance for the Nasdaq, 27% of the variation in IRR is explained by the market index. The R-squared also indicates which market index that is most appropriate for benchmarking the data, and the results indicate that, in general, Russell 2000 is the most appropriate for benchmarking against buyouts.

Panel B-E in Table 2 reports the results from the regressions of each sub-category within buyouts. Interestingly, the α-intercept is statistically significant at the 1% level for small, medium and large buyout funds, suggesting that the manager's skills do affect the return of the fund. It does not appear to have a significant effect on the mega-sized funds, however, and one explanation for this is that the companies are too big for the manager to have an impact. This explanation is supported by the data, as the manager's skills have greatest effects on small buyout funds, where it reaches up to 10.33% for the Russell 1000 index. The β-coefficients for small and medium funds are all significant, some at the 5%-level but the

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[2] Harrel (2001) suggests that R-squared should range between .4-.6 for the model to have an acceptable fit.

majority at the 1% level. This indicates that the returns to buyout funds of these sizes are dependent on the performance of the stock market. Yet, large and mega-sized funds show no significant dependency on the stock market (with the exception of Russell 2000), perhaps because they are large enough to affect the market themselves.

Table 2: Regression Results for Buyout Funds

Panel	Market Index	α	β	R^2
A: All	S&P 500	8.73**	.23**	.15
	Nasdaq	8.54**	.14**	.13
	Russell 1000	8.58**	.23**	.17
	Russell 2000	8.96**	.31**	.27
B: Small	S&P 500	10.18**	.24**	.17
	Nasdaq	10.02**	.15**	.16
	Russell 1000	10.33**	.25**	.18
	Russell 2000	10.10**	.29**	.27
C: Medium	S&P 500	9.60**	.28*	.17
	Nasdaq	9.44**	.15*	.14
	Russell 1000	8.56**	.27**	.22
	Russell 2000	9.56**	.34**	.27
D: Large	S&P 500	8.45**	.17	.09
	Nasdaq	8.36**	.10	.06
	Russell 1000	8.59**	.19	.11
	Russell 2000	9.07**	.29*	.23
E: Mega	S&P 500	.92	.12	.16
	Nasdaq	.66	.08	.20
	Russell 1000	.38	.11	.17
	Russell 2000	2.09	.21*	.47

Notes: The table reports β (unstandardized coefficients), R^2, and significance levels *p<.05, and **p<.01.

In general, we observe smaller α as the size of the buyout increases. This indicates that smaller funds are more guided by manager skills than by market performance. We can also make an interesting observation that Russell 2000 generates the largest R-square, regardless of size. This goes against what previous literature argues, that smaller funds should be benchmarked against small-cap indices like Russell 2000 and larger funds should be

benchmarked against large-cap indices like S&P 500. However, it is worth taking into account that the data contains many more observations of small funds than of large funds and that this could potentially give rise to this issue. If there would be similar number of observations for each fund size, this might be adjusted for.

4.2 Venture Capital

Table 3 presents the regression results for the complete sample of venture capital funds, with the different sub-category represented in Panels A-D. Panel A represents the results for the complete sample of venture capital funds. The annual returns to venture capital were regressed in the same manner as for the buyout funds. In all cases the β-coefficient is statistically significant at the 1% level, and so is the α-intercept. Hence the data shows evidence that venture capitalists add value beyond that of the public market return. The significant β-coefficients also demonstrate that the returns to venture capital are dependent on the performance of the stock market. This could be expected, as a strong stock market generally indicates a healthy IPO market, which in turn translates into good returns for the venture capitalists. We should note that the regressions generated relatively low R-square measures, ranging from 21% to 32%. This implies that, for instance for the S&P 500, 32% of the variation in IRR is explained by the market index. The R-squared also indicate that, in general, the S&P 500 and Russell 1000 are the most appropriate for benchmarking venture capital funds.

Comparing venture capital to buyout funds, we observe that the β-coefficients in Table 7 are higher than those for buyouts in Table 2. This indicates that venture capital funds are more sensitive to the returns to the stock market. The α-levels are much higher for buyouts, indicating that manager's skills are more important for buyout funds than for venture capital. The results offer no clear picture of which benchmark is most appropriate in general for the respective strategies.

Panels B-D in Table 3 report the results from the regressions of each sub-category within venture capital. Interestingly, the α-intercept is not statistically significant for early stage venture capital, suggesting that the manager's skills do not affect the return of the fund. This is somewhat surprising, as one might expect it to be more important at the early stage of a company's life-cycle. Yet a logical explanation is that, as early stage companies are strapped for cash, the provided capital is relatively more important than skills to get the company

going. As soon as the company is off the ground and enters growth and late stage, the manager's skills come to have an effect on return, as demonstrated by the α-intercept that are significant at a 5% level. Values are particularly high for growth funds, implying that when a skilled manager can help form strategies and expansion plans, their effect on return is the highest.

The β-coefficients are all significant, some at the 5%-level but the majority at the 1% level. This indicates that the returns to venture capital are dependent on the performance of the stock market, regardless during which part of the life-cycle the investment is made. R-square increases for both early stage and growth, indicating that they are more closely linked to the public markets than late stage venture capital. This is surprising, as one would assume that the closer the company is to IPO, the more affected it would be by the stock markets. Yet the results state the opposite.

