# Allocation to Private Equity among Nordic Investors

## By

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Master Thesis within the main profile of Financial Economics

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## Executive Summary

Do Nordic investors allocate an optimal share of their portfolios to private equity? This study argues that they do, but there are many aspects that have to be considered that cannot be perfectly modelled. By finding an optimal portfolio and then comparing the actual allocation to private equity among limited partners, indications that they are allocating close to optimal can be found. The methods used for this purpose are two different analysis; mean variance analysis for finding an optimal portfolio and a survey among Nordic limited partners to find out more about how they are allocating.

The mean variance analysis of a portfolio containing equity, bonds, and private equity shows that Nordic investors should invest between three and nine percent of their assets in private equity. Two different time periods have been used for the study to see differences; one from $1^{st}$ January 1994 to $1^{st}$ January 2009 and one ending one year earlier. For this study a relatively new type of private equity is used; listed private equity. The most challenging decision when including private equity is the choice of proxy, so that you can find data and returns that are comparable to other asset classes. With listed private equity daily market prices are available, and hence we do not have the same problems that we have with other measures of private equity with stale pricing and only quarterly data; not often traded and valuations are seldom updated.

By conducting a survey among Nordic institutional investors that have invested in private equity I find that they on average have allocated 4.8% to private equity; their target allocation is slightly higher at 6.1%. This indication of investors wanting to increase their allocations in the asset class is also seen from the fact that most limited partners will remain at the same allocation or increase it in the coming year. This place their allocation in-between the two different optimal portfolios found by using different time periods; the historical data gives very different future expected returns. Other findings from the survey includes: small buyout and secondaries will be popular investments in the coming year while large buyout and venture capital will be less popular, few of the limited partners use mean variance analysis as their main approach to determining their target allocation to private equity, and while many investors believe that fair value reporting from private equity funds is positive they also see negative sides to this form of valuation techniques.

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## Foreword

This dissertation has been written as part of my Master of Science in Economics and Business Administration at the Norwegian School of Economics and Business Administration (NHH). With a major in financial economics, my minor was taken on exchange in Taipei, Taiwan, I thought about writing about private equity on an early stage of my study. It has been an industry that have taken a big part of the business environment during the years I have been studying at NHH, and the topic I have found most interesting. I have to admit that I sometimes during the period that I have been writing this paper have been tired of the topic, but I still believe that it is the most interesting topic for me to write about even though it at times is difficult to find useful information about. I do not regret choosing this subject though, and feel that I have learned a lot from theory and articles read, but even more from experiences and thoughts from other that have knowledge about the industry and are really interested in the topic.

This thesis could not have been written if it were not for the help I have gotten during the semester. I would therefore like to thank my thesis advisor Professor Carsten Bienz that has helped me with finding the topic and guided me during my writing. Argentum has provided me with contact information to Nordic investors, data and useful tips regarding my thesis. I would especially like to thank Kristina Evenson, Daniel Rygg and Maria Borch Helsengreen. At last, but not least, I have to mention the contribution given by portfolio managers that have taken time to answer my survey and give me feedback about their thoughts regarding allocation to private equity and other issues on the subject.

I hope this paper will give you an interesting perspective on the Nordic private equity market and some useful information on the subject.

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Per-Cato G. Trønnes, Bergen, 06.20.2009

# 1 Introduction

"Properly selected investments in leveraged buyouts and venture capital generate high returns relative to other equity alternatives, enhancing overall portfolio results." This is expressed by one of the most successful portfolio managers in recent years, Swensen (2009: 220). The process of find the proper investments and understanding the private equity asset class has proved to be difficult though. It is this complexity that has motivated me to study it in more detail throughout my thesis.

In this introductory part I will start by elaborating on the motivation I have for choosing this topic, before I discuss the limitations of this dissertation; to make it clearer what the actual focus is. Then at last I will go through the various parts of thesis to make it more comprehensible to see how I have tried to answer the problems I want to in this research paper.

