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SCHOOL OF BUSINESS, ECONOMICS AND LAW

- *How Limited Partners define and evaluate risk in Private Equity*

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Abstract

Limited Partners (LPs) have a limited liability in the Limited Partnership Agreement (LPA) when investing into Private Equity (PE). However, due to their limited liability, LPs face different risks and have to manage and evaluate these risks differently due to the low transparency contributed from the General Partners (GPs). This research paper used a qualitative approach, with usage of a questionnaire, to expand on the research question. The research question aimed to expand on the subject on how LPs define and evaluate risk. The findings indicated that there are some common definitions and evaluations between LPs, meanwhile there are some indications of different definitions and evaluations. The overall definition of LPs risk in PE indicates that the risk is very closely related to the return and past performance of GPs. Also, the overall highest risk is associated with the early years of the funds lifetime if the investments made in the early years are successful later on. In case the investments do not meet expectations, the highest overall risk is associated with the last years of the fund's life, where the capital risk (realization and performance risk) is highest. The overall evaluation of LPs risks showed indications of market risk being the risk which is toughest to manage, meanwhile all other risks were easier to manage in a portfolio compared to each fund by itself. A complete illustration of LPs risks is defined in this research paper along with an illustration of how risks evolve inside a PE fund from the LPs perspective.

Keywords: Private Equity, Limited Partners, Risk, Definition, Evaluation

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1. Introduction

In recent decades, there has been a trend towards companies going private more than ever, investing into Private Equity (PE) is on the rise. This is heavily due to the fact that there are great returns from emerging companies and markets that grow extremely fast due to good management and backed by large amounts of capital. The return from these companies is what the investors are constantly seeking, where the pursued dream is to find the next Spotify, Apple, Amazon or Alibaba. However, private markets are private and not as transparent as the public markets, which creates problems for using standard measuring approaches and tools. This research paper emphasizes on the role that Limited Partners (LPs) have in their risk evaluation and what the common risks for LPs are. Since there are no visible returns or comparable, this research paper is a qualitative research paper and uses a questionnaire answered by LPs in order to further understand and deepen the knowledge about how LPs define and evaluate risk. (Cochrane, 2001)

Due to the lack of transparency and frequently visible returns, LPs rely on Net Asset Values (NAVs), Internal Rate of Return (IRR), Public Market Equivalents (PME) and other multiples. These measurements can be somewhat unreliable which this paper will emphasize further into the research paper. LPs position in the PE fund is of great importance. LPs have a limited liability, which means that they only contribute with capital to the fund; meaning that LPs are not contributing to the daily operations in the fund, making the LPs risk management and evaluation further more complicated. One of the main reasons behind this research paper is the lack of literacy and knowledge about how LPs define and evaluate risk. The most common literature in PE emphasizes on how the General Partners (GPs) define, manage and evaluate their risk. However, LPs are very important in the PE symbiosis due to the fact that it is the LPs that contribute the major part of the capital to the fund, as much as up to 99 percent. (EVCA, 2011)

This research paper starts off by an introduction of PE in order to better understand the position that LPs are in and how in general PE investments and their funds are structured. The paper will thereafter continue to define risks and returns and how they are related to each other in general, in PE, in single funds and in portfolios. This paper both highlights the ex-ante and ex-post risks. The questionnaire builds upon the material that is contributed by earlier literature, PE institutions and associations in order to expand on the research question. The analysis and conclusion will be based upon the earlier literature together with the findings from the questionnaire. Lastly, the conclusion contributes to answering the research question.

1.2 Purpose

In order to make a complete and sufficient risk evaluation of one's risks, one needs to first be able to identify and define one's risks. This research paper aims to get an overall and general definition of risks in PE from a LP perspective. Of essence is also to understand if there is a common definition or if there exist some areas where there are differences in opinions between LPs. Due to the fact that there is barely any research regarding the definition of LPs risks, this research paper is a first step into filling the gap.

Even though PE is becoming a more popular asset class for the past decades, the limited data and low transparency has stayed the same, making normal risk evaluation tough. In addition to this, there also exists very little research contributed to the subject nor does there exist any praxis for how risk evaluation should be conducted, which further complicates the risk evaluation for LPs.

The purpose for this research paper is in everyone's interest in society. Since it is the LPs that are the largest contributors to PE, as much as up to 99 percent into a fund, which is capital that the everyday-person is contributing to their pension funds and insurance companies. Therefore, the necessity for good returns and low risk is of essence not only for LPs, but for everyone. The return accomplished by the LPs will further evolve into the pension that the everyday-person will have as a part of their pension-plan, which puts some emphasis on how important LPs risk evaluation is; LPs are truly important for the PE symbiosis. This research paper contributes to a general illustration and explanation of the definition and evaluation of risks in PE for LPs.

Adding all the obstacles and problems together, the research question becomes quite clear. This research paper therefore aims to get a better understanding of how LPs define and evaluate risk during the whole investment process from start to finish. The research question is:

- *How does Limited Partners define and evaluate risk in Private Equity?*

2. Private Equity

In order to understand how LPs define and evaluate their risks, this section will present how PE is structured, what information is accessible, how the LPs and GPs contracts and funds are structured. Lastly, a complete view of PE risks and LPs risk in PE are presented.

According to BlackRock (2017), the asset class PE has a very high return potential together with a very low cash-flow stability. The general definition of PE is companies who either purchase a public (listed) company and take it private, or purchase another private company. The general strategy is to make the new acquisition more effective in terms of making the company stronger, bigger and more profitable. The investments made into PE are usually considered to be held for quite some time, somewhat illiquid but with the potential of high return. PE firms (GPs) raise money from investors which is pooled together and invested into different funds. The invested money that is pooled together is mainly from institutional investors like: *endowments, sovereign wealth funds, pension funds, insurance companies, insurance banks, superannuation funds, private investors, family offices, foundations and development institutions*. The investors are commonly named as the Limited Partners, LPs. (Invest Europe A, 2021)

As mentioned earlier, the investments are considered to stay in the fund for quite some time, up to ten or twelve years. Investors can therefore most commonly follow the fund's NAV, IRR or the cash flows which shows the fund's development throughout the years. (Investopedia A, 2021)

2.1 What is Private Equity?

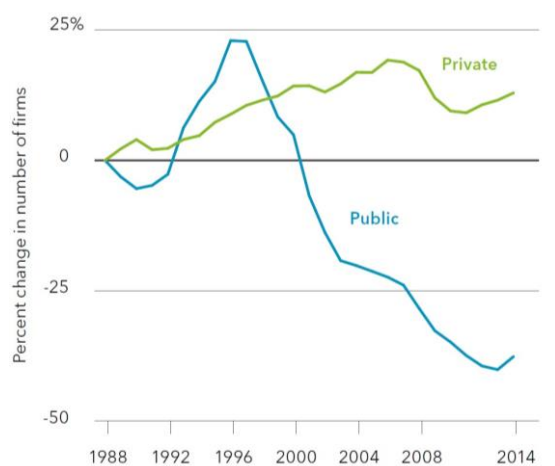
2.1.1 The general definition

PE comes in all shapes and sizes, but the main concept of PE is that its investments are not listed on a stock exchange. The capital used by the GPs to invest are pooled together from different LPs and are put into a specific fund with its own agreements and lifetime. All capital that is committed to the fund from the LPs are not immediately invested, but kept on the sideline waiting for the next best opportunity to invest. Comparing investors between private and public equity, PE investors are fewer and their investments are very illiquid, while it is the opposite for public equity. When the lifetime of the fund has expired, the goal from the GPs and LPs is to have maximized the return during the years the fund has been active. The funds are usually set up for ten years in order for the GPs to make value from the investments. (EVCA, 2011)

2.1.2 Outlook of the Private Equity market

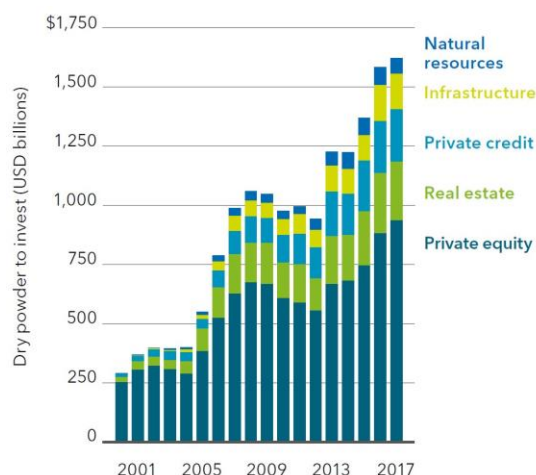
PE has over the years played a big role for some of the largest companies like Apple and Spotify in order to grow at a tremendous speed. Shown in Figure 1, one can see a stable positive trend for U.S. private firms. Meanwhile, U.S. public firms have been decreasing quite profoundly since 1996 (BlackRock, 2017). Adding on to the trend is how much dry powder (committed capital to a fund, but not yet invested (Investopedia B, 2021)) is available within the PE market, which has more than tripled between the last 17 years (Figure 2). As of 2019, 3.9 U.S. trillion dollars was in the hands of PE firms, which was an increase of about 12.2 percent from the previous year. (Investopedia C, 2021)

Figure 1: Growth in number of U.S. private & public firm



(Source: BlackRock, 2017)

Figure 2: Global private market dry powder



(Source: BlackRock, 2017)

2.1.3 General Partners, GPs

PE firms are more commonly known as the GPs in the PE community. They are the managers of the fund, they attract capital when needed and they decide what capital will be allocated to what investment and when, all according to the Limited Partnership Agreement (LPA). They usually invest and own about a 1-2 percent share of the fund's value, which works as an incentive (Investopedia D, 2021). The GPs have full liability in the LPA, which means that the GPs are liable for the decisions of the business, for example its debt and lawsuits (upcounsel, 2021). However, for their services they earn good returns as a result of GPs having a performance fee, which will kick in if the fund itself generates profits over the chosen hurdle rate (minimum return to LPs before performance fee is allowed), together with a management fee that always will be committed to the GPs no matter how the fund performs. (Investopedia E, 2021)

2.1.4 Limited Partners, LPs

Investors and institutional investors are more commonly known as the LPs. Not to be confused with the Limited Partnership, which is the collaboration and partnership itself between the LPs and GPs. They are the ones that provide capital for funds that GPs will manage. The LPs provide around 98-99 percent of the capital that is committed to the fund. However, LPs are only limited liable in the LPA, meaning that they are liable for the capital that is allocated to the fund, hence the committed capital is all that they can lose (Investopedia F, 2021). LPs do not take any operational actions in the investment decisions into the fund, nor does it get involved in the legal actions due to its limited liability. (Investopedia G, 2021)

2.1.5 Limited Partnership Agreement, LPA

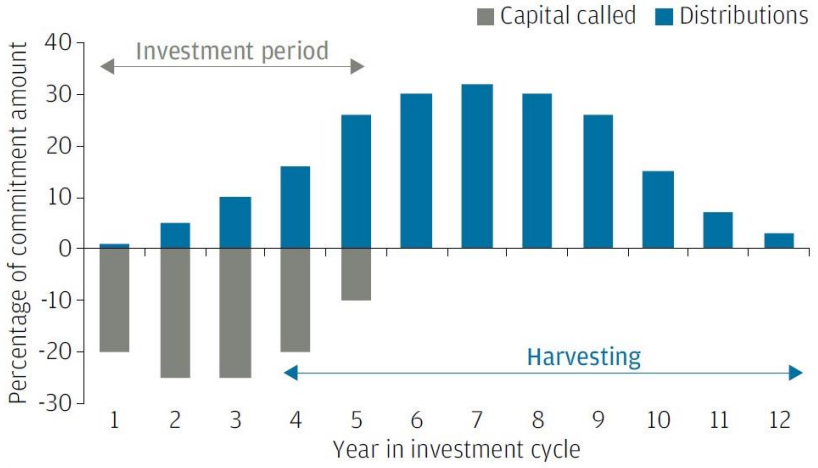
The LPA is created in order for PE funds to define the legal bindings for both the LPs and the GPs. Since LPs are not allowed to interact in the daily operations of the investing and managing of the fund, the LPA is of great importance to set the rules and regulations for the committed capital. The LPA will define that the LPs will be limited liable while the GPs will have full liability. Also, the LPA is a detailed contract which sets out the obligations and rights for partners, as well as the launch of funds, provision, fees, flow of information etc. This is the last stand that LPs can take in order for their risk to be managed after their preferences, after the signature of the LPs, GPs have full authority to the fund's operations in

accordance with the LPA. LPs can use the LPA in order to define their investment preferences and flow of information in order to minimize their risk and plan for their risk management operations. Other important bullet points or clauses are brought forward by the *British Private Equity & Venture Capital Association (BVCA)* and can be seen in the appendix (Exhibit 3). (BVCA, 2002)

2.1.6 Fund structure

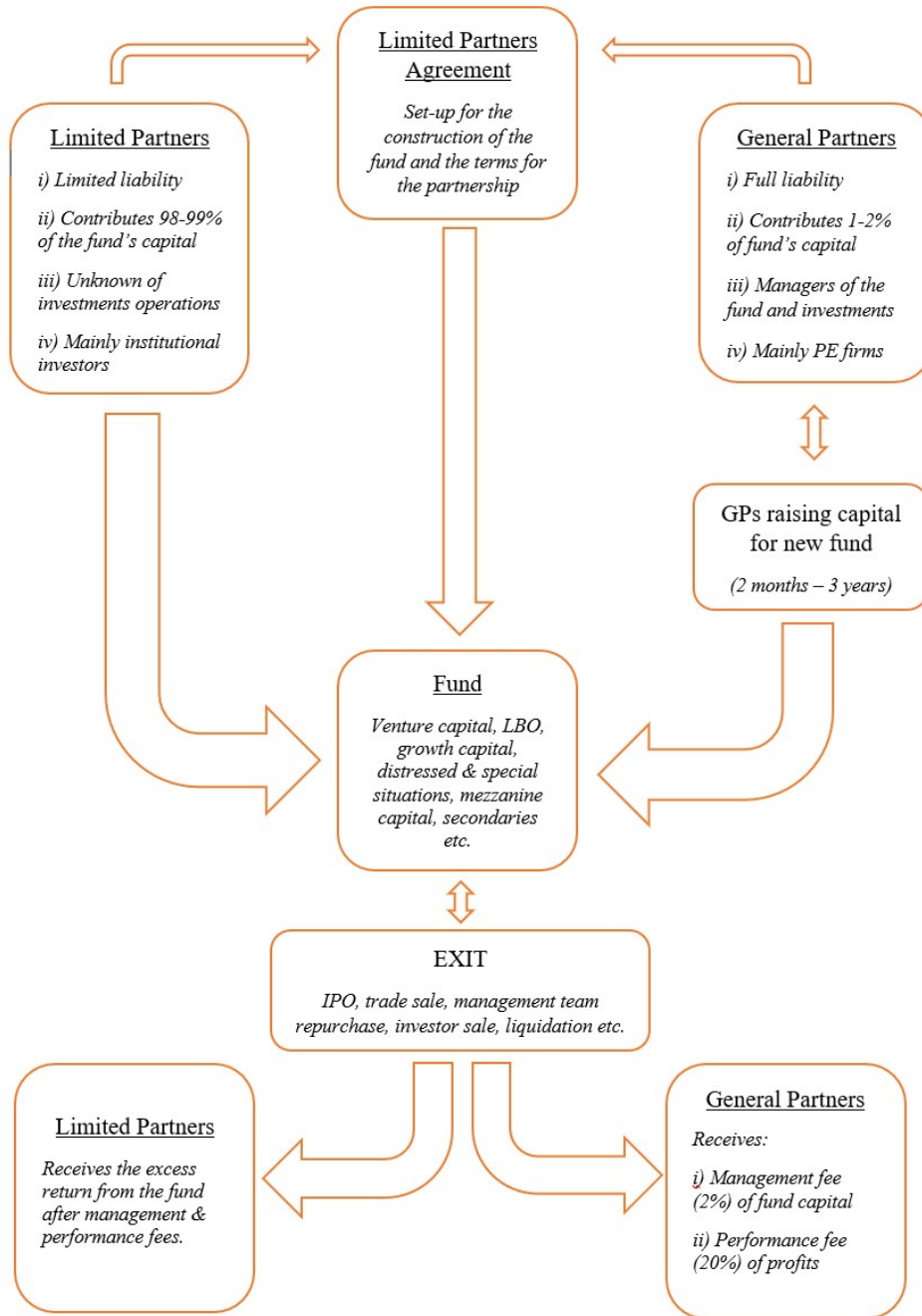
PE funds vary in both sizes, industries, geography and lifetime. However, the general fund has a life of about ten to twelve years with about the first three years before the fund is active to raise capital, first five years after the fund is active to invest the committed capital and between years 4-12 of harvesting profits from its investments and distributing the returns (Figure 3). As a result of the capital being locked for a longer time, investors with long time horizons are needed, this is why one quarter of the LPs investing in the European PE industry is pension funds (Invest Europe B, 2021). Once LPs have committed capital to GPs and their funds, they do not immediately transfer the capital. GPs will ask LPs once their capital is needed, this is called a *capital call* or a *draw-down* which is illustrated in Figure 3 below. (EVCA, 2011; J.P. Morgan, 2018; BlackRock, 2017)