Table 3: Regression Results for Early, Growth and Late Stage Venture Capital

	Market Index	α	β	R^2
A: All	S&P 500	6.02**	.42**	.32
	Nasdaq	5.86**	.22**	.21
	Russell 1000	6.61**	.42**	.32
	Russell 2000	6.30**	.34**	.22
B: Early Stage	S&P 500	5.41	.51**	.46
	Nasdaq	5.39	.23*	.24
	Russell 1000	6.26	.50**	.44
	Russell 2000	5.80	.40**	.29
C: Growth Stage	S&P 500	6.83*	.31*	.69
	Nasdaq	6.51*	.26*	.68
	Russell 1000	7.33*	.31**	.71
	Russell 2000	6.63*	.32**	.75
D: Late Stage	S&P 500	6.07*	.40**	.25
	Nasdaq	5.95*	.21**	.17
	Russell 1000	6.56*	.41**	.26
	Russell 2000	6.44*	.32*	.16

Notes: The table reports β (unstandardized coefficients), R^2, and significance levels *p<.05, and **p<.01.

5 Discussion

5.1 Implications

A number of implications arise from the analysis of the regression. Firstly, the results show that manager skills do have a significant impact on return to private equity and therefore it is suggested that practitioners take skills into account when evaluating the return prospects of various funds. In practice, this may be more difficult said than done as skills are subjective, and sometime also not visible for all to see. However, investors are recommended to look at factors such as number of previous funds, years in the private equity industry and performance of previous funds to create their own composite measure of a manager's skills. Secondly, the results from the regression are in some cases ambiguous with respect to previous literature regarding which market index is more appropriate for which fund type. This leaves a gap in the theory that should be filled in order to better be able to compare private and public equity performance.

Furthermore, this research has contributed to a broad stream of research in Economics and Finance, seeking to understand the covariance of returns across different asset classes. The regression analysis performed here resulted in much higher R-squared values than previous studies seeking to explain drivers of private equity returns, hence indicating that the model fits the data better. Thereby, this study has contributed to a greater understanding of what drives returns, but also tries to fill the knowledge gap on how skills play a driving role.

5.2 Limitations

When performing regression analyses, the results are only as good as the data. The data used in this study is restricted to buyout and venture capital funds, and therefore the results cannot be generalised to the entire private equity industry as such. However, together these two types of funds represent the majority of all funds and therefore it is reasonable to assume it provides a good indication of the general market. In addition, the dataset employed in this study is provided by Preqin, and any biases in their data gathering process or reporting are therefore inherent in this study.

5.3 Further Research

Studies have found that the returns of private equity funds follow the stock markets, but some results also indicate that there is a lag between stock market performance and private equity performance (Sommer, 2012; Robinson and Sensoy, 2012). Therefore, it is suggested to run a multiple period regression on the same data set to see if this changes the effects of skills on returns. Furthermore, as this research has found that manager's skills have a significant positive effect on returns, a further advancement could be to try to understand and empirically test for different aspects of skills. Coggin, Fabozzi, and Rahman (1993) make an attempt to quantify the effects of the skill of timing of investments and that of portfolio selection, but their model could potentially be extended to include more variables. In general, performing the same study with an increased level of data is likely to enhance the results.

6 Conclusion

The purpose of this study was to investigate the effect of the general partner's skills on private equity returns. The study uses a regression model in which the private equity return is compared to the return to public market indices in order to generate the excess risk-adjusted return earned by the manager. Using data provided by Private Equity Intelligence Ltd. the analysis was done on 2692 buyout and venture capital funds from 1992-2012.

The results of the the analysis showed that the skills of the fund manager do have a significant positive effect on returns, both for buyout and venture capital funds, but the effects were found to be stronger for buyout funds. The results also indicate that venture capital firms are more closely linked to the stock market indices and are more sensitive to movements on the public market than are buyout funds. Finally, the analysis concludes that there is no preferred market index to benchmark buyout and venture capital funds against, as previous literature indicates.

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Appendices

Appendix I: Definition of Fund Types

The following definitions are cited from Private Equity Intelligence Ltd. (Preqin)'s database.

Buyout: "Buyout funds enable the current operating management and investors to acquire or to purchase a significant shareholding in the product line or business they manage. The financial sponsor usually gains control of a majority of a target company's equity through the use of borrowed money or debt."

> **Small:** ≤ $500 million in managed assets.

> **Medium:** $501-$1,500 million in managed assets.

> **Large:** $1,501 million -4.5 billion in managed assets.

> **Mega:** >4.5 billion in managed assets.

Venture Capital: "Venture Capital is a type of private equity investment that provides capital to new or growing businesses. Venture funds invest in start-up firms an small businesses with perceived, long-term growth potential."

> **Early Stage:** "A type of venture investment but that invest only in the early stage of a company life."

> **Growth:** "Funds aiming to grow and expand an established company.

> **Late Stage:** "Venture Capital investments in more mature companies.