## 1.1 Motivation for Choice of Topic

The complexity mentioned is there because the private equity market is not efficient; it is difficult to find information about funds and their performance, there is no secondary markets, getting access to invest in the best funds will be limited, etc. All of these aspects will be discussed more in detail through the paper. More generally my interest for private equity comes from the boom in the buyout industry that we have seen in the recent years, peaking in 2006/2007, with a focus on largest deal in particular. This initial interest have developed into an interest for the due diligence process behind investments and managing these portfolio companies. In this thesis the focus will be on the investors' side though; studying different aspects of their asset allocation to private equity. This topic is especially interesting because of the difficulties finding a good proxy for private equity for using modern portfolio theory and gives an opportunity to learn more about what investors think about the asset class.

Private equity has become increasingly popular to write about in master thesis at NHH as well; so many topics have been covered previously and, from my point of view, it was important to find a subject that had not already been covered to a great extent. It seems like many of the papers I have looked at on the subject focus on performance of companies owned by private equity firms and other performance related topics. From this I saw the

opportunity to study the industry more from investors' perspective and the issues they have to take into consideration when they are deciding if they should invest in private equity and how much to invest.

More precisely, I chose to write about how investors decide on how much they should allocate to the asset class and what methods they use. From the papers I have read at the NHH library, only one thesis has had this focus before, Aaberg and Tennfjord (2008). They have written about how Norwegian investors should allocate capital to private equity. The focus of this dissertation is to look at it from a strict portfolio theory perspective and coming with a recommendation on how much a Norwegian investor should allocate to private equity. What I want to reveal through my studies is how investors are actually allocating and how they have decided on their target. Similarities between my paper and the one that has been written before is that I will present modern portfolio theory as a background to the survey I will do among Nordic investors that have invested in private equity. Instead of focusing on one country, I will try to find a general portfolio that is optimal for Nordic investors. These results will be used, not only for the interesting findings in itself, but for comparing with the results from the survey. Some of the methods, proxies and calculations will be similar, but with updated data that will most likely give different results since they will be highly influenced by the turmoil in financial markets that we have been witnessing since they wrote their paper.

Focus of mine will therefore be on a survey that checks how much investors have actually allocated to private equity and other aspects around their allocation. Among the things I would like to find out more about is: actual allocation compared to target allocation, if they have a theoretical approach to determining their target, how they will change their investments in the coming year etc. I believe that this will give me information about the private equity industry that has not been focused so much on yet, especially in the Nordic countries. As a background to this, I will discuss how relevant modern portfolio theory is to determining allocations for investors to the asset class by looking at previous studies on the topic and by doing a portfolio analysis myself. This should make me able to do some conclusions about the relevance of portfolio theory generally and among Nordic investors especially.

## 1.2 Limitations

As I said will this not be a thesis that focuses on finding an optimal portfolio allocation to private equity, it would be a thesis on its own to find an optimal allocation for Nordic investors and compare differences among the countries. My calculations are for this reason as basic as I feel it is possible to do them without making them meaningless when it comes to this part. I will encourage future students that are thinking about writing a paper on the topic to study differences among regions/countries when it comes to allocation to the asset class, but that is not what I intend to do here.

When I talk about allocation to private equity here, I have not studied thoroughly how investors think about different types of private equity and diversification within this asset class. The only thing included on this topic are some parts of my survey that focuses on what type of private equity investors currently have, and what their view are on investing in specific types in the coming year. This could have been further studied.

The investors that I have included in my study have already invested in private equity at some point of time; they might not have investments at the moment. This means that I have not looked at investors that have not invested in the asset class at all. It would be interesting to see how they think about investing as well, and what stops them from doing so.

I would also like to mention the possibility for more in depth studies of a few investors that are investing in private equity, which I have not done. This would be a case study of some different institutions, to look more closely at issues that they are experiencing and differences between countries and types of institutions. Looking at some specific cases would have been a possibility that would have worked well with the topic and structure of my thesis, but I have still decided not to do it, so that I am able to highlight the important findings from my study in the best possible way.

## 1.3 Structure of the Thesis

Compared to some types of master thesis that have been written by many, finding a good structure and what to include has not been as easy in the process of writing this paper. I

have tried to reflect the topics I believe are important in the decision making process for institutional investors in general.

In the first part I want to present private equity. In light of the topic, I will not go into detailed information about the industry in general, but rather focus on the issues that are important to investors that have invested or consider investing in the asset class. The structure of a typical fund and the different roles will give an understanding of issues that will be important to have as a background when we look how investors actually are thinking about their private equity investments.