Figure 3: Lifetime of fund



(Source: J.P. Morgan, 2018)

Figure 4: Structure of a Limited Partnership in Private Equity



The two main indicators for fund performance are the NAV (equation 1) and the IRR (equation 2). The IRR estimates the profitability of potential investments while the NAV represents the net value of an entity and is referred to as the “share price” of a fund (Investopedia H & I, 2021). Other common performance metrics is to use *Multiple’s* version to measure the performance of managers and the PME which acts as a benchmarking tool to measure fund performance. (Invest Europe, 2016)

$$NAV = \frac{Assets - Liabilities}{Number\ of\ Shares} \quad (\text{Equation 1})$$

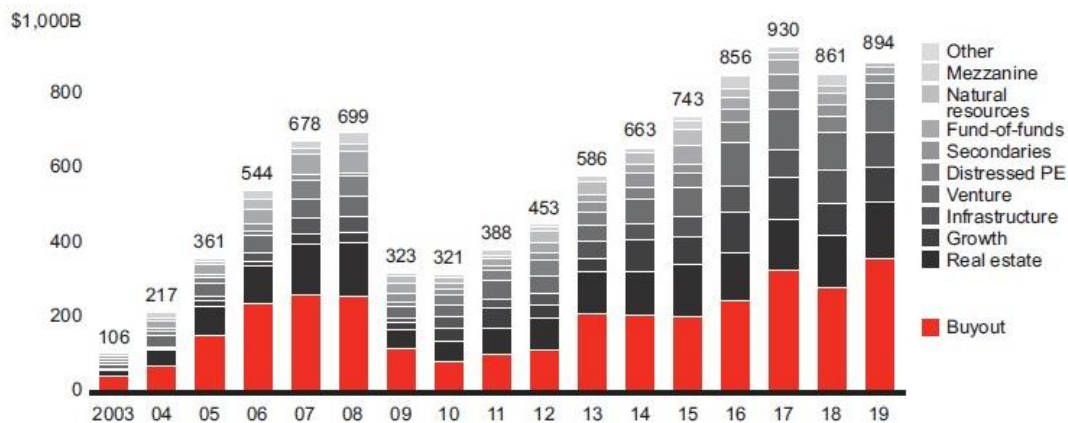
$$NPV = 0 = \sum_{t=1}^T \frac{C_t}{(1+IRR)^t} - C_0 \quad (\text{Equation 2})$$

(Note: For IRR, C_t is the net cash flow inflow for period t . C_0 is the initial investment costs)

2.1.7 The Private Equity Model

In order to further understand the risks associated with PE funds, one has to first define the investments. As each fund has to follow its specific LPA and Information Memorandum, there are infinite investment strategies. However, according to Bain & Co. (2020), the major categories to invest into was identified to be: *Leverage Buyouts (LBOs), Real Estate, Growth capital, Infrastructure, Venture Capital (VC), Distressed & Special situations, Secondaries, Fund-of-Funds (FoF) & Mezzanine Capital* among others.

Figure 5: Private Equity Capital raised by each asset class globally



(Source: Bain, 2020)

2.2 Risk assessment of each Private Equity asset class

Due to the fact that each investment opportunity is different, each PE asset class itself also contributes to different risks which need to be justified by the expected return. By investing between different PE asset classes one can expect different risks and returns.

Leveraged Buyouts, LBOs

LBOs is a strategy that uses about 60-90 percent debt and the rest equity in order to buy out companies. LBOs are structured to minimize the purchase price using an investor's own capital, but instead use debt as a large part of the purchase in order to increase the potential return. One of the risks associated with LBOs is when the acquired company does not perform any cash flows, and the acquirer gets stuck in a very big debt with large interest payments which will contribute to an increase in leverage risk. However, LBOs can be towards somewhat more established and mature companies which more likely will generate cash flows. Hence, each investment strategy using LBOs are considered with different levels of risk. (Deloitte, 2012)

Real Estate

Real Estate is a PE asset class that has a somewhat limited return potential, since the outcome of the invested real estate only can generate the promised return. However, the real estate industry has a very close correlation to the inflation, which puts great importance to the market risk. Investing into private real estate can either have the investor believing in the prices for that specific real estate to grow over the upcoming years, or that the rent (steady cash flows) can be attractive, or both. (J.P. Morgan, 2018)

Growth Capital

Growth capital is an equity investment towards companies that are usually somewhat established and have fairly stable cash flows with a business model that is proven. Investing in these companies, PE firms can see a broader picture: expansion into new markets, expansion into new products, restructuring, add-ons to previous products or services, synergies etc. Investments into growth capital may have the end-goal of an Initial Public Offering (IPO), which could result in vast returns. (Deloitte, 2012)

Infrastructure

Equity investing into private infrastructure is a good way to get strong cash flows. This is due to the fact that infrastructure is of essence in the society and you have the government on the buyer side which almost never will default on their commitments. However, it is very similar to investing into private real estate, there is limited upside and its correlation with the inflation is very high. (J.P. Morgan, 2018)

Venture Capital, VC

Equity investing towards VC will contribute to early access into smaller start-up companies in hope for substantial expansion and growth for the upcoming years. As a result of many VCs being in the early years, having no positive cash flows or proven ideas, the risk of investing into VC is generally quite high, but with potential of tremendous returns. (Deloitte, 2012)

Distressed companies & Special situations

Distressed companies and companies with special situations are targeted by PE firms in order to take control over their debt and equity during bankruptcies, restructuring, an overall difficulty to pursue its short-term obligations etc. If PE firms identify a distressed company, it can acquire it, rebuild it and stabilize its balance sheet and restructure it, in order to later exit from the company in a better shape than when they acquired it. Investing towards these kinds of companies can contain many different special situations, hence it is difficult to assess a specific risk or return to it, since each case is different, but on an overall basis these investments are usually considered to be quite risky. (Deloitte, 2012)

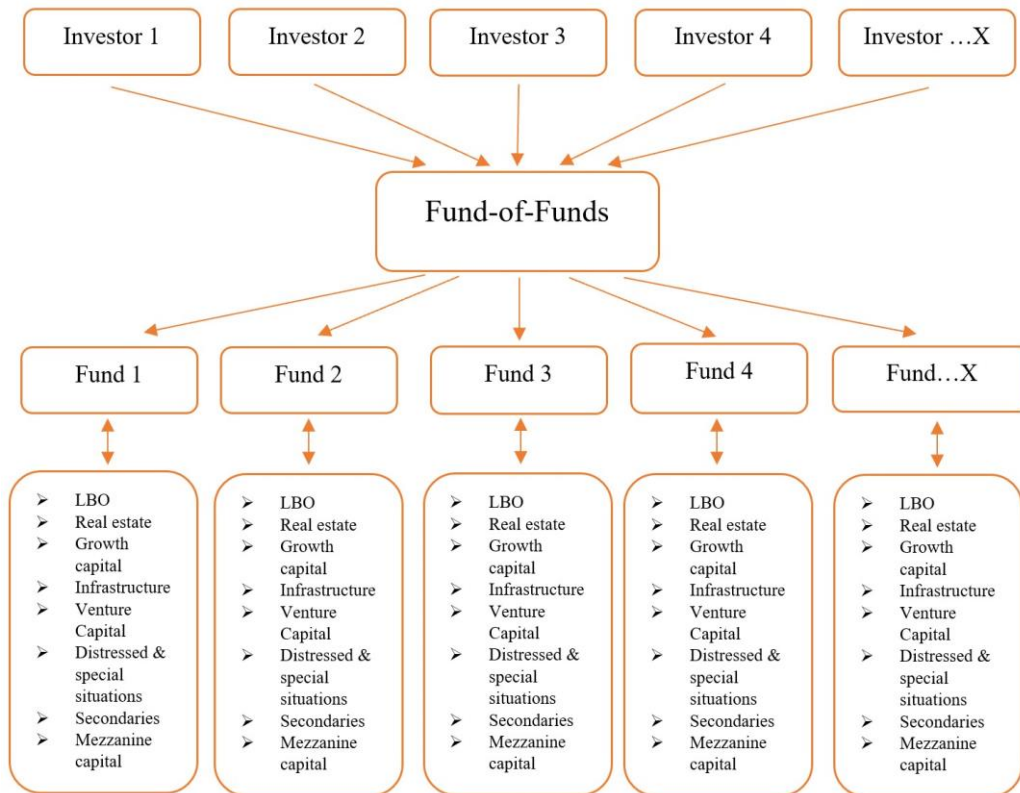
Secondaries

Secondaries is a marketplace for LPs to sell and buy shares of PE funds, just like public equity. However, one risk with using the secondary market is that the market itself is very illiquid due to few buyers. The deals that need to be made are very large and it can take a while for two parties to agree on all terms, which might result in liquidity not being available for certain short-term obligations for the seller of the shares. The illiquidity itself can contribute to LPs ultimately needing to sell their stake with a quite large discount. On the contrary, since the performance of the fund can be shown in the secondary market, its new buyers can estimate its risk and easier grasp how well it would fit into their portfolio. (Deloitte, 2012)

Fund-of-Funds, FoF

In order to further diversify one's investments, investors can use Funds-of-Funds (FoF). FoF are constructed to further diversify PE funds by pooling investors' money into a major fund and thereafter distributing the committed capital over multiple PE funds (Figure 6). This allows investors to invest across many different geographies, GPs, sectors, currencies etc. The overall strategy with the FoF concept is to minimize the risk of investing into a specific fund or sector that won't meet the expectations. (Private Equity UK, 2021)

Figure 6: Fund-of-Funds structure



Mezzanine Capital

Mezzanine capital, or mezzanine financings, is a strategy that some PE firms offer in order to reach high returns. PE firms offer debt to firms where the debt itself is usually unsecured, but senior to common shares in case of bankruptcy. The risks are considered quite high due to the fact that the debt is unsecured. Therefore, there is a possibility that the firm that got offered the debt may default and there would be a big loss for the PE firm. On the other hand, the interest rate for the debt itself is very high, and if successful, high returns can be achieved. (Deloitte, 2012)

Table 1: Key characteristics for PE asset classes

Asset class	Primary risk driver	Average holding period (years)	Return potential	Cash-flow stability	Diversification potential	Inflation linkage	Holding transparency
Private credit	Credit	3-5	3	4	4	2	3
Real estate mezzanine debt	Real estate	4-6	4	4	3	1	3
Real estate equity	Real estate	4-7	2	2	3	4	4
Private equity	Equity	6-8	5	1	2	3	4
Infrastructure equity	Equity / regulatory	6-8	5	3	2	4	3
Infrastructure debt	Credit / regulatory	8-10	2	5	4	1	4

1 = very low; 2 = low; 3 = neutral; 4 = high; 5 = very high

(Source: BlackRock, 2017)

2.3 Risk assessment of each Limited Partner group

Due to the fact that LPs have different sophistication, knowledge and risk appetite, their investment strategy and risk management might differ. Therefore, LPs might experience different levels of returns and risks.

Public Pension funds

A LP that is investing on behalf of pension funds usually sits on a very large amount of capital to a tremendous amount of capital. Public pension funds offer their services to employees of companies who wish to contribute during their working years with capital to the fund, in order to after retirement get a steady monthly income. Their allocation into PE is usually about 0-20 percent while most of their investments are towards public equity like index funds, bonds, stocks and commercial real estate. Most pension funds add the PE investing as an extra boost to the less risky bonds, in order to achieve higher returns. Since most of the capital is locked in for a very long time, up to 40 years, pension funds have a long-time span to generate value out of their investments. Pension funds are usually set up to take on more risk at the early years of an individual's life (more PE and stocks, less bonds), while decreasing the risk the closer one gets to retirement (less PE and stocks, more bonds). (Investopedia J, 2021)

Private pension funds

Private pension funds are very similar to public pension funds. However, public pension funds are on a general basis funds that are created on a national level and whose money comes from the local, state or federal government. All other pension funds are private pension funds. Private pension funds do have some more flexibility, tax benefits and anyone can join (working or non-working), which itself creates more capital to the funds since private pension funds can attract a broader audience of investors. (UN, 2021)

Superannuation funds

Superannuation funds are a company pension plan for individuals offered by their employee. The individuals will receive a guarantee of capital after retirement compared to many other pension plans. These funds offer individuals a guarantee, since the individual's guarantee is not affected by market fluctuations. Superannuation funds have a similar allocation strategy to pension funds; a mix of PE, stocks and fixed securities. Superannuation funds therefore also have a very long investment period (up to 40 years) in order to create value for their investments. (Investopedia K, 2021)

Endowments

An endowment is most commonly used by museums, universities and hospitals in order to create value from money coming from donations. The money can be spent on ongoing operations, education, research etc. Endowments are usually non-profit organizations with trustees and directors to allocate capital into different funds and investments. Since endowments differ in sizes between universities, hospitals and museums, their amount of capital under management can look very different. Endowments earn significant tax benefits, which usually boosts their return profoundly. The largest of endowments are the *Harvard University Endowment Fund* which back in 2018 had about 38.3 U.S. billion dollars under asset management. (CFI A, 2021)

Foundations

Foundations works as a sort of "private charity", with focus to support specific organizations, programs or businesses in need or should be rewarded capital. Similar to endowments,

foundations are non-profitable with trustees and directors that allocate their capital. However, compared to endowments, foundations can choose not to distribute any capital, but instead reinvest their capital, which endowments cannot. Therefore, foundations are not as dependent on continuing donations as endowments, since they have their own profit. The largest among foundations is the *Bill & Melinda Gates Foundation* which had back in 2019 an astonishing 50,7 U.S. billion dollars under asset management. (Investopedia L, 2021)

Insurance companies

An insurance company is a financial institution and intermediary with a business model that offers individuals insurance against certain risks. Individuals get the insurance for a price, a premium, that is set on behalf of different variables depending on each insurance and risk the premium is connected to. When the insurance company receives these premiums, the capital is thereafter allocated into different funds and investments. Insurance companies always have to be prepared if many individuals are in need of capital from their insurance during a short period of time, for example if there would be floods or an earthquake in an area where the insurance company is active. Their business model builds upon many individuals contributing to the same fund with a smaller amount and if some of the individuals would need the insurance, they would be covered by other individuals and the insurance company's return on investments. (Investopedia M, 2021)

Banks

Even though banks also are a financial institute and intermediary, they are quite different from insurance companies. Their business model builds upon short-term deposits in exchange for interest rates and making long-term loans and investments. Therefore, there may be a somewhat mismatch between their assets and liabilities in case of a bank run (low deposits and huge outflow of cash), which puts great importance to the liquidity risk management. (Investopedia M, 2021)

Family offices

In line with the rise of worldwide wealth the past two decades, more Family Offices have emerged. Family Offices serve the most capitalized private people in the world, they are considered to be *Ultra High Net Worth Individuals*, where each individual or family has about 30 U.S. million dollars or more to invest. Family Offices are divided into two, either a single-family office (SFO) which only serves only one family, or a multi-family office (MFO) which serves multiple families. Due to Family Offices serving investors, their preferences and risk appetite change by each individual and its families' preferences. (KPMG, 2021)

Development institutions

Development institutions, or Development Finance Institutions, are usually partly or completely governmental-owned. As the name suggests, the institution makes investment towards development and research across different sectors, whereas much focus is usually on sustainability, promoting jobs, sustainable economic growth, climate change, renewable energy etc. (EDFI, 2021). These institutions play a very critical role in the financing and investments that are needed for continuous improvements to be accomplished in order for companies or research to be able to continue without any gaps for capital acquiring. (OHCHR, 2021)

Sovereign wealth funds

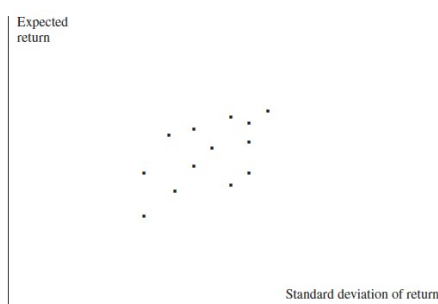
LPs that represent sovereign wealth funds represent a governmental or state-owned investment fund. The capital consists of a country's surplus from trades, reserves or similar. These funds do have a purpose, for example to boost the national start-up companies within sustainability focus. Due to their structure, sovereign wealth funds vary greatly among countries regarding both investment strategy and risk tolerance. There are some concerns that due to the funds being state-owned, there might exist some political pressure or political influence. Also, since the funds are state-owned, they usually consist of large amounts of capital whereas the largest sovereign wealth fund back in 2020 was the Norwegian fund called *Norway Governmental Pension Fund Global* which had 1 074 U.S. billion dollars under asset management. (Investopedia N, 2021)

2.4 Risk & Return

2.4.1 Risk-Return Trade-off

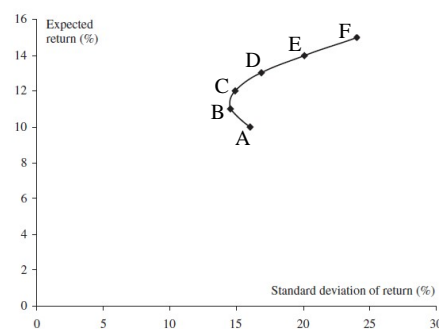
Trade-offs is a general concept that can be applied for basically any situation. Choosing between A or B, C or D, E or F, will all have its benefits and disadvantages. Same concept can be applied for the risk-return trade-off. If you choose a high-risk (standard deviation) investment, it will be associated with a high risk that you might lose most or some of the money but if the investment is successful, you will most likely have a larger return. Or, you can choose a low-risk investment with a lower chance of losing most or some of the money, but there is also a smaller return if the investment is successful (Figure 7). In order for companies to prosper, grow and survive they must take on some risk (Investopedia O, 2021). However, applying portfolio theory allows the investor to benefit from diversifying its risk and increase its expected return by investing different sizes into multiple investments and instead create a portfolio of investments (Figure 8). The portfolio theory bases its assumptions upon standard deviation, therefore it is of great essence that investments complement each other well in a portfolio, instead of looking at each investment individually. The portfolio theory concept can also be applicable to LPs to control the risks in their portfolio.

Figure 7: Risk and expected return (single assets)



(Source: Hull, 2018)

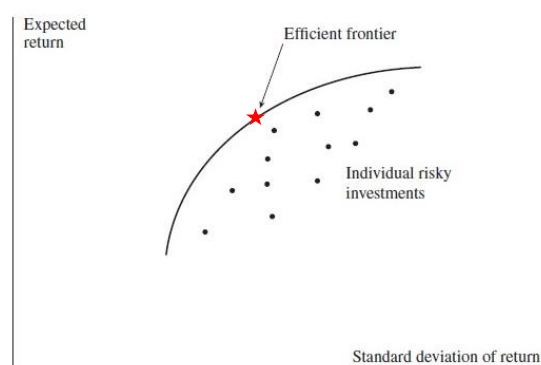
Figure 8: Portfolio combinations of the assets



(Source: Hull, 2018)

Comparing portfolio A and D (Figure 8), one can see that both portfolios almost have the same amount of risk (standard deviation), but portfolio D has about a three percent larger expected return. Same goes for portfolios B and C, where they basically have the same amount of risk, but portfolio C has a larger expected return. This shows how an investor can benefit from pooling assets together in a portfolio. This is later evolved into what is known as the efficient frontier (Figure 9).

Figure 9: The efficient frontier and optimal portfolio



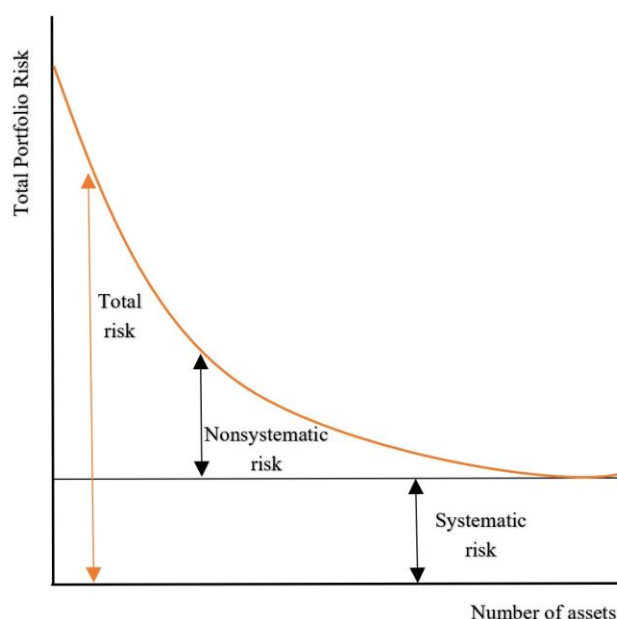
(Source: Hull, 2018)

The efficient frontier (black concave curve) represents every combination of a portfolio for the chosen assets (Figure 9). The efficient frontier helps investors to create portfolios whose risk (standard deviation) is lower than the risk of the individual securities. Marked with a red star is the location of what is known as the “Market Portfolio” or the “Optimal Portfolio”, which represents the optimal portfolio allocation of your assets in order for a specific risk to maximize its return. In order to have a portfolio, there must exist at least two assets. Therefore, this research paper will in the next section show how portfolios risk evolve as more assets enter the portfolio of an investor. Therefore, the two risks, *unsystematic* and *systematic* risk will now be introduced.

2.4.2 Systematic risk & unsystematic risk

When considering risks, risks can be categorized into two categories: systematic and nonsystematic risks. Together, they represent the total risk of a portfolio or investment. The systematic risk represents external factors that may affect the outcome of the investment, which is known as the *market risk*. The systematic risk affects the whole market, for example natural disasters, political factors, currency devaluations etc. The nonsystematic risk can however be somewhat managed. The nonsystematic risk is also called the *unsystematic*, *idiosyncratic* and *company-specific risk*, due to the fact that the risk lies completely on the decisions of each company, for example bad leadership, loan and debt issues, operational breakdown, bad reputation etc. The nonsystematic risk management is well represented when investors invest into mutual funds, but is also very applicable for PE funds. The mutual funds contain thousands of companies which are all exposed to nonsystematic risk individually, but together in a portfolio these risks can be diversified to almost or completely disappear (Figure 10). Shown in the figure below, the total risk of the portfolio can only be partially reduced by adding investments or stocks to a portfolio, eventually an investor cannot benefit more from diversifying its portfolio, there will always exist market risk. This part of an investor’s decision on how many assets an investor wants is very important and is closely related to the previous concept regarding optimal portfolios. Both concepts emphasize the same fact; the more investments you have in a portfolio, you can more easily manage and reduce the total risk in your portfolio. (Hull, 2018)

Figure 10: Total portfolio risk and how nonsystematic and systematic risk is related to diversification



The total portfolio risk can be explained by the usage of historical data, to conduct an analysis on how “far away” the investment returns is from the market portfolios returns:

$$R_i = \alpha + \beta R_M + \varepsilon \quad (\text{Equation 3})$$

R_i = Return on investment

α = Intercept (return on investment independent of market return)

β = Systematic risk

R_M = Return on market

ε = Nonsystematic risk

Where β can be calculated by:

$$\beta = \frac{\text{Covariance}(R_i, R_M)}{\text{Variance}(R_M)} \quad (\text{Equation 4})$$

The β , or Beta, can be used to get an understanding of how investment i (either individually or portfolio) returns are correlated to the returns from the market. A $\beta = 1$ suggests that investment i is perfectly correlated with the market, hence if the market goes up by one percent, the investment will also go up by one percent. A $\beta = -0,9$ suggests an *inverse* or *negative* correlation between the investment and the market. Hence, if the market goes up by one percent, investment i will only go down by 0,9 percent, making investment i less volatile than the market. If the $\beta = 1,1$, the correlation is *positive* and suggests that if the market goes up by one percent, investment i will increase by 1,1 percent, making investment i somewhat more volatile than the market. If the value of the β is closer to zero, there will be less volatility in investment i , and vice versa for a high β . In accordance with the previously mentioned risk-return trade-off, a high Beta will also contribute to investors requiring a high expected return (Capital Asset Pricing Model, CAPM). With the knowledge of this kind of information, investors can allocate different sizes to different assets, and thereafter complete their optimal portfolio after their risk preferences. (Hull, 2018)

2.4.3 Ex-ante & ex-post risk

As well as the risk could be determined to be either systematic or nonsystematic, there are two timeframes for risk calculation and consideration, *ex-ante* and *ex-post*. *Ex-ante* is Latin for “before the event” and represents a prediction of a future event on the basis of economic and financial indicators, past and present data, estimated earnings, economic trends etc. All in order to get a better picture of the future development of a potential or current investment. In PE and investments in general, due diligence is a big part of the *ex-ante* evaluation. However, no matter how many times the *ex-ante* prediction will be done or how good the prediction is, there will most likely occur events that might change the *ex-ante* prediction, for example systematic risks. The *ex-ante* predication is therefore a forecast, which most investors use in order to evaluate if an investment will be beneficial or not, but only based on the current knowledge of the investor itself. On the other hand, *ex-post* is Latin for “after the event”. The *ex-post* evaluation can contribute to getting an understanding of how well expectations were met with reality. The *ex-post* is equally important moving forward, one can refine predictions and hopefully make even better predictions moving forward. One can easier match expectation with the future outcome, hence the *ex-post* contributes to the next *ex-ante* risk evaluation. (CFI B, 2021)

2.5 Risks in Private Equity

Risk in this research paper is viewed as a possible unfavorable scenario where the timeframe and impact are unknown. A complete illustration of the risks that Limited Partners may face are located at the end of this chapter.

Associations & Institutions

This paper will now introduce the risks that are considered from associations and institutions in the PE industry. In order to get a complete view on what risks are associated with LPs, a broad range of associations and institutions was examined.

Institutional Limited Partners Association, ILPA

ILPA serves as a global advising association towards LPs in the PE community. Their main objective is to represent the interests of LPs and guide LPs to maximize performance, offer education, events and research. ILPA also offers data and tools in order for LPs to analyze and perform risk management in the PE industry. (ILPA A, 2021)

ILPA emphasizes the importance of transparency within the PE industry and specifically into the partnership between the GPs and LPs. The transparency will contribute to boards, portfolio managers, trustees and risk departments making better decisions. ILPA has therefore created guidelines for GPs and LPs to follow. The guidelines are introduced in order to improve the LPs ability to monitor their investments. These guidelines are presented in their paper *Quarterly Reporting Standards, QRS* (ILPA B, 2021). According to ILPA (ILPA, 2016), an effective QRS should include (but are not limited to) risks like:

- Concentration risk
- Foreign exchange risk
- Leverage risk
- Strategy risk
- Reputational risk
- Realization risk
- Extra-financial risks (ESG)

Bank for International Settlements, BIS

BIS is a global organ working closely with 63 central banks all over the globe which together represents 95 percent of the world's Gross Domestic Product (GDP). While BIS mainly are directed to the financial health and stability of banks, one of their missions is to “*carrying out research and policy analysis on issues of relevance for monetary and financial stability*”. (BIS, 2021)

BIS highlights the principal-agent problem, which in this case is defined as the limited downside risk that GPs have, so they can take on extra risk to achieve large returns. Due to the fact that the GPs only contribute a very small amount of capital to the fund compared to the LPs, the GPs might have incentives to maximize their return and take on larger risks. (BIS A, 2008)

In line with BIS mission to contribute to financial stability, BIS highlights the liquidity risk being significant for firms in the evaluation of their risk management. Liquidity risk is the risk of not meeting obligations or continuing to do so. An effective risk management can minimize the liquidity risk by accurately estimating cash flows both in the short and long term, but also under normal and stressed economic conditions.

Invest Europe

Previously known as *European Private Equity & Venture Capital Association (EVCA)*, Invest Europe is now the new name for the world's largest association for VC and PE investors. Their goal is to contribute with expertise, dynamism and innovation to result in better understanding within the PE industry. (Invest Europe C, 2021)

Due to the low liquidity in the PE and VC markets, Invest Europe emphasizes that some risk managers would prefer to assess the default risk, rather than the market risk. During the recent economic crisis of 2007-2008 the already illiquid secondary market became even more illiquid. Many investors who wanted to sell their share in their PE fund during the crisis did not find any buyers nor got offered a decent price. Therefore, they ended up in liquidity shortage and could not pursue their short-term commitments to the fund. Invest Europe has identified four key risks that LPs have to consider:

- Funding risk
- Liquidity risk
- Market risk
- Capital risk

European Investment Fund, EIF

EIF acts as a middle hand for private and public banks and institutions, being a specialist of risk finance, portfolio reviews and expected performance ratings (EIF, 2021). EIF created some guidelines, or rather a framework, in order to deal with the associated risks in PE (EIF, 2010). *The Charter* highlights the operational risks and codifies EIF's approach to measure and manage risks. In the definition of operational risk, EIF includes:

- Legal risk
- Compliance risk
- Reputational risk

British Private Equity & Venture Capital Association, BVCA

The BVCA has represented the PE and VC industry for over three decades with expertise, research, analysis, specialist training and best practice standards (BVCA A, 2021). According to the BVCA, in order to get sound risk management, LPs must receive high-quality reporting from their GPs that is both transparent and meets the LPs needs. (BVCA B, 2021)

Research contributed by *Montana Capital* (MC) was published by the BVCA in 2015, where MC looked further into what risks were associated with PE investments and how they could be managed. They found four key risks: *market risk*, *funding risk*, *liquidity risk* and *capital risk* (realization risk is added later on). MC emphasizes that due to the investments into PE being long-term, market risk is only somewhat considered, while more focus is on capital risk. (BVCA A, 2015)

Sixth Swedish National Pension Fund, AP6

AP6 acts as a LP in the *Swedish National Pension Fund* as it is concentrated to allocate its capital into the PE market. Their allocation is both contributed to co-investments and directly into PE funds (AP6 A, 2021). Their identified key risks are:

- Market risk
- Credit- & counterparty risk
- Liquidity risk
- Performance risk
- Operational risk
- Sustainability risk

(Source: AP6 B, 2021)

Publicly & Privately Owned Companies

Since all of the previous mentioned institutions and associations this research paper previously looked into may be under some regulation or political pressure, it is of great importance to look into private and publicly owned companies to get a neutral and unbiased view of all the existing risks.

BlackRock

BlackRock is a global investment management corporation that offers expertise and solutions to a wide range of investors and institutions and is a well-known PE investor (BlackRock, 2021). BlackRock defines the PE industry as a very important asset class for diversifiers, since the asset class itself has potential for high returns and is uncorrelated to broad market swings. According to research done by BlackRock, not only public markets face macroeconomic risks, but so does PE. The main drivers for the macroeconomic risks for PE are the economic growth, real rates, commodities, currency and company-specific risks. (BlackRock, 2017)

J.P. Morgan

J.P. Morgan (JPM) is a world leading provider of financial services and expertise and has been around for about 200 years. (J.P. Morgan, 2021)

In order to be a successful investor into PE, JPM puts great importance into diversification in the allocation strategy. JPM emphasizes the need of a clear implementation investment program which is driven by top-performing funds and investments. The diversified portfolio needs to be diversified over strategies, geographies, industries and vintage years. In order to

diversify even more, the investments should be diversified over direct investment and into funds, but also over the primary market and over the secondary market.

However, one problem with PE is that market timing is tough to predict due to business cycles and capital flows over the long haul. Entering a very illiquid market is never easy to do, neither is getting out of it, hence liquidity risk plays a major role. Being able to invest into the secondary market can help investors to not only with the liquidity, but also skip the early years of the fund’s investing-time and negative cash flows and instead enter when there are positive cash flows into the fund. Being able to access the secondary market would somewhat minimize the risk of the infamous J-curve and somewhat smoothen the curve and therefore get earlier access to positive cash flows. (J.P. Morgan, 2018)

Private Equity International, PEI

PEI is a multi-international company who deliver PE analyses and expertise towards investors and fund managers. In their latest collaboration with *Capital Dynamics*, they identified PE risks and how to deal with them, whereas most focus lies towards the capital and market risk. (PEI, 2021)

PEI offers different solutions to reduce risk, or volatility. The first quantitative solution is the *Asset Allocation strategy* which is based on the assumptions of an optimized portfolio and the *Modern Portfolio Theory (MPT)* and the *CAPM*. The MPT model optimizes the portfolio by maximizing the expected return for a given risk measure (volatility). This will help portfolios to minimize market and capital risk. However, one problem with having an optimal portfolio in PE, is that it has to be updated constantly in order to stay optimized, which is a tough and expensive assignment on the illiquid secondary market.