Since I will use modern portfolio theory in my discussion and some of the methods, I will present some portfolio theory. This will not be exhaustive, but the background needed for the calculations that I will do in my minimum variance portfolio analyses. It will also be valuable to have for the discussion of whether or not it is appropriate to use it and if investors use it when they find they target allocation to private equity.

In the last of the theoretical parts I will look at papers and studies on the topic of asset allocation with private equity. The main focus will be to look at articles that use portfolio theory for the purpose of studying allocation targets for the assets class and those that write about other aspects that have to be taken into consideration in the case of private equity.

In the sixth chapter a short study of optimal allocation using modern portfolio theory will be conducted, this will be done using three different asset classes; equity, bonds and private equity. It will be done for global and Nordic investors, both in US Dollars. There will be many possible improvements of these studies that I will discuss, but I believe that it will make it too extensive to do as part of this study, since it is not the main focus.

In the last chapter, before I draw my conclusions, I will have the most interesting and most important part of my paper. The conduction process of the survey and some background information from some of the few comparable studies will be presented at first.  Then I present the findings and discuss them quite thoroughly. At last I will try to make some conclusions from what I have discussed through my paper and possible future studies within the same topic.

## 2 Private Equity

The focus of this thesis will be on private equity as an asset class and on investors investing in this asset class, it will require some background knowledge about private equity and industry terms. To illustrate what is expected from the reader I will say that you should know about different types of private equity from before; buyout, venture capital, mezzanine, secondary etc.[1] This means that I use private equity as a term that represents all of these types. In this chapter I will try to give an understanding about what it means to be a limited partner, what is different from investing in other asset classes and some information about the Nordic private equity market. This will be useful information for having a better understanding of the issues to be aware of when I present my analysis of optimal allocation and the findings of the survey.

### 2.1 Fund Structure

Figure 1: Private Equity Fund Structure
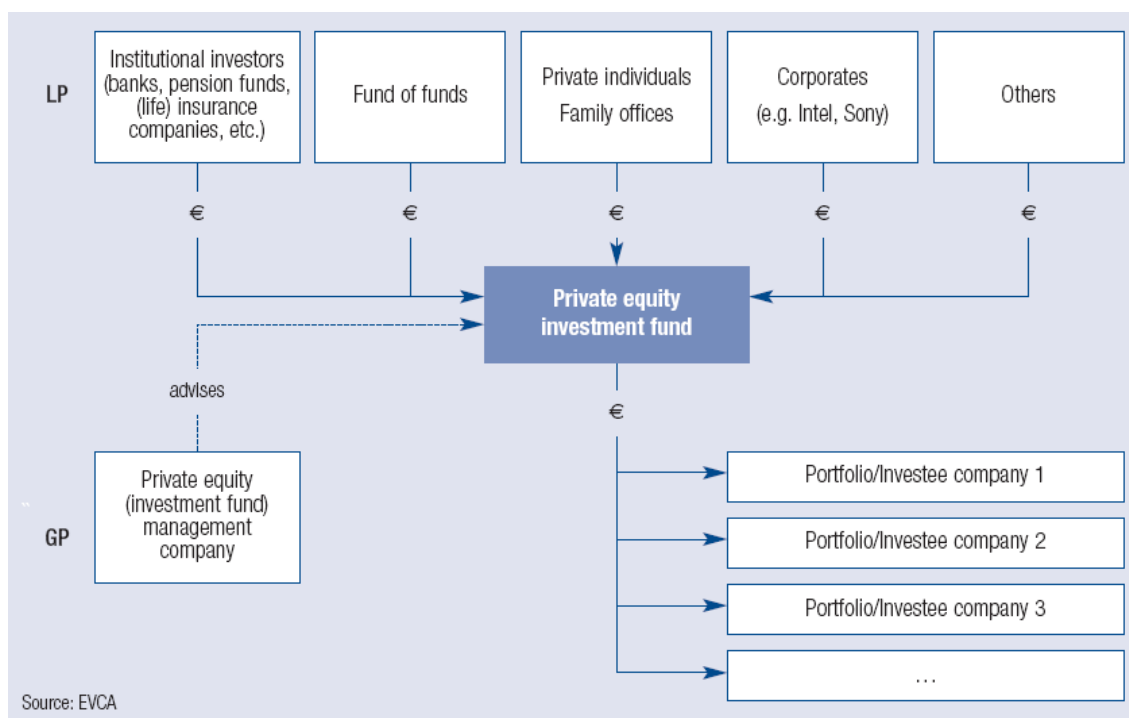


*Source: EVCA (2007)*

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[1] The European Private and Venture Capital Association (EVCA) has a useful glossary on their website for industry terms: http://www.evca.eu/toolbox/glossary.aspx?id=982

A private equity fund is usually structured as a partnership between general- and limited partners that invest in multiple portfolio companies over a finite lifetime, which is explained in the figure above. Other structures will exist, but this will be the most general type of private equity funds. You also have fund-of-funds that invest in other private equity funds, but they will in this structure be classified as limited partners.

A limited partner (LP) is mostly institutional investors, but some wealthy individuals and family offices also invest in private equity funds or manage their own funds. The focus of this academic paper will be on institutional investors, and these institutions can be pension funds, insurance companies, endowments or corporations that choose to invest in this asset class. LPs have limited liability in the partnership, committing capital, and do not take part in the day-to-day operation of the fund (Metrick 2007). Some investors contribute with industry experience and capital over time to more funds from the same general partner, so in the longer term they are more than just a passive partner, but develop a relationship to the general partner.

Since the lifetime of a fund is normally ten to twelve years it will take time before investors get return on their investments and their capital will be tied up for a long time period. For this reason and the fact that there is no efficient secondary market, a market were fund shares can be traded, private equity is viewed as an illiquid investment. A long term investment like this involves some special circumstances that you have to take into consideration when investing in the asset class. It will be difficult to rebalance your investments continuously, so they will have to decide on how much to commit to the asset class every year in order to keep the allocation relatively stable.

The limited partner decides how much to invest when the fund is raised, but in most cases does not commit all of the capital immediately. The capital will be provided on either a set schedule or when the general partner calls them. Because of these draw downs LPs have to have the capital available for the whole investment period that usually is up to five years. For the general partner this is attractive since they do not manage the capital yet, and do not have to include the period before it is committed when they calculate return on the investments (Metrick 2007).

General partners (GPs) are from a management firm, professional private equity managers that have responsibility for day-to-day operations of the fund. These professionals raise capital to the fund, screen and choose investment targets, manage investments and exit portfolio companies. GPs' income come from management fees and carried interest in most instances. Management fees will pay fixed salary for managers and some other administrative expenses. These fees will usually be a set percentage of committed capital every year, usually around 2%. Carried interest, or carry, is a percentage of the total profit from the fund. 20% can be called a standard carry, but it might vary. It varies when the carry is calculated from, in most instances it will be from when the LP has gotten back the committed capital, but it is also normal to have a hurdle rate that gives him an additional percentage (seldom more than 10%) before the GP gets a carry. The fee structure generally does not vary so much between funds, but there are often variations in the terms of the exact percentages charged (Metrick 2007).

General partner's responsibilities are many, and all these stages are important to the creations of returns for the fund. In the first stage they raise capital to the fund. Because the general partner only can manage a certain amount of capital, it is normal that some investors will not be able to invest in funds by the best GPs. It is therefore difficult to get access to these funds for investors that have no previous relationship with the managing company. For general partners they cannot just hire more professionals, because they are limited and the returns will most likely be lower if they try to raise too much capital for a fund.

The screening process or investment period will in many cases take up to five years, and hundred of companies can be screened to find one single target company. The process of finding the companies to invest in will vary between general partners, and they will also have different preferences in terms of size of investments, segment (from seed capital to buyout), industry etc that will be determined by the experience and preferences the general partner have. The initial analyses will often be based just as much on the experience of the managers as theoretical calculations. During the holding period the general partner will use its possibility to actively manage the company that they have invested in. The company might need to be restructured, hire experienced professionals that often is easier for GP to get hold of and do other improvements to the company that differs a lot in terms of what

type of private equity investment it is. Typically a portfolio company is held from five to ten years depending on the market for divesting, opportunities to improve the company and how much time is needed for these implementations, but it is also normal with shorter periods. When exiting the company it is usually a choice between a trade sale and an initial public offering (IPO), but it is also normal to sell it to another private equity fund that sees more potential for development.