Other ways to deal with risk and try to maximize the diversification is to use *Equal Risk Contribution (ERC)* portfolios or *Equally Weighted (EW)* portfolios. ERC portfolios will create a portfolio with equal risk contributions, while the EW portfolios will create a portfolio with equal weight of each asset class. One other solution is the *Market-Weighted Risk Contribution (MWRC)* portfolio which will create portfolios with larger allocation to assets that have larger markets meanwhile the portfolio will reduce allocation to those assets with more risk (quite similar to the ERC). Lastly, there is the *Minimum Variance (MV)* portfolio, which only has one focus, which is to minimize the portfolio’s risk but does not consider the potential risk and return trade-off at all. Looking at the IRR and volatility between 2000-2014 in Table 2, one can conclude that the best tool for minimized risk (volatility) is to use the EW portfolio strategy. One can also see from the figure that depending on how LPs and investors do build up their portfolio, one might expect different risks and returns.

Table 2: IRR & volatility over quarterly returns for different allocation models

	Minimum variance (MV)	Equally weighted (EW)	Market-weighted risk contribution (MWRC)
IRR	9.1%	6.84%	10.21%
Volatility of quarterly returns	14.02%	9.4%	11.28%

(Source: PEI, 2014)

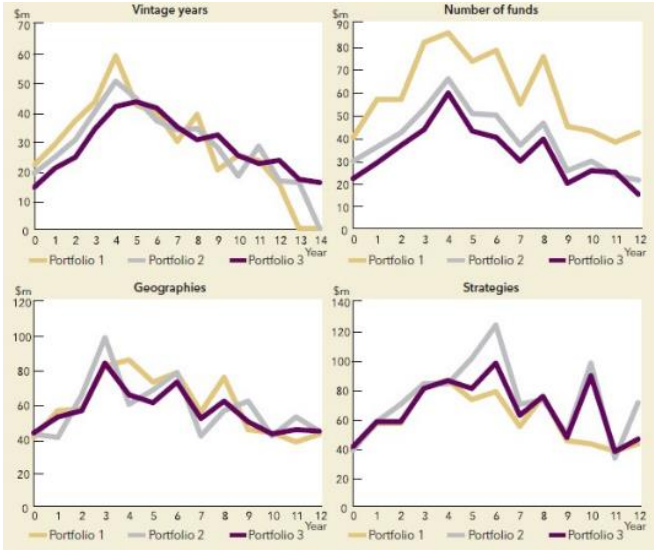
Another quantitative solution is the *Value-at-Risk (VaR)* approach. It is a good and simple tool to measure market, credit and operational risk. PEI used the VaR approach on NAVs in order to identify which attributes among investing into different vintage years, geographies, strategies or number of funds that had the most effect on risk reduction and diversification. Construction of portfolios and scenarios was done using the Monte Carlo approach and the results are shown in Figure 11 and Table 3.

Table 3; Average risk reduction by each attribute

Source of diversification	Average risk reduction
Vintage years	1.01%
Number of funds	44.64%
Geographies	3.93%
Strategies	0.56%

(Source: PEI, 2014)

Figure 11; Evolution of one-year VaR

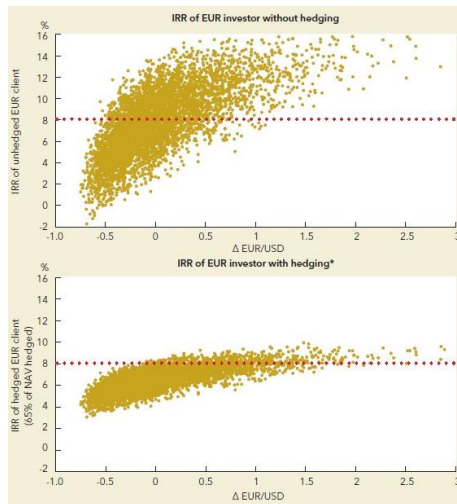


(Source, PEI, 2014; Note: Portfolio 1 is the least diversified, thereafter portfolio 2 and Portfolio 3 is the most diversified after each attribute: vintage years, number of funds, geographies & strategies)

Due to the fact that one year in a ten-year fund is considered quite short, the VaR only examines the short-term risk. However, the attribute to diversification and risk reduction over the number of funds is clearly the easiest way to reduce the risk in the short-term (44,64% average risk reduction). Furthermore, the most important long-term risk reduction is the investment done over different vintage years.

The last solution relates to the problem associated with investments with currency risk over the long-haul. Investors who invest into other countries and their currencies, have to consider the fluctuations in currencies, since the fluctuations can offset a good return or contribute to negative returns. PEI conducted portfolio experiments over EUR/USD portfolios. As one can see, the currency risk can be reduced quite heavily with hedging where the maximal loss was a three-percent gain on IRR. Meanwhile, if one were not to hedge, there could occur a maximal loss of two-percent on the IRR (Figure 12). (PEI, 2014)

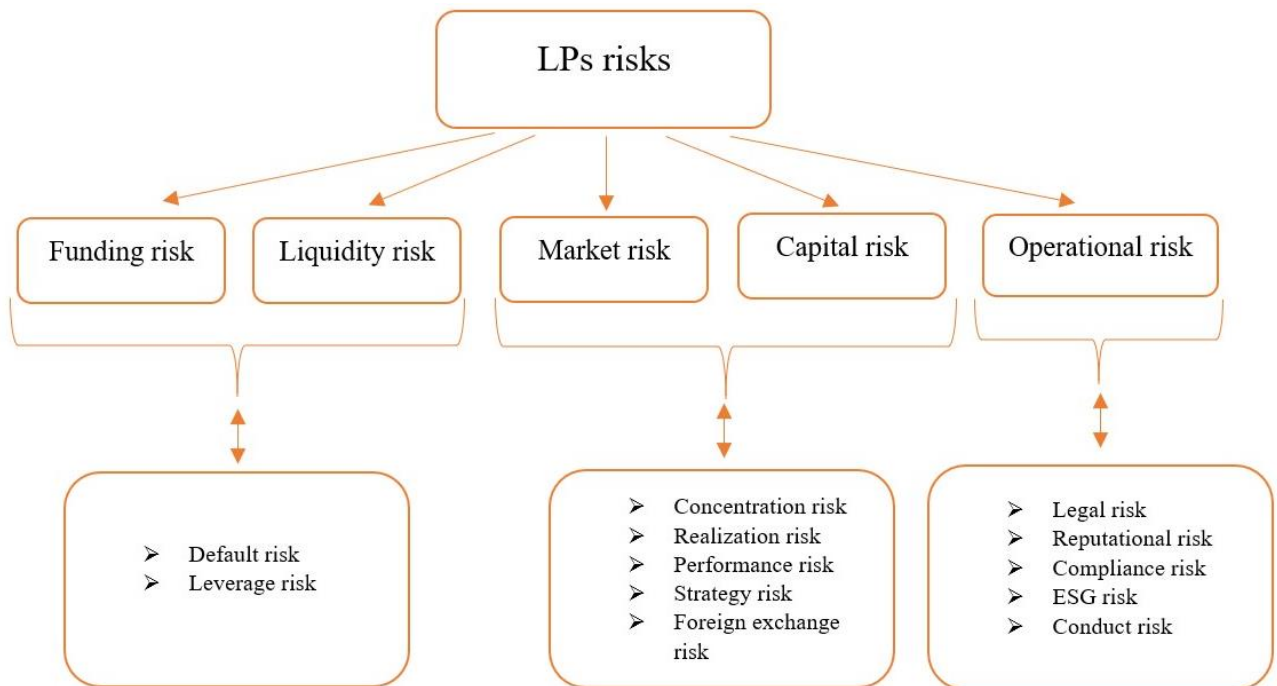
Figure 12; Volatility of IRR



(Source: PEI, 2014)

The overall conclusion is that these different companies, institutions and associations have quite different views on the key and sub risks for LPs. One common view is that the illiquidity of the secondary market creates a problem for LPs who are in need of liquidity in the short-term. Market and capital risk are also very central and highlighted, these risks affect the valuation of the fund and its realized exit value. Figure 13 shows the complete view of key risks and their sub risks for LPs that was collected and summarized from the earlier research. Solutions for these risks can be found in the appendix (Exhibit 12). Figure 13 will lie as a basis for the definition of what risks that are associated with LPs in PE.

Figure 13; Summation of LPs key risks in Private Equity



(Note: Summation of risks from ILPA, BIS, Invest Europa, EIF, BVCA, AP6, BlackRock, J.P. Morgan & PEI)

2.6 Barriers for risk evaluation for LPs

In order to understand why risk management and risk evaluation in PE is different from public markets, some obstacles, or barriers, are introduced in order to understand what problems LPs are facing.

NAV

In the case of PE, the quarterly change of NAV is somewhat a comparison to the daily movements of public stocks or funds. Hence, this is why the NAV is defined as the market risk. However, since the NAV does not represent recent deals, but rather a valuation done by GPs, PE NAVs are quite different from public markets NAVs which are represented by investors' daily transactions. Therefore, PE NAVs are not market prices. Also, the low frequency of reporting NAVs creates a tough situation in order to get relevant data. It is important for risk measuring and evaluation to have as much data as possible, whereas four data points over a year may be too little in order to make good predictions and evaluations upon. (BVCA A, 2015)

The other major problem is how the NAVs are created and the transparency contributed to the LPs by the GPs. Recent research done by Kaplan et al. (2019) shows that GPs might in some cases manipulate the NAV, both under- and overestimate. Their research shows that the top-performing funds tend to underestimate their NAV in order to be sure to beat expectations. Meanwhile, the underperforming funds tend to overestimate, usually during fundraising periods, in order to look attractive to current and new LPs. These intentional over- and underestimations will contribute to an even more difficult landscape for LPs to measure, evaluate and manage market and capital risk.

IRR

The IRR is the other common tool in order to calculate returns from PE investments. The IRR is contributed by the cash flows from the investment, including drawdowns, capital gains and dividends. However, the IRR can be represented in either gross or net IRR. The gross IRR is sometimes preferred by GPs due to the fact that it increases the return since it does not include the management fee that GPs receive. Hence, in order to make the most accurate model, the net IRR contributes to the best transparency. The offering of both net and gross IRR from GPs, makes it tougher for LPs to compare and navigate between GPs in order to define who actually had the best past performance. (BVCA B, 2015)

Benchmarking

GPs want to compare themselves with the most favorable benchmark in order to keep and attract new LPs. As a result, there is no standard or consistent benchmark for GPs, GPs will put themselves in favorable positions and use benchmarks that benefit themselves. LPs need to fully understand what the benchmark is built upon and there may be big bias on the performance when comparing GPs (BVCA B, 2015). LPs need to have a deep understanding of the measurements and how the data is collected, measured and compared. Unless the data from the GPs are unbiased and of good quality, LPs will have a tough challenge to understand their risk that they may be facing. This problem is very relatable to the problem regarding IRR and how they are presented (net or gross).

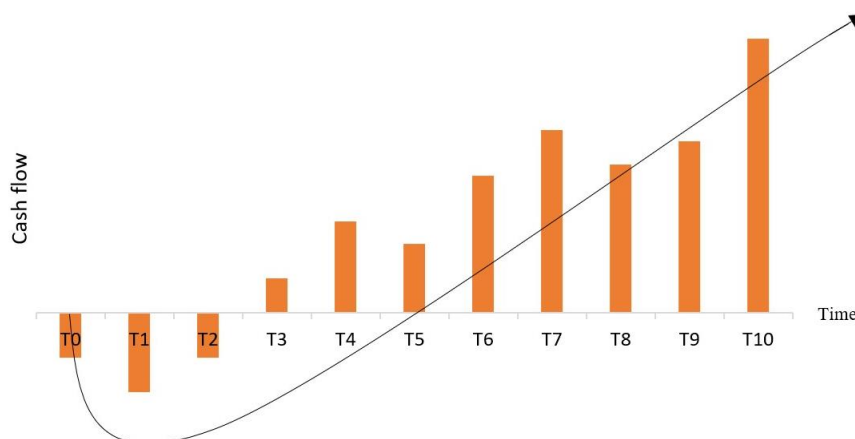
Principal-agent problem

The principal-agent problem (LP being the principal, GP the agent) occurs when the GPs and LPs do not have the same vision for their interests. Due to the fact that GPs only invest 1-2 percent of the committed capital into the fund and the LPs the remaining 98-99 percent, their stake is quite different to start off with. On a general basis, LPs pay a two-percent management fee to GPs for taking care of their investments and therefore already cover the 1-2 percent stake from GPs in case the fund does not perform well. Adding to this, GPs get on a general basis a 20-percent performance fee (depending on the hurdle rate). Therefore, GPs and LPs interests are not truly aligned. While LPs have a quite large downside risk, GPs have a very little one with large incentives if the fund performs well. Therefore, GPs might take on extra risk in order to boost their performance fee (BIS A, 2008). This evolves into a problem for LPs since they have a limited liability in the partnership and cannot affect the decision made by the GPs. However, this is why most LPAs include the hurdle rate clausal, in order to keep GPs focused on good performance, otherwise the GPs will not benefit from the performance fee.

J-curve

Since PE funds look quite different from public ones, they are somewhat tougher to value. Public funds invest in already established companies that are listed on a stock exchange and have steady cash flows, meanwhile PE funds start off their vintage year by investing a lot of capital and perhaps will not get any positive cash flows until the fifth or seventh year. This is known as the J-curve, if you tilt the “j” somewhat towards the right, it will represent the NAV of a typical PE fund (Figure 14). A portfolio with many start-ups and young companies will have a steeper J-curve while mature funds with established companies will contribute to earlier cash flows and a more smoothed J-curve. Due to the fact that there may only be negative cash flows for many years of the funds’ early years, good quantitative modelling for market and capital risk may be a challenge. (EVCA, 2013)

Figure 14: Lifetime of fund & the J-curve



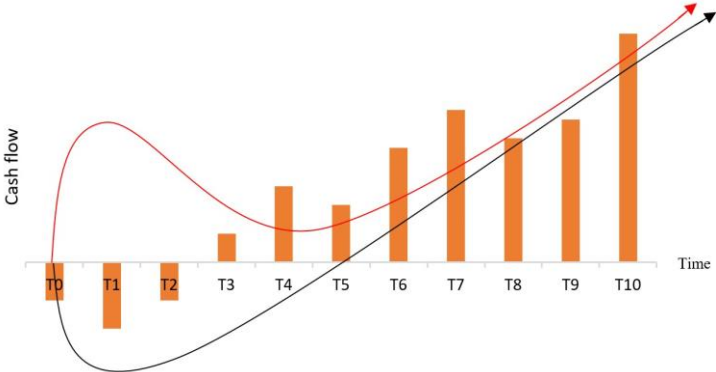
(Note: Black arrow represents the “J-curve”)

2.7 Risk evolution in Private Equity funds

In accordance with the general definition of the risk-return trade-off, the highest uncertainty and lowest returns are associated with the early years of the PE fund. Since LPs will not be given any distributions until the fund’s life is finished or an exit has occurred, the only thing that truly matters should be the return received at the end of the fund’s life, making short-term

risks somewhat less important. However, liquidity risk and funding risk is associated with short-term risks and has to be considered, so there should always exist some risk during the fund's life. Also, the operational risk is associated with the short-term risk and needs to be constantly monitored in order to minimize errors and mistakes. Therefore, Figure 15 below illustrates from earlier research and literature how the large amount of investments in the early years of a fund's life with no positive cash flows is defined by quite high risk. The short-term risks in the middle of funds life are somewhat less dependent on the long-term realized (exit) value, making this section of the fund's life less risky. Lastly, the capital risk (realization risk) is of greatest importance and increases further as the end of the fund's life is getting closer. Figure 15 will lie as a basis for how LPs define the evolution of the overall risk within a fund's life.

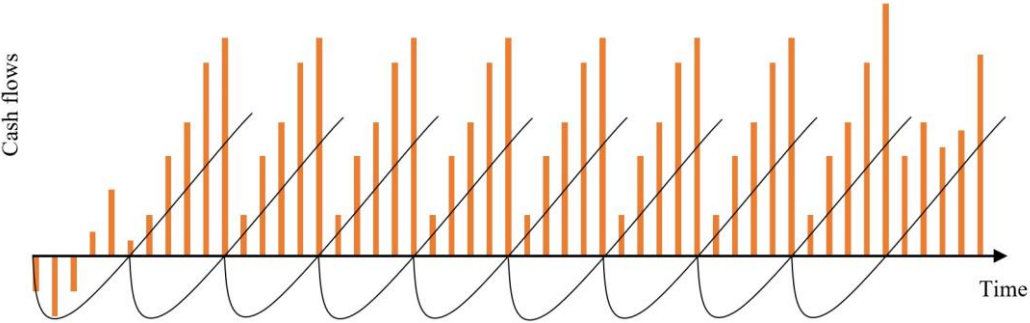
Figure 15: J-curve and risk evolution in PE funds



(Note: Black arrow represents the “J-curve” and the red arrow represents the overall risk evolution of the fund)

Applying the exact same intuition from a single fund's J-curve (Figure 15) and its intuition into a portfolio, one can see how investing into a new fund every five year affects a portfolio. Even though it is tough to change the J-curve in a single fund, one can affect the J-curve in a portfolio of funds. An investor can weigh up the early-stage investments and negative cash flows by another mature fund's distributions and positive cash flows (Figure 16). This emphasizes the fact that investing over different vintage years is of essence together with the fact that it is much easier to evaluate and manage risk in a portfolio compared to each investment by itself. If an LP would use this concept of investing, one can see from Figure 16 that after the first five portfolio's years, the portfolio will be able to stay on positive cash flows throughout all 50 years (assuming the exact same intuition and cash flow from Figure 15).

Figure 16: J-curves in a portfolio



(Note: Portfolio lifetime of 50 years where a new PE fund is introduced every 5 years)

3. Review of literature

This section will highlight earlier research and literature contributed to the subject regarding the research question. This section will also lie as a base for the theoretical scope.

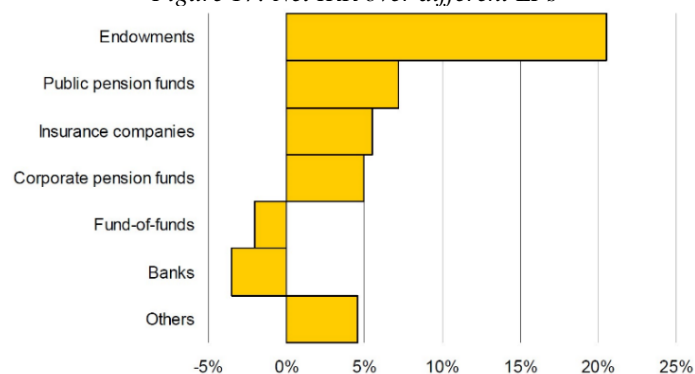
The earliest research contributed to this paper comes from Cochrane (2001) which explains some of the highlighted problems with PE and its returns. Cochrane emphasizes the fact that despite PE being a very important asset class, very little research and work has been put into analyzing the characteristics for the returns and risks for PE investments. Cochrane mainly identifies that the problem lies in the fact that PE offers very little data that is available.

More recent research is contributed from Lerner, Schoar & Wong (2007), they explained based on their data (1991-2001) that depending on what kind of LP that is investing, there has been a large variation in returns. Endowments are the top performers (net IRR) whereas the main driver is their reinvest strategy. One might assume that these endowments take on a bigger risk in order to achieve those returns, but their standard deviation (risk) is the lowest among all LPs. What Lerner et al. emphasize is that in those PE funds where the top performing LPs choose to stay and reinvest, the performance is great (31 percent IRR). Whereas when the top performing LPs choose to leave and not reinvest into a fund, the fund did not generate the same good performance (7 percent IRR). Hence, the inside information from GPs and the PE funds is of great essence. Pension funds and endowments are the ones that are least likely to reinvest into a follow-on fund, which might indicate that these two LPs are the most proactive in regards of risk and return. On the other hand, banks and older LPs tend to reinvest more often, indicating a somewhat less proactive approach.

Their findings also indicated an overall IRR excellence from endowments that on average had an IRR of 20,5 percent. However, digging deeper into which funds that contributed the most shows that it was the early-stage VC funds. The early-stage VC funds had an IRR of 34,6 percent, while the later-stage VC funds had an IRR of 19,3 percent and the buyout funds only had an IRR of 0,1 percent. The worst performing LPs are banks and finance companies which had an overall IRR of negative 4,1 percent whereas the early-stage VC funds contributed to a negative 13,9 percent IRR (Exhibit 1 & 2 in the Appendix).

The second part of their research is focused on LPs selection of PE funds and how they have a systematic pattern. Their conclusion is that each LP has different investment styles and therefore has a difference in performance. Top performing LPs tend to invest into older and more mature funds. The fact that universities and foundations are considered the “grandfather” of the first PE investment programs, they had early access to the top performing GPs where the funds now are closed to new investors, which gives a major benefit to the “older” LPs.

Figure 17: Net IRR over different LPs



(Source: Kaiser & Wesarp, Value Creation in the Private Equity and Venture Capital Industry, 2010)

Somewhat in line with Lerner et al. (2007) are Manninen, Jääskeläinen & Maula (2010). Their research and findings are based upon how performance is achieved, either by LPs skill of choosing the best future funds or whether the access of LPs to better-performing funds was the main driver. Their findings show that it was the access to funds which was the main driver. Their research also showed an indication of LPs that do reinvest into follow-on funds tend to get a very similar performance from the follow-on fund. The two significant variables that had a positive effect on the returns was the past performance of the GPs and the GP themselves.

Driessen, Lin & Phalippou (2007) takes on a stronger approach towards risk management within the PE industry. They say that due to the fact that the funds are not publicly traded and the returns are not visible, the only things we can look at as investors are the dividends and investments put into the fund and the fund's NAV. NAVs are created internally and self-reported statements on how the fund is performing. However, there are incentives to both boost and degrade the NAV. Therefore, standard estimation techniques and tools cannot be applied to measure the risk and return of PE performance. Agreeing on this matter of subject is Cumming & Walz (2009). According to them, there exist some barriers and obstacles to the smoothness of valuing, measuring and checking for performance in PE investments. Cumming & Walz contributed research regarding the reporting of the performance of funds. Their research shows how there is a bias (overstatement of NAV) in the reporting from GPs to LPs when asking for new capital for follow-on funds when the deadline is getting closer.

Kaplan & Schoar (2005) got access to data over individual fund's returns and cash flows in the period between 1980-1997. The funds that outperformed (PME, and IRR) S&P 500 were the VC funds, meanwhile the buyout funds did not outperform the S&P 500. However, gross of fees (management and performance fees), both VC and buyout funds outperformed S&P 500. Their study showed that a GPs past performance is highly correlated to the ability to attract new capital to the funds, which is in line with Manninen et al. (2010). They also suggest that the main driver for the attraction of the capital is mainly due to the past good returns rather than the risk associated with it.

More recent research on performance was contributed by Phalippou & Gottschalg (2009) which somewhat agrees with the conclusions made from Kaplan & Schoar (2005). Their research indicated that, gross of fees, the PE funds' performance outperformed (IRR) the S&P 500 by three percent annually, while net of fees they did not outperform the S&P 500 and instead was three percent lower on an annual basis. Indicating the importance of understanding the performance measurements and benchmarks between GPs for LPs. However, adjusting for risk, the risk-adjusted returns alpha net of fees was about six percent lower than S&P 500 annually. Lastly, Phalippou & Gottschalg emphasize the fact that it is only mature funds that are reliable enough in order to be able to measure their performance. Somewhat in line with the arguments on PE funds' performance are Groh & Gottschalg (2005). Their research emphasizes on PE investments made during the period of 1984-2004. Using gross of fees, all of their alphas were positive (however not all significant), meanwhile net of fees, returns would be smaller but not turn negative.

Harris, Jenkinson & Kaplan (2012) adds on to the subject with their own research. Their conclusion is that buyout funds outperformed S&P 500 by three percent annually between the years of 1980-2010. On the other hand, they agree upon earlier research that VC-funds

significantly outperformed the public markets between the years of 1990-2000, but also significantly underperformed compared to public markets between 2000-2010. Both performance measurements were not sensitive to systematic risk, even though there was the IT-bubble in 1999-2000 and the financial crisis in 2007-2008. Their research indicates that the performance for different asset classes may have shifted over the past decades and that depending on what data one would use, one could see different returns and draw different conclusions.

The most recent research on PE investments performance in this research paper was contributed by J.P. Morgan back in 2018. When comparing PE returns (Burgiss Private Equity Composite) to S&P 500, they found that on average over the long-haul, PE beats S&P 500. Over a 5-year period, PE underperformed by 0,4 percent, meanwhile PE investments over 10, 15 and 20 years have outperformed S&P 500 by 1,5 percent, 3,3 percent and 6,1 percent.

The overall literature of this subject points to the fact that PE is an asset class of its own which lacks transparency and low frequency of visible returns. Being able to use standard measuring tools and techniques for risk and returns may not be applicable. Even though PE usually is associated with high returns, IRR or PME, researchers' findings have not agreed on the matter whether PE has been outperforming the market or not. Also, there seems to be great variation in IRR depending on what kind of LP that is investing and what strategy that is being pursued. Main drivers for future good performing fund returns are the necessity to a wide access of GPs and funds together with the past good performance of the GP and the GP itself.

4. Expected findings

This section highlights the expected answers and findings from the questionnaire. The expected answers have been divided into subsections based upon the questionnaire.

4.1 General questions

These general questions are necessary since the literature has identified that depending on the LP, different strategies and performance have been achieved. It is therefore necessary to be able to distinguish some LPs from other LPs in order to make conclusions later on. Since many LPs like pension funds and insurance companies only have a small part of a very large portfolio invested into PE, their risk exposure might be different compared to a smaller investor with a larger stake in PE. Therefore, one needs to single out the LPs with a small stake compared to LPs with a larger stake.

4.2 General risk questions

These questions lie as a basis for how LPs truly define and evaluate risk. We know from earlier research and literature that GPs' past performance and access to the top performing GPs is of essence in order to achieve high returns for LPs. We also know that the key risks are identified as: *liquidity risk, funding risk, market risk, capital risk and operational risk* combined with sub risks for each key risk. These questions elaborate on what is the main driver for different LPs; the return of the investment, the risk of the investment or which GP that is doing the investment. The research points to the fact that it is the return that is the main driver and not the risk associated with it.

Meanwhile, even though all risks are relevant to LPs, how relevant are they overall during the whole investment process? Due to LPs limited liability, after committing capital to a PE-fund, they should not be able to affect the market risk or capital risk. Their main focus after committing their capital should be to focus on liquidity risk, funding risk and operational risk. However, that's the reasoning for investing into a single fund, LPs that have a larger portfolio should be able to somewhat at least affect the market and capital risk using the secondary market to adjust their portfolios.

This section also contributes to the understanding of how the risk evolves over the whole investment period; from the start of the fund's life until the end. The predictions are that while all risks are relevant to LPs, they somewhat become less relevant for LPs after the capital is committed to the GPs. Therefore, one assumes that the main risk management is done in the due diligence and ex-ante process, since that is where LPs find the most appropriate investment plans and GPs that fit each specific LPs investment plan. Therefore, all risks should be minimized before entering the LPA and thereafter LPs should focus on liquidity, funding risk and operational risk for each PE-fund. Meanwhile in a larger portfolio, market risk and capital risk should be considered as well.

4.3 Ex-ante risk questions

This section of questions looks to expand on the pre-investment decisions into a new PE fund and to a follow-on fund. Since the literature can single out that access to the good GPs and GPs with good past performance being the key to good returns, it is important to understand how LPs evaluate these GPs. The literature specifically emphasizes that the top performing LPs, like endowments, had both the highest return and the lowest standard deviation (risk). Therefore, one might assume that many LPs would select the top performing funds of cash flows, NAV, PME or IRR, and not look at the volatility or risk of the investment. The same

reasoning is somewhat used for choosing the appropriate follow-on fund to re-invest in: one might assume that LPs will look at the past cash flows, NAV, PME or IRR. However, since the already invested LPs have an edge of already being in the fund, they have an upper hand on other LPs since they can use inside information to evaluate their risk and return easier compared to others. Lastly, this research paper expands on the question whether the access to GP is a risk itself, since some research has indicated that the access to the GP is the main driver for good returns.

4.4 Single funds questions (ex-post)

These questions emphasize on what risks that LPs can affect after committing capital to a new fund. As mentioned earlier, after committing capital most of the risks are in the hands of the GPs. LPs main focus should be on liquidity, funding risk and operational risk. One should be quite surprised if LPs feel that they could affect any other risks due to their limited liability. This section is necessary in order to see if there is any difference between the single fund-investor and the portfolio-investors, which it should be.

4.5 Portfolio questions (ex-post)

This part of questions contributes to the research regarding the fact if it is easier to manage risks in a portfolio of funds. The predictions are that it is much easier due to the fact that an investor can use the secondary markets to rebalance their portfolios in order to take on less risk, by either; buy shares of mature funds or selling shares to get the appropriate level of risk in your portfolio. Therefore, the access to the secondary market should contribute to making it somewhat easier for LPs to manage the market and capital risk in a portfolio of funds. However, the operational risk should not be easier to manage in a portfolio compared to the fund's individual operational risk, since the risk itself is very company-specific and individual.

4.6 Discordance among LPs

There should be a somewhat difference in answers between LPs due to their risk appetite and returns preferences. One might assume that LPs with a larger stake of their asset allocation into PE will take a more proactive approach in order to make sure returns are high and loss and risk remains low. Meanwhile LPs with a smaller stake perhaps will seek exceptional returns and therefore can take on extra risk in order to achieve those returns.

4.7 Approval among LPs

One might believe that most LPs will be reluctant towards the NAV of the funds and more focus being spent on the cash flows generated within the fund, since the NAVs can be tempered with. Furthermore, one might assume that the LPs will not put too much effort into the short-term market risk due to the fact that it is the realized value at the end of the fund's life that is of essence (capital risk). Other similarities are perhaps that all LPs would have the same view regarding how they can affect the risks associated with the investment and that most of the risk evaluation should be done before committing capital to a fund. Lastly, one might assume all LPs would have the same overall view of how the risk evolves over the lifetime of the fund, high in the beginning of the fund, lowest at the middle of the fund's life and highest in the end of the fund's life.

5. Methodological approach

Using a qualitative method to expand on a research question enables one to understand a more complete, overall and deepened knowledge by aiming to understand what is deviant from the normal, but also what is unique (Holme & Solvang, 1997). A qualitative method aims to expand on how each individual defines, evaluates and understands their surroundings and social reality, which is very much in line with the research question of this research paper. The focus in the questionnaire is on the person conducting the questionnaire, where each LP had the ability to expand on each question and answer. Even though the questionnaire is structured, the individual conducting the questionnaire had the ability to jump between questions in any preference they preferred, but also expand further on their answers (Bryman, 2005). This qualitative research paper used a case study in order to get an in-depth understanding of the research question itself in order to explain the definition and evaluation of risks in PE for LPs. In order to keep the questionnaire unbiased and stay away from misunderstandings, it is important to keep the language in the questionnaire simple and very understandable, since the answers later on need to be categorized and simplified. Benefits with using a questionnaire is its simplicity for handling data and analyzing it, compared to spoken data which has to be transcribed before one can conduct the analysis, where misunderstandings and errors might occur. (Young T.J., 2016)

5.1 Sample

The sample contains of LPs that have accepted the invitation of contributing to the research paper and answer the questionnaire. In order for the sample not being biased, the invitation was sent out to 149 different LPs simultaneously with an equal weight (15 invitations) to each LP group: endowments, sovereign wealth funds, pension funds, insurance companies, insurance banks, superannuation funds, private investors, family offices, foundations and development institutions. This research paper bases its sample upon the criterion sample approach, which means that the sample needs to fulfill some criteria in order to be a participant of the questionnaire (Marlow, 2005). The criteria were that all the participants needed to be a part of a LP company or association which is currently invested in at least one PE fund. These LPs were found through the association ILPA, which acts as an association and community for LPs worldwide. The sample consists of LPs with stakes into PE between 0-100 percent where most LPs considered themselves to have almost full access to their preferred GPs. However, not all of the LP groups were represented in the sample. All LPs that did participate were all currently invested in 20 or more funds. The questionnaire had twelve LPs participating to conduct the questionnaire.

5.2 Questionnaire

The questionnaire was structured into five categories: general questions, general risk questions, ex-ante risk questions, single fund questions and portfolio questions (ex-post). Even though the questions were asked in order, each participant could jump between sections and questions after their own preferences. This way of conducting a questionnaire enables each participant to go back and forward between questions if they feel they forgot to mention something important, or wanted to further expand on their answers (Bryman, 2005). The questionnaire can be found in the appendix (Exhibit 13). The questionnaire is built upon the literature and research that was contributed in the earlier sections. Each question has its specific purpose to expand on, either expand on the definition or the evaluation of risks. The literature together with the research contributed to the subject will lie as a basis for the

questions, all in order to be able to answer the research question. In order to be able to define what risks that LPs are facing, the participants were introduced to Figure 15 where the questionnaire enabled them to add or remove risks. The questionnaire also enabled the participants to define how the overall risk evolved and what risks that LPs are facing. On the other hand, in order to understand how LPs evaluate risk, questions regarding risk management were asked. Also, LPs were asked to explain how they evaluate risk between single funds versus portfolio. Lastly, none of the participants knew the questions before conducting the questionnaire, so their view of their definitions and evaluations of risks would remain unbiased.