**2.2 Returns and Valuation**

Measuring performance of private equity is difficult for many reasons, among them are the lack of information about the actual cash flows and there is no consistent methodology. The most common measure of return for private equity is internal rate of return (IRR). One of the drawbacks of not having a better measure of return for private equity is that it is difficult to compare with other asset classes. IRR is calculated finding the rate that gives a net present value equal to zero:

$$\sum_{t=1}^{T} \frac{CF_t}{(1 + IRR)^t} = 0$$

The cash flows include all cash flows for the company or project including the initial investment cost. The IRR can be a misleading measure though, and since there often is not consistence in the calculation it is difficult to compare different funds. With negative cash flows you can find that your net present value (NPV) increases when the discount rate gets higher, then you cannot look for an IRR higher than the opportunity cost of capital. In some cases there will be no IRR or more than one, using NPV would give a satisfying measure. Comparing funds is also difficult because of differences in when cash flows increment, if one of them tends to have cash flow later than the other NPV might be higher, but if you use IRR you can get another answer. The calculation method also means that you do not adjust for risk either, which you do when you use NPV in terms of the cost of capital (Brealey et al 2006).

An alternative to using IRR is to calculate value multiples. Multiples are easily understandable, total distributions divided by the invested capital when calculating it gross of fees. As a limited partner you will be more interested in a multiple net of fees though.

One issue that is especially negative with this measure is that it does not take time into consideration. Two investments might have the same multiple, but if one of them is return from two years while the other is from five years there is obviously a great difference. There is again an issue of adjusting for risk when using multiples (Metrick 2007).

As mentioned, as a limited partner you are interested in returns that are net of fees. Many general partners report returns gross of fees though, and sometimes do not state that the returns are actually calculated in this way. There is many other ways for fund managers to manipulate the reported returns from private equity. We have already seen that duration can be a problem with value multiples, but it can be a less evident problem when using IRR. A short holding period, investing in a company and selling again within a short period of time, will give a high IRR for this investment, but it is not so important in terms of the total return of the fund over the whole lifetime. When it is reported as individual investments it seems impressive though. It will affect the aggregate performance measure of the fund as well though, giving a false impression of the actual return. Another way to manipulate the reporting is to show the investments that have performed well, but the actual capital invested in these companies is only a small portion of the total invested capital. This means that largest investments have given a low or even a negative return that the smaller ones take the focus away from. These short term and smaller investment can actually also be investments done with the purpose of manipulating the reported measures, if two funds buy these small investments from each other results like this can be produced even. At last I would like to mention the unrealized investments that funds hold; I will come back to these valuations later in the paper though. Since these valuations are done by the GP and the LP does not have the sufficient information to reproduce them they are highly uncertain. In the end it will be certain what the actual value is, but the general partner might raise a new fund before this. When it comes to venture capital funds it might be a problem that the venture company actually has not been able to develop in the way it was suppose to, so the actual value is especially far from the reported value (Bienz 2008; 2).

Another problem with reported valuations and few market observations that we have to be aware of when wanting to calculate variances for private equity is the stale pricing bias. Because there are few observations and valuations do not get updated, there is a tendency for smoothing the returns; there will be less variance because valuations are used for many

periods. This will lead us to believe that private equity has performed better than other asset classes, but we are underestimating the risk of private equity. In the chapter about previous studies of optimal portfolios containing private equity I will come back to the problem of stale pricing and how researchers have dealt with it (Artus and Teïletche 2004).

In the early years of a fund it normally has a negative cash flow because of investment and fees, while the positive cash flows come in the last years of the life of the fund. This gives us what is called a J-curve because of the shape of the return graph. The cash flows are for the limited partner that because of drawdowns and management fees in the early years will for sure have a negative return. Important to understand is it that it does not show the annual return for each of the years, but the IRR so far in the investment *(Fraser-Sampson (2007)* :

Figure 2: J-Curve