5.3 Implementation & collection of the questionnaire

After the invitations were sent out to participate in the questionnaire and the research paper, the questionnaire was open for two weeks. Due to the fact that there was a time restraint on the research paper, two weeks seemed necessary to enable as many LPs to participate as possible. After two weeks the collection of answers was collected and stored. In accordance with Bryman (2008), the answers were summarized to subcategories and highlighted into smaller sentences and answers of what the participant had previously answered, all in order to get a more overall view of the answer. Further, according to Bryman as well, the findings are presented in tables at the end of the research paper in the Appendix (Exhibit 13). Each question had suggested answers together with a free spot to answers after their own preference. As mentioned earlier, each answer could be expanded on further to explain more in depth. The answers in Exhibit 13 show only the answers that at least one LP answered, the other suggested answers were removed. In accordance with Kvale (1997), the participants were first introduced to the purpose of the questionnaire and the research paper itself, in order to understand their purpose of being a participant. Also, each five sections inside the questionnaire had an explanation on why that specific part was of essence in order for this research paper to understand the definitions and evaluations of risk by LPs in PE. Also, in line with making all participants feel as comfortable as possible (Kvale, 1997); all the participants were allowed to get the questionnaire on either a Word-document or PDF-document if they did not feel comfortable with putting their answers through an online-questionnaire. However, all the participants choose to conduct the questionnaire online. In order to further make the LPs more comfortable, it was clearly stated that if any LP would not like to answer a specific question due to disclosure or similar, there was always the possibility to skip that specific question.

5.4 Validity

Validity of the study is all about how well the findings can be trusted, based upon the reliability of the participants in the study and their answers. One wants to achieve as high reliability and validity as possible, in order to make assumptions and conclusions later on. In order to achieve a high reliability, the research can be compared to earlier research regarding the same subject, which this research paper highlights in the analysis section (Holme & Solvang, 1997). The reliability also increases due to the fact that the author chooses to single out LPs that were a member of ILPA, which is a worldwide known association for LPs who invest into PE. The validity was further increased since each answer was conducted online and could not be tampered with, changed or misunderstood. Also, to increase the validity from the questionnaire, the answers were stored so one easily could go back and forward between questions in order to understand the bigger picture of LPs definitions and evaluations

of risks. What might have a negative effect on the overall generalization of the findings was that some of the answers were quite short so the author could only make very basic generalizations about the subject and not make a deep dive. Also, the sample was not represented by all LP groups, which might have a negative effect on the validity. According to Bryman (2008), in order to enhance the validity all answers were stored, where each answer could be expanded upon on an individual basis. Lastly, to further increase the validity of the report, only Chief Financial Officers (CFOs) were asked to conduct the questionnaire, since they are the ones that are central to the investment decisions.

6. Findings

This section highlights the differences and indifferences between the definition and evaluation of risks from the Limited Partners perspective which was gathered from the questionnaire.

6.1.1 General information

In order to be able to draw conclusions, this section singles out the differences and indifferences between LPs definitions and evaluations of risk. The findings expand on answers regarding definitions and evaluations of risk where the LPs have a very similar mindset for some questions, whereas some answers highlight the differences among the LPs. One can draw conclusions and see clear trends for questions where *all* the LPs have the same answer, whereas there exist some answers where each LP has chosen a different answer, and a conclusion might be tougher to conclude. Therefore, the findings were divided into four parts; the first part are definitions and evaluations which *all* LPs agree upon, the second part are definitions and evaluations which *most* LPs agree upon, the third part are definitions and evaluations which *less than half* LPs agree upon and the last part are definitions and evaluations where there is *no consistency* among LPs.

The first questions in the questionnaire were created in order to identify what kind of LP that was undergoing the questionnaire. The findings from this section shows a quite diversified sample of LPs coming from five different LP groups: family offices, pension funds, sovereign wealth funds, insurance companies and banks. The sample also displays LPs stake, or allocation, into PE, where their allocation differs between 0-10 percent up to 76-100 percent. However, all of the LPs indicate to be quite capital heavy due to them being able to be invested into more than 20 funds simultaneously. Lastly, the sample indicates that all LPs have almost full, if not full access to all their preferred GPs and PE funds. To conclude, the sample is quite diversified among different LP groups, very diversified among their stake into PE, with a good and broad network of GPs and PE funds.

6.1.2 All LPs agree upon

First off, independent of their stake or association to a specific LP group, all LPs agree upon that the risk that is associated with PE investments into funds, justify the return they get. Hence, the 10-year illiquid and not so transparent investment creates a realized value to cover the negative parts with the investment.

Secondly, Figure 15 was introduced into the questionnaire in order to get a complete view of how LPs defined their risks and to get a clear vision on what risks that were apparent. The risks this research paper has introduced in Figure 15, was good, but not complete. *All* LPs considered no risks from the risk-figure (Figure 15) to be removed, however, a few LPs submitted suggestions to be added into the figure; *valuation risk, slow repayment risk, keyman/team risk & GP allocation risk.*

Thirdly, the findings show very clearly that the main key and sub risk is the capital risk and the performance risk. The realized value of the fund is of essence and this is LPs major concern.

6.1.3 Most LPs agree upon

Most LPs agree upon that it is the ex-ante risk evaluation that is of essence to minimize their risks. If a LP could get their hands on a GP or PE fund's past performance, they can more easily evaluate their risk and return preferences, since most LPs consider that past performance is a good indication of future performance.

When looking closer at the risk evolution inside PE funds, most LPs consider the lowest overall risk is at the end of the PE fund's life if the realized value is acceptable. On the other hand, most LPs agree on the matter that bad realized value of a fund is the single most unwanted scenario, which somewhat contradicts the statement made before about the lowest overall risk at the end of the fund's life.

Regarding the short-term volatility and the NAVs offered by GPs each quarter, LPs believe that good risk evaluation and management cannot be done well enough on the basis of those four data points (quarterly reports). However, most LPs do follow the short-term volatility of their investments, even though it is the capital risk (realization and performance risk) that is of essence.

Another finding is that most LPs do find it easier to manage risks in a portfolio of funds compared to each fund by itself. Also, buying new shares into funds using the secondary market makes it easier for LPs to evaluate the risk due to the fact that the fund is somewhat more mature and can show some performance compared to new funds.

The last conclusion to be made from most LPs is the fact that funding and operational risk is easier to manage after the capital is committed, meanwhile liquidity, market and capital risk is as difficult to manage before as after committing the capital. That conclusion is however only true when comparing individual funds by themselves between before and after committing capital. Another view is expressed when there exist many funds and LPs can manage their risks in a portfolio. Most LPs agree upon the matter that all risks except market risk, are easier to manage in a portfolio compared to an individual fund.

6.1.4 Less than half LPs agree upon

While most LPs have indicated that the principal-agent problem, where GPs take on extra risk due to their limited downside, is a problem, there exist large differences on the individual level.

The question that highlighted if there should exist a GP risk (risk of LPs not having access to the preferred GPs or PE funds) showed a variety of different answers. However, considering the general information questions, all LPs that participated in the questionnaire had almost full, if not full access to all their preferred GPs and PE funds, which might make the answers to this question somewhat biased. Among the individual answers, it was the LPs with the lowest stake, 0-10 percent of their allocation into PE, that indicated there should exist a GP risk.

6.1.5 No consistency among LPs

Most LPs do define the highest of overall risk to be at the beginning of the fund. However, they are not aligned on what is the main driver for that high amount of overall risk. Some believe that the main driver for the overall highest risk is when there exists the highest degree of capital calls, while some indicate it is during the period when the highest number of investments are done. On the other hand, some LPs consider the highest overall risk to be when the investments are done, but it is just not apparent until exit. Overall indicating a very broad spectrum of answers and definitions.

The last topic highlights the most important main driver or variable, in order for LPs to make commitments to a completely new fund or reinvest into a follow-on fund. Starting off with what LPs consider the most important driver when investing into a new fund, one can split the groups into three; LPs that look at past returns, LPs that look at the past risk or volatility and LPs who look at the GPs. Most LPs take into consideration who the GP and its team is before investing, meanwhile few LPs look at the volatility or risk of GPs past performance or who the returns. Taking a closer look into the main driver for committing capital to a follow-on fund displays somewhat other findings. The main driver for LPs to reinvest into follow-on funds is the past performance they have received from the GPs, and not the GP and its team nor the past volatility or risk of the investment.

7. Analysis

This section contributes to an overall analysis on how well the literature is in line with the findings from the questionnaire.

7.1 Analysis of the definition of risk in Private Equity

7.1.1 Risks associated with Limited Partners

Once the participants of the questionnaire were introduced by Figure 15, which was supposed to illustrate all risks that LPs faced in PE, it became quite clear that it was almost complete. Figure 15 acted as a basis for the LPs to take a stand towards in order to see how complete the risk-figure actually was. While no LP suggested that any of the risks in Figure 15 should be removed (even though some mentioned that some of the risks were very uncommon), a few participants suggested adding the following risks: *valuation risk, slow repayment risk, keyman risk & GP allocation risk.*

Valuation risk is the risk of not valuing an asset correctly, which might contribute to an under- or overvaluation of the NAV itself. The wrongful valuation might be on purpose or not, but either way it should be considered a risk for LPs, especially since it is the capital risk (realization and performance) of the asset that is of essence. Biased valuation might also contribute to the risk management and evaluation of risks ending up being wrongful due to biased data and valuation from the GPs, creating an evil circle based upon biased valuation. This risk is closely related to the research contributed by Driessen et.al (2007) and Cumming & Walz (2009) on the matter of how the NAV is reported and how it may be biased.

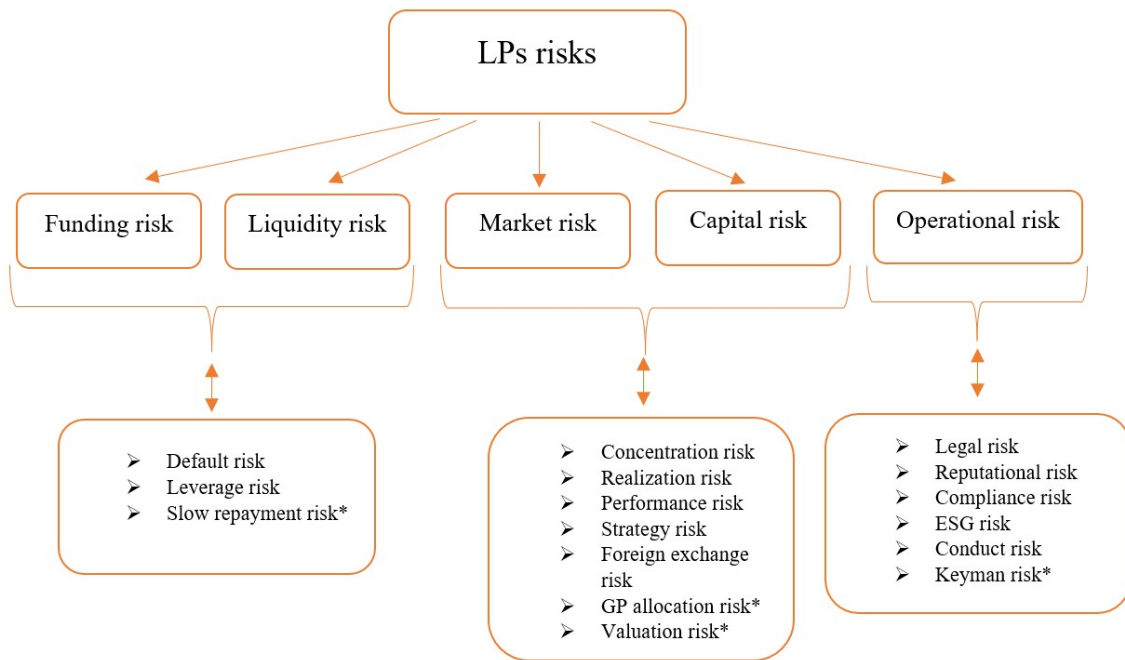
Slow repayment risk is according to its name, the risk that GPs will slow down the distributions to LPs. This is especially an important risk when the GPs know it is their last fund, since it is the realized value that is dependent on the GPs salaries and fees. So, in order for the GPs to get their share, they cut down on the distributions to the LPs in order to make sure they get their share.

Keyman risk is the risk of team members within the PE firm, not being able to, or want to, pursue their mission of being a GP. This can have large effects on the competence and strategy of the GPs and the LPs investments. In some cases, LPs do have the right to end their contract with a GP if such an event would occur. Either way, this is a risk for LPs since it might have a tremendous effect on the operational and capital risk for the fund.

The last addition is the GP allocation risk, which is closely related to the strategy risk. Meanwhile strategy risk focuses on the daily operations of their investments, the GP allocation risk is the strategy for choosing the appropriate investments to invest in together with the appropriate amount of capital to allocate to that investment. Since the Information Memorandum only indicates what kind of investments will be pursued and towards what industries, it does not specifically indicate what companies they will invest in. Therefore, it is always a risk that a GPs might invest too much into an investment that will not be as successful as wished for.

Finally, this research paper can now illustrate the complete risk figure in Figure 18, showing the newly added risks added to the previous risk figure in Figure 15.

Figure 18: Complete definition of LPs risks

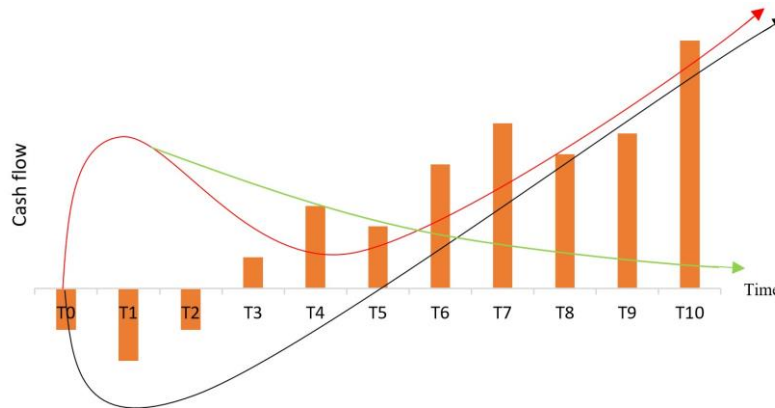


(Note: * indicates that those risks were added to the figure after conducting the questionnaire)

7.1.2 Evolution of risk throughout the fund

The overall risk is high at the fund's early years when there are large investments made and no positive cash flows, meanwhile the lowest risk is associated with the last years of the fund's life when you can locate the highest amount of positive cash flows and distributions. However, most LPs agree on the matter that if the performance or realization is not as expected at the fund's last years, this is where most risk is located. Therefore, one cannot truly identify when there is overall highest and lowest risk, but one can define that it is high risk in the early years of the fund's life and lower risk in the middle of the fund's life. This is supported by the fact that some LPs do not even consider the short-term volatility risk, since it is the capital risk (realization & performance risk) that is of essence, which is in line with the estimated findings. The is also supported by the fact that it was the key risk capital risk and its sub risks performance and realization risk that *all* LPs agreed upon that was considered the most important risk. Which is also confirmed by the fact that almost everyone indicated the "worst case scenario" would be if there is a bad realized value of the fund. Therefore, this research paper can now illustrate the evolution of the overall risk in a PE fund, by two scenarios (Figure 19). Meanwhile both scenarios will contribute to large risk at the early years in a PE fund, the two scenarios split due to their success or failure of investments. If the investments are successful, the overall risk will follow the green arrow and will therefore have its highest risk at the beginning of the fund's life. Meanwhile if the investments are not successful, the overall risk will continue the red arrow's path to have its highest overall risk at the end of the fund's life. Furthermore, this definition of the evolution of risk inside a PE fund is how LPs perceive their risk. The lowest overall risk perhaps should be considered in the shortest time frame when the outcome is less unknown, compared to the early years of a fund's life when the outcomes may vary quite large.

Figure 19: Definition of the evolution of overall risk in a PE fund



(Note: Red arrow indicates how the overall risk evolves if investments do not meet the expected realization or performance, meanwhile green arrow explains the evolution of the overall risk if the investments are successful. Black arrow represents the “J-curve”.)

7.1.3 Risk-Return Trade-off

The risk-return trade-off could, according to the participants in the questionnaire, be applicable in PE funds, which does make sense. Taking on larger risks like investing into VC or mezzanine capital, should be considered a higher risk, but are also associated with large returns if successful. Comparing those investments to investing towards already established companies with steady cash flows, should be associated with a lower overall risk, but also a lower return if successful.

Assuming that it is the early years of the fund’s life that is experiencing the highest risk, it should also be associated with the highest return, but there are no positive cash flows nor distributions in the early years of the fund’s life. Meanwhile most LPs did agree on the matter that there existed a risk-return trade-off scenario within the PE fund, they might think of the red arrow in Figure 19. The red arrow indicates that there is highest risk associated with the later years of the fund’s life, which makes more sense when applying the risk-return trade-off scenario. This is where most risk is associated with, but also highest return (in this case distributions). To conclude, the risk-return trade-off is only applicable when investments do not pan out as expected.

On the other hand, if one expands on the thought that some of the LPs that participated suggested; that it is the investing in the early years of the fund’s life that sets the risk and return profile, it does make sense. But that also suggests that the risk is not that high at the beginning of the fund’s life, meanwhile the true risk is associated with the later years of the fund’s life, and the realized value. In that case, the risk-return trade-off is applicable. There is quite low overall risk at the early years of the fund’s life, which is associated with no cash flows or return, and at the end of the fund’s life there is highest risk which is associated with the positive cash flows and distributions that do occur. Now, the risk-return trade-off is truly visible, but it all depends on the investments done in the early years of the fund’s life.

7.1.4 Main drivers for investing and reinvesting

One of the more interesting findings was the variables, or main drivers, that LPs considered most important when investing into new funds and reinvesting into follow-on funds. On an individual basis there was consistency; if one LP chose the main driver to be the NAV before investing into a new fund, it also looked at the NAV as the most important driver when choosing to reinvest into a follow-on fund. Other than that, the consistency was low between

the LPs; while some LPs chose to look at the volatility and risk of the past funds, others considered the GP and its team, while some focused on past returns and performance. This might be somewhat connected to Lerner et al. (2007) and their research on how different LPs and their sophistication allow them to look at different risks and returns. On the other hand, it somewhat contradicts the research contributed by Kaplan & Schoar (2005), whose research pointed towards return being the main driver and not the risks associated with the investment. However, of greatest importance was also to see that none of the participants chose to look at the returns or volatility of cash flows, which was quite a surprise. Since it is the cash flows that is the one thing that GPs cannot interfere with and is ultimately what drives the realization of the fund. To conclude, the estimated findings did not align with the findings, since the participants chose to rather look at the NAV than the assumed cash flows.

Lastly, one might have assumed that there would exist a larger difference between investing into a new fund and reinvesting into a follow-on fund, mainly due to the inside information that the already invested LPs possess. Even though some of the LPs did consider the return and volatility of their investments to be the main driver, most LPs did consider that the GP and its team being the most important driver when choosing to invest into a new fund. This is in line with the earlier research. Therefore, being able to attract the best GPs and their funds should be of greatest importance.

Very few of the participating LPs did consider the NAV to be the main driver, both for investing into a new fund and a follow-on fund. It does make sense, since earlier research pointed to the fact that the NAV could easily be tempered with, but also since there could occur large biases in the NAVs when funds are getting closer to attract capital to follow-on funds, which was supported by Cumming & Walz (2009).

Due to the fact that LPs are already in the partnership with the GP when it is supposed to make their commitments to a follow-on fund, it should have some more information, or inside information, about the operations and their skill to create value. Therefore, there should exist some deviation from when an LP is supposed to invest into a new fund compared to a follow-on fund. There existed a slight change between the LPs when investing into new funds and follow-on funds, their view changed somewhat more towards the returns of the investments rather than the GP and its team. Which might suggest that it is tougher to evaluate a new fund whether to invest or not, because a follow-on fund will only be attractive to reinvest into if the return is acceptable. This finding might however be explained by the research contributed by Manninen et al. (2010) that LPs that reinvest into follow-on funds tend to get a very similar performance, where the return of the fund in this case is the performance.

7.2 Analysis of the evaluation of risk in Private Equity

7.2.1 Risk management in individual funds and portfolios

Starting off to compare single funds and their risk management, both ex-ante and ex-post committing capital to PE funds and their GPs; the findings indicated that it was simpler to manage funding risk and operational risk ex-post compared to ex-ante, meanwhile it was tougher to manage capital risk after one had committed its capital. LPs had the same difficulty to manage liquidity and market risks ex-ante and ex-post. Being able to manage capital risk would of course not be simpler ex-post since LPs do not contribute to the daily operations of the fund and its investments, hence the ex-ante commitment decisions and due diligence is of greatest importance. Therefore, those findings were as expected and do make sense. This is also in line with the fact that LPs do consider that most risk management and evaluation can and should be done ex-ante committing capital.

Secondly, comparing a single funds ex-post risk management to risk management in a portfolio of funds ex-post, shows indications of it being easier overall to manage risks in a portfolio rather than each fund by itself. Funding risk becomes even easier to manage, while liquidity risk becomes significantly easier to manage. This may be due to the fact that portfolio holders can allocate their stakes into different funds, meanwhile the single-fund investor has all its stake into a single fund. Also, capital risk now becomes easier to manage, probably due to the availability of using the secondary market to sell and buy new shares of funds, which might fit the LPs portfolio better than the previous fund. However, market risk is the risk that seems to be least easy to manage, since most LPs indicate it is as tough to manage it in an individual fund as it is in a portfolio, which does make sense. Market risk is very unpredictable and being a LP makes it even harder to manage, since they are not aware of the daily operations within a fund. Therefore, market risk should be as tough to manage in a single fund as in a portfolio. This finding was in line with the research contributed by Invest Europe and BVCA, that less risk management should be towards market risk due to its unpredictability in the long-term. Adding to the problem is the illiquidity of the secondary market with slow and expensive deals that would be made in order to manage the market risk in a portfolio. Overall, the findings were pretty much in line with the expectations, since many participants indicated it was much simpler to manage risks in a portfolio. However, the expectations were that market risk should have been at least somewhat easier to manage in a portfolio, but that is not the case.

7.2.2 Risk-Adjusted Returns

Even though research by Kaplan et al. (2005), Harris et al. (2012) and J.P. Morgan (2018) indicated that the returns of PME and IRR, net and gross, showed quite different performance from LPs, *all* LPs did agree on the matter that the risk they took on when investing into PE justified their return. That itself does indicate that even though on average the returns were not that high, LPs are willing to take on quite some risk to achieve high returns and understand that the investment will not be successful every time. Perhaps the research by J.P. Morgan (2018) is the reason behind it; on an average year PE does not beat the market, but over time, ten to twenty years, PE outperforms the market.

7.2.3 Limited Partner sophistication

Even though the questionnaire was not represented by all LP groups, one could still easily see how different LP groups choose different answers, for example regarding what is the main driver for investing in a new fund or reinvesting into a follow-on fund. This may be connected to the research by Lerner et al. (2007) and their view on how the sophistication and knowledge of the LP, chooses to look at different variables and main drivers. Meanwhile some identified the returns to be the main driver, others chose the volatility or the GP to be the main driver, which clearly is in line with Lerner et al.'s research that LP groups do experience quite different returns and performance, since they apparently look at different main drives. While some GPs have the lowest volatility and some the highest IRR, they will attract different LP groups depending on the LPs preferences and risk appetite. The overall inconsistency among how the LPs did answer the questionnaire shows how the previous research by Lerner et al. and the estimated findings are in line with these findings.

7.2.4 Risk Management

The research done by Manninen et al. (2010) is very much in line with the findings presented in this research paper. Their findings indicated that it was the access to funds which was of essence. While all the LPs that contributed to the questionnaire considered themselves to have pretty much full, if not full, access to GPs and their PE funds, they all agreed that past performance is a good indication of future performance. That itself indicates that access to the preferred GP and PE fund is of essence for future returns, which itself indicates that past risk is a good indication of future risk (if one would to assume the risk-return trade-off). In order to evaluate risks, most LPs did not believe that the four data points (quarterly reports) presented by GPs was sufficient for making good predictions and evaluations of their risks. This finding strikes as quite odd, since LPs cannot do too much too fast if there is a deviation from their expected findings between quarterly reports. The secondary market is quite illiquid and rebalancing a portfolio on the secondary market during the three-month period could become very expensive and time consuming.

Evaluation of risks was considered to be much easier when considering buying shares on the secondary market compared to a completely new fund. This makes sense since mature funds already show trends and GPs can present their investments, compared to new funds that only can contribute with the Information Memorandum. This is very much in line with the research contributed by Lerner et al. (2007), whereas their research pointed to the fact that it was the top-performing LP who invested into older and more mature funds. However, LPs might have other risks to think of when investing on the secondary market. There could exist a problem or issue that the buyer of the investment is not aware of, but the LP is aware of but chooses to hide, also known as *adverse selection*.

Even though the whole sample did have more than 20 active funds that they were invested in, they all agreed on the matter that it was easier to manage risks in a portfolio of funds. Which does make sense, because in the portfolio one can truly manage the risks using the secondary market to rebalance their portfolios to either buy or sell shares.

Lastly, most LPs agreed on the matter that ex-ante risk evaluations are of greatest importance when choosing between ex-ante and ex-post risk evaluation. That is also in line with predictions since LPs are limited liable and cannot affect the operational activities in the fund, their ex-ante risk evaluations should be of greatest importance.

7.2.5 General Partner access

Digging deeper into the questions whether “GP risk” should be a risk or not, there exist clear differences among the participants. However, even though the sample might be biased since they all have access to their preferred GPs, it should have been biased towards *not* being a risk. But the findings showed indications of GP risk actually being a risk. Due to the sample being as it is, one cannot draw a conclusion on the matter, but there are some indications that GP risk should be a risk and further research is needed on the subject in order to draw a conclusion.

8. Conclusion

In order to answer the research question regarding LPs definition of risks in PE, a complete view of what risks that are associated with LPs have been illustrated using a combination of literature, research and by participating LPs. The five key risks were identified to be: *Funding risk, Liquidity risk, Market risk, Capital risk & Operational risk*. The research paper also successfully managed to illustrate and define the overall risk evolution inside a PE fund, which was estimated to be high at the beginning at the fund's life, where most investments are done. Meanwhile, there exists uncertainty where the fund's lowest overall risk was located, which seemed to be dependent on whether the investments at the beginning of the fund were successful or not. If the investments were successful, or at least acceptable, the lowest risk was associated with the last years of the fund's life. Meanwhile, if the investments did not pan out the way one expected, the highest overall risk was located at the end of the fund's life and one could find the lowest overall risk somewhere at the middle of the fund's lifetime. This finding is very much in line with the fact that all LPs did consider the capital risk to be the most important risk due to it being the main driver for the realized value and performance of the fund.

Looking into the evaluation of LPs risks in PE, it was considered quite clear that it was easier to manage their risks when the LPs had multiple funds under management. Using the secondary market to rebalance funds might be one of the main tools to minimize risks by buying new shares in funds and selling of shares in funds that do not match their specific portfolio or risk appetites. The risk that was toughest to manage was clearly the market risk, which is heavily due to the fact that LPs are limited liable and cannot affect the daily operations. Meanwhile, buying and selling shares on the secondary market can be very expensive and illiquid in order to rebalance a portfolio. In line with the increased popularity regarding PE investments, *all* LPs did consider that their risk associated with the PE investments was justified. Most LPs did agree on the matter that past performance was a good indication of future performance, which was in line with earlier research that it was of essence to have access to the preferred GPs in order to minimize risk and maximize return. However, LPs do not agree on the matter of what is the main driver for LPs in order to commit capital to a new PE fund or reinvest into a follow-on fund. Even though there existed a wide spectrum of the most important main driver for both new funds and follow-on funds, most LPs did consider the GP and its team being the most important main driver for new funds, meanwhile the return of the investment was more important when one would consider to reinvest into a follow-on fund or not. LPs preferring the return in order to reinvest into follow-on funds might be an indication that LPs assume that past returns are a good indication of future performance. Meanwhile investing into a new fund, LPs are in pursuit of GPs that are true money makers and can make value of the LPs capital, but also find a partner in the partnership that is trustworthy and one can rely on.

This research paper is a first step for how LPs, the ones that contribute the major part of capital into the PE funds, define and evaluate risk. LPs do face many risks, but with extensive due-diligence and access to the preferred GPs and PE funds, LPs can minimize their risk and have high expected returns already before investing, since their position in the partnership is very limited after they have committed their capital. Due to LPs position in the partnership, they are a very important piece in the PE symbiosis and their risk management is of essence not only for the LPs, but for the whole society, since everyone contributes with capital.

9. Limitations

Since this research paper focused on LPs definition and evaluation on risk, GPs risks were not considered. The paper was also limited to PE investments into funds, not co-investments nor direct investments were considered. Since there is a lack of transparency in the PE industry, the questionnaire has been somewhat written in order for LPs to answer without giving out direct investment strategies or risk management, this research paper solely focused on the general and overall definitions and evaluation of risk. Due to the fact that each asset class and LP group contribute to different risks and expected returns, this research paper had to focus on the overall definition and evaluation risk for LPs.

10. Further research

Since this research paper touches the basics of LPs risk and only lie as a basis for further research, the two additional risks *Adverse selection & General Partner (access) risk* may need some further research and could act as a complement and addition to this research paper.

Regarding the adverse selection, further research may look into what variables LPs can and should look at in order to not miss out on additional risk when entering the secondary market. Since this research paper did not meet the preferred sample in order to answer whether GP risk should be a risk or not, new research with a sample that has a wide range of access to GP, from full to none, is of essence.

Beyond that, further research into each specific PE asset class and LP group could be interesting, mostly due to the fact that different risks and expected returns are associated with each asset class, but also each LP group has different risk appetites which itself contributes to different risks and expected returns.

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13. Appendix

Exhibit 1: LPs performance

	Overall					Early-stage VC funds				
	N	Fund size (MMS)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)	N	Fund size (MMS)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)
Public pension funds	2,317	984	4.8	7.6	2.6	365	320	4.8	12.1	1.1
Corporate pension funds	759	826	4.6	5.1	3.1	141	228	4.4	9.4	3.1
Endowments	1,433	588	4.7	20.5	16.9	542	309	4.8	34.6	28.9
Private endowments	953	613	4.8	20.8	19.1	379	324	4.8	33.4	30.7
Public endowments	214	701	4.9	16.2	3.2	61	344	5.4	30.6	7.6
Foundations	266	404	4.1	23.9	23.3	102	233	4.1	44.3	43.4
Advisors	1,667	782	4.6	-1.8	-3.0	551	343	4.5	-0.5	-0.6
Insurance companies	594	542	4.0	5.5	2.1	148	238	4.3	2.6	-5.3
Banks and finance companies	573	721	3.5	-3.2	-4.1	89	252	3.4	-13.9	-13.2
Other investors	244	429	3.7	4.8	5.9	98	148	2.9	-6.8	-6.5
Overall	7,587	777	4.5	6.9	3.8	1,934	299	4.5	12.8	7.7

(Source: Lerner, Schoar & Wong (2007))

Exhibit 2: LPs performance

	Later-stage VC funds					Buyout funds				
	N	Fund size (MMS)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)	N	Fund size (MMS)	Fund sequence number	Fund IRR (%)	Weighted fund IRR (%)
Public pension funds	910	593	5.6	10.8	4.7	1042	1,557	4.0	3.2	1.5
Corporate pension funds	260	376	5.5	10.9	8.1	358	1,389	3.9	0.3	0.3
Endowments	493	465	5.4	19.3	15.3	398	1,118	3.8	0.1	0.5
Private endowments	307	482	5.6	19.2	17.4	267	1,174	3.9	2.1	2.4
Public endowments	91	517	5.5	17.1	4.8	62	1,324	3.5	-5.0	-5.4
Foundations	95	361	4.6	22.2	20.6	69	717	3.4	-2.1	-0.3
Advisors	601	680	5.5	-1.0	-3.8	515	1,370	3.7	-4.3	-4.5
Insurance companies	218	443	4.6	12.3	7.9	228	835	3.2	-0.6	0.7
Banks and finance companies	177	444	3.8	1.0	-0.4	307	1,017	3.3	-2.2	-3.3
Other investors	86	480	5.4	17.8	20.2	60	815	2.6	-2.3	-2.3
Overall	2,745	544	5.3	9.4	5.2	2,908	1,314	3.7	0.4	-0.3

(Source: Lerner, Schoar & Wong (2007))

Exhibit 3: Possible clauses within the LPA

1. **Parties** – Identifies everyone involved into the partnership
2. **Recitals** – Defines why the LPA was created
3. **Definitions & Interpretation** – Define time periods (e.g., Accounting Period), define terms and interpret how rules should be interpreted
4. **Name & Place of Business** – Required by law. The partnership must have a name and be registered somewhere
5. **Establishment** – Defines what kind of partnership it is. Where it is registered and under what Act (Limited Partnership Act)
6. **Purpose of the Partnership** – Describes the fund, describe the GPs activities, investment constraints and investment policy
7. **Duration of Partnership** – Specifies the period for the life of the partnership and exceptions for early closing or extending life of the partnership
8. **Capital & Loan Contributions** – Defines the drawdowns from LPs
9. **Loan Commitment** – Defines how the partnership can call for investor's capital and when drawdowns for loans are cut-off
10. **Allocations, Sharing & Distributions of Partnership Profits** – Defines the order of loans to be repaid and how profits, provision and losses are shared between all parties
11. **Carried Interest** – Known as the performance fee, which in this clause defines the profits the GPs will make from their performance
12. **Appointment & Removal of the General Partner** – Defines the possible grounds for removing the GP
13. **Powers, Rights & Duties of the General Partner** – Defines how the GPs can operate with the committed capital in the fund: what investments can be made and with what size.
14. **Power of Limited Partners** – Defines the liability and rights from the LPs
15. **Withdrawal of Partners** – Defines situation for partners to leave, both on own preference and on preference of others within the partnership
16. **Borrowing & Bridge Financing** – Defines GP appropriate methods to undertake when in need of financing
17. **Establishing a New Fund** – Prevents GPs to open up new funds if there is still capital that has not been allocated or invested
18. **Co-Investment Rights** – Defines how Co-investments can be made or if they are allowed
19. **Fees & Expenses** – Establishes the fees and expenses: management fee, establishment costs, transaction costs and fee income of the general partner
20. **Transfer of Interest** – Defines the conditions and rules for transferring partnership
21. **Termination of Partnership** – Defines bankruptcy, liquidation or other causes of termination of the partnership between all parties
22. **Follow-on Investments** – Defines how follow-on investments can be made and if they are allowed
23. **Accounts & Reports** – Defines how the partners will share information regarding their investments, financing and tax returns at a specific frequency
24. **Meetings of Investors** – Defines when and how often meetings will be held
25. **Consents, Meetings & Votes** – Defines decision-making and describes who can impact and how
26. **Representations & Warranties** – Describes who can represent the partnership and how
27. **Advisory Board** – In order to represent the limited partners best interests
28. **Information Memorandum** – A formal prospective for investors describing the key elements of the GPs investment policy
29. **Deed of Adherence** – Template for becoming a LP or Power of Attorney.
30. **Variation of Agreement** – Defines how the LPA can be flexible and how
31. **Indemnification of General Partner** – Defines how indemnification are taken care of
32. **International Issus** – Describes how the partnership should adapt to international regulation and laws
33. **Miscellaneous Legal Issus** – Describes Governing of law and jurisdictions, power of attorneys, confidentiality etc.
34. **Legal options** – Defining limited and full liability, tax status etc.
35. **Document to be signed by Investors** – Signature from all partners

(Source: BVCA, 2002)

Exhibit 4: BIS key risks, their problems and their solutions

Risk	Problem	Solution
Liquidity risk	Shortage of liquidity that may result in LPs not being able to meet short-term obligations	Stress test, scenario analysis
Principal-agent problem	GPs taking more risk to boost returns	LPA, Hurdle rates

Exhibit 5: Invest Europe key risks, their problems and their solutions

Risk	Problem	Solution
Legal risk	LPs getting to involved into daily operations which results in LPs losing their limited liability	Unbiased risk manager, due-diligence
Funding risk	LPs being able to pay committed capital	Funding test (stress tests), unbiased risk manager, due-diligence, monitoring
Liquidity risk	Shortage of liquidity that may result in LPs not being able to meet short-term obligations	Stress test, unbiased risk manager, VaR, due-diligence, monitoring
Market risk	Fluctuations in market prices for assets	Cluster analysis, diversify, unbiased risk manager, due-diligence, NAV & cash flow modelling
Capital risk	Losing some or all of the invested capital	Cluster analysis, diversify, unbiased risk manager, due-diligence, NAV & cash flow modelling

Exhibit 6: EIF key risks, their problems and their solutions

Risk	Problem	Solution
Operational risk (Legal, reputational & compliance)	-----	Risk framework (The Charter)
Liquidity risk	-----	Stress testing

Exhibit 7: MC & BVCA key risks, their problems and their solutions

Risk	Problem	Solution
Funding risk (default risk)	LPs not being able to pay committed capital	Funding tests, cash flow models, do not over-commit if assets are illiquid, have a plan for extreme situations
Liquidity risk	Unable to redeem their investment at a specific time or the secondary market is very illiquid or not offering a fair value	If one is only invested in PE there is no way to circumvent this risk. However, large portfolios from pension funds or insurance companies, other assets could be traded.
Market risk	Fluctuations in market prices for assets	De-smoothed NAVs and diversifying over different FX, geographies, markets, industries.
Capital risk	Losing some or all of the invested capital	Diversify over different funds, vintage years, direct and co-investments, regions, industries and stages of funding and weight each investment equal or use DPI and TVPI
Realization risk	Risk of receiving lower distributions than expected	Diversifying over many funds

Exhibit 8: AP6 key risks, their problems and their solutions

Risk	Problem	Solution
Market risk (Share price, currency & interest rate risks)	Fluctuations in market prices and cash flows for assets	Maximum of 10 percent MV assets to be exposed to currency risk & use of derivatives
Credit & counterparty risk	A party's inability or unwillingness to pursue its obligations	Diversified portfolio to minimize company specific risks
Liquidity risk	Shortage of liquidity that may result in LPs not being able to meet short-term obligations	Liquidity reserve of 10 percent & use of credit facility
Performance risk	Goals & expectations of investments not being met	Constant monitoring & having members on the board
Operational risks	Financial loss as a result of human errors, system breakdowns etc.	Constant mapping, documenting and education
Sustainability risks	Investments not following the protocol set by AP6	Reviewing & assessing companies' pre-investment & continue to improve post-investment

Exhibit 9: BlackRock key risks, their problems and their solutions

Risk	Problem	Solution
Market risk (Currencies, commodities etc.)	Fluctuations in market prices for assets	Cash flow analytics, stochastic analysis & diversification
Liquidity risk	Shortage of liquidity that may result in LPs not being able to meet short-term obligations	Have at least some liquid assets

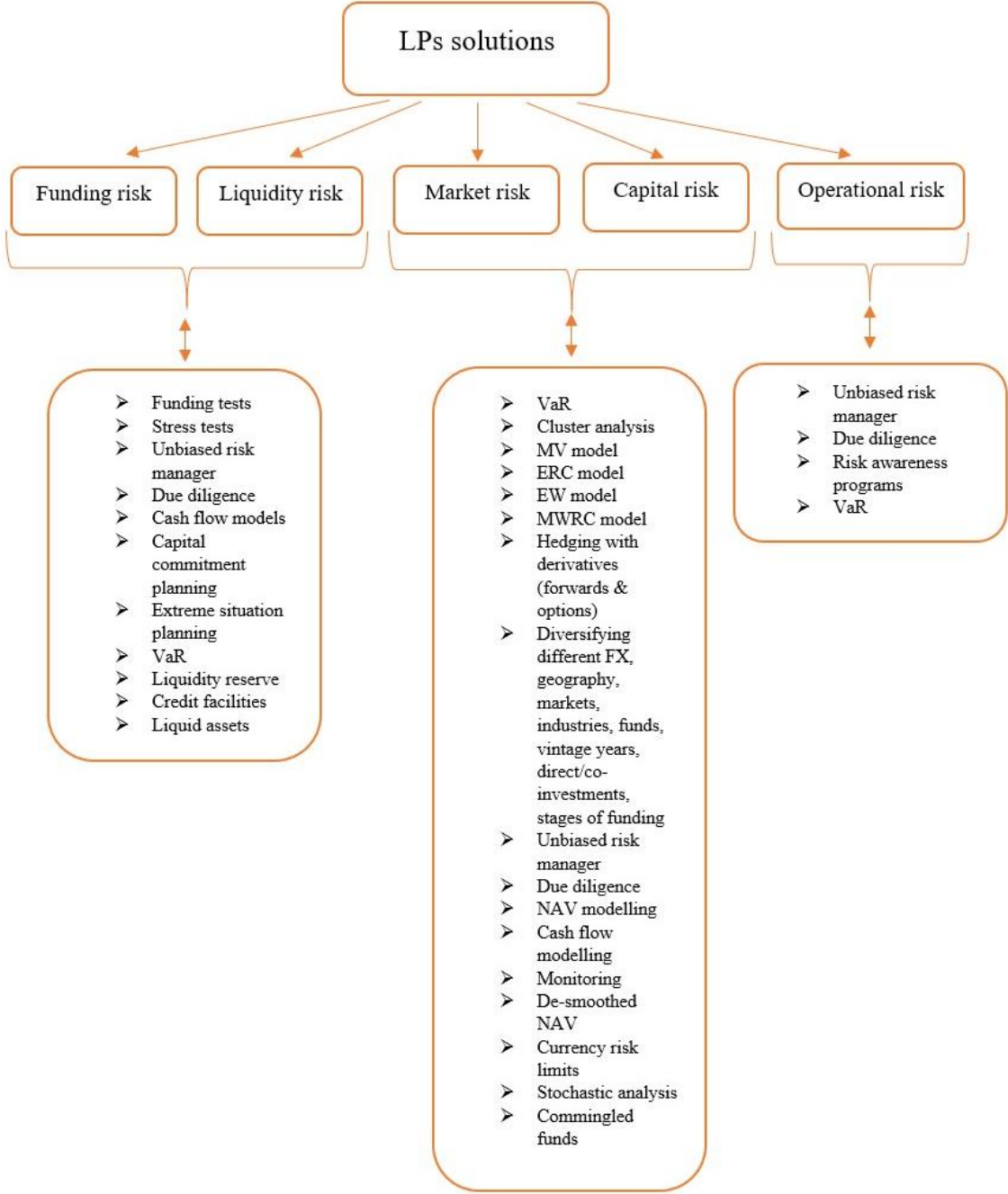
Exhibit 10: J.P. Morgan key risks, their problems and their solutions

Risk	Problem	Solution
Market risk	Fluctuations in market prices for assets	Good due diligence and usage of commingled funds
Liquidity risk	Unable to redeem their investment at a specific time or the secondary market is very illiquid or not offering a fair value	Use secondary market to smoothen out the J-curve and help with diversification (diversify over vintage years)

Exhibit 11: PEI key risks, their problems and their solutions

Risk	Problem	Solution
Market risk	Fluctuations in market prices for assets	Diversification using MV, ERC, EW, MWRC or usage of VaR
Capital risk	Losing some or all of the invested capital	Diversification using MV, ERC, EW, MWRC or usage of VaR
Operational risk	Financial loss as a result of human errors, system breakdowns etc.	VaR, due diligence
Currency risk	Unfavorable movements in currencies leads to losses	Hedging, diversified portfolio over different currencies, currency forwards, currency options
ESG risk	Risk of worsening reputation	ESG rules from PEI, PRI, BVCA etc.

Exhibit 12: Summation of LPs key solutions to their risks in Private Equity



(Note: Summation of solutions from ILPA, BIS, Invest Europe, EIF, BVCA, AP6, BlackRock, J.P. Morgan & PEI)

Exhibit 13: Summation of the results from the questionnaire

Invitations was sent out to 149 Limited Partners with equal weight from the different Limited Partner groups: public pension funds, private pension funds, superannuation funds, endowments, foundations, insurance companies, insurance banks & family offices. 12 Limited Partners answered the questionnaire and contributed to the research.

General information Questions

What kind of Limited Partner are you?

Pension fund	33,3%
Family office	16,7%
Sovereign wealth fund	16,7%
Insurance company	16,7%
Bank	16,7%

How many PE funds are currently invested in?

More than 20	100%
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How much of your total assets is allocated and invested in Private Equity? (%)

0-10%	33,3%
11-25%	16,7%
26-50%	16,7%
75-100%	33,3%

Do you as a Limited Partner consider yourself to have access to invest along any General Partner (Private Equity firm) that you'd prefer?

Yes, no problem	16,7%
Yes, pretty much	83,3%

General risk questions

Do you as a Limited Partner consider the principal-agent problem (General Partners taking on extra risk when investing Limited Partners' capital in order to achieve high returns due to their limited downside) ever being a problem for you?

Yes, a big problem	16,7%
Yes, a small problem	50,0%
No, not really	33,3%

Since a Limited Partner is limited liable and not a part of the daily operations, do you consider most risk evaluations for a new fund has to be done before (ex-ante) or after (ex-post) entering a new partnership?

Risk evaluation before is of greatest importance (Ex-ante)	66,7%
Both are equally important	33,3%

When do you as a Limited Partner consider that a Private Equity fund has its overall highest risk?

At the beginning of the fund	33,3%
When there is the highest degree of capital calls from the General Partners	16,7%
When there is the highest degree of investments done in the fund	16,7%
In line with the last investments	16,7%
Beginning of fund but not apparent until exit	16,7%

When do you consider a fund has its overall lowest risk?

End of funds life	66,7%
At the end, if realization (exit) value is OK	16,7%
When there is the highest degree of positive cash flows into the fund	16,7%

Do you believe the risk you take on when investing into Private Equity usually justify your return?

Yes	100%
-----	------

Do you as a Limited Partner believe that the risk-return trade-off is applicable for the return and risk within a Private Equity fund?

Yes	66,7%
No	16,7%
Not sure	16,7%

Do you as a Limited Partner believe that your risk evaluation can be evaluated good enough on the basis of 4 data points (quarterly reports from General Partners) per year?

Yes	33,3%
No	66,7%

Would you as a Limited Partner say that past performance of General Partners and Private Equity funds are a good indication of future performance?

Yes	66,7%
No	33,3%

What do you consider being the worst scenario for a Limited Partner that could occur when investing into a Private Equity fund? (You may write your own under "Other")

Bad realized value from fund (exit of fund)	83,3%
Bad reputation	16,7%

Do you as a Limited Partner follow the short-term market volatility and risk evaluations considering that it is the realization/exit-value of the fund that is of essence?

Yes, it is very important	16,7%
Yes, it is somewhat important	66,7%
No, it is not important	16,7%

Overall, which one of the key risks below is your biggest concern?

Capital risk	100%
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Overall, based on previous question, which one of the sub risks below is your biggest concern?

Performance risk	83,3%
Realization risk	16,7%

Looking at the picture below with all Limited Partners risks, is there any risk/risks that you believe that should added? Either key risk or sub risk.

Slow repayment risk
Keyman/Team risk
GP allocation risk
Valuation risk

Looking at the picture below with all Limited Partners risks, is there any risk/risks that you believe that should be removed? Either key risk or sub risk.

No

Do you as a Limited Partner consider it a risk itself, let’s call it “General Partner risk” (Limited Partners not being able to invest along the preferred General Partners and Private Equity funds), a risk?

Yes	33,3%
No	50,0%
Not sure	16,7%

Ex-ante risk questions

Before committing capital to a fund, which risk/risks can you as Limited Partner truly affect? You may choose several answers.

Funding risk	50,0%
Liquidity risk	33,3%
Market risk	33,3%
Capital risk	66,7%
Operational risk	50,0%

Which variable is of greatest importance for you as a Limited Partner when considering to invest into a new Private Equity fund?

Past funds realized MOIC	16,7%
Teams' past performance	16,7%
Who the GP is	16,7%
Past funds NAV	16,7%
Past funds volatility of IRR	16,7%
Whether the GPs are true moneymakers	16,7%

What is the main driver for you as a Limited Partner in order to not reinvest into a fund?

Past funds volatility of IRR	20,0%
Overall consistency	20,0%
Who the GP is	20,0%
Past funds NAV	20,0%
Past funds IRR	20,0%

Assuming that you as a Limited Partner wants to invest on the secondary market (buy shares of a Private Equity fund that is somewhat mature), would you find it easier to risk evaluate that fund compared to a completely new Private Equity fund or a follow-on fund?

Yes	83,3%
Not sure	16,7%

Ex-post risk questions

After committing capital to a new fund, which of your risk/risks can you as a Limited Partner truly affect after the investment has been done? You may choose multiple answers.

Funding risk	66,7% (+16,7%)
Liquidity risk	33,3%
Market risk	33,3%
Capital risk	50,0% (-16,7%)
Operational risk	66,7% (+16,7%)

(Note: In parenthesis is the change in percent between ex-post committed capital compared to ex-ante in single funds)

Do you believe that you as a Limited Partner easier can manage risks in a portfolio, where you are invested in multiple funds?

Yes	83,3%
No	16,7%

After committing capital to a new fund, which of your risk/risks can you as a Limited Partner truly affect in a portfolio of funds? You may choose multiple answers.

Funding risk	83,3% (+16,7%)
Liquidity risk	66,7% (+33,4%)
Market risk	33,3%
Capital risk	66,7% (+16,7%)
Operational risk	66,7%

(Note: In parenthesis is the change in percent between portfolios and single funds ex-post committing capital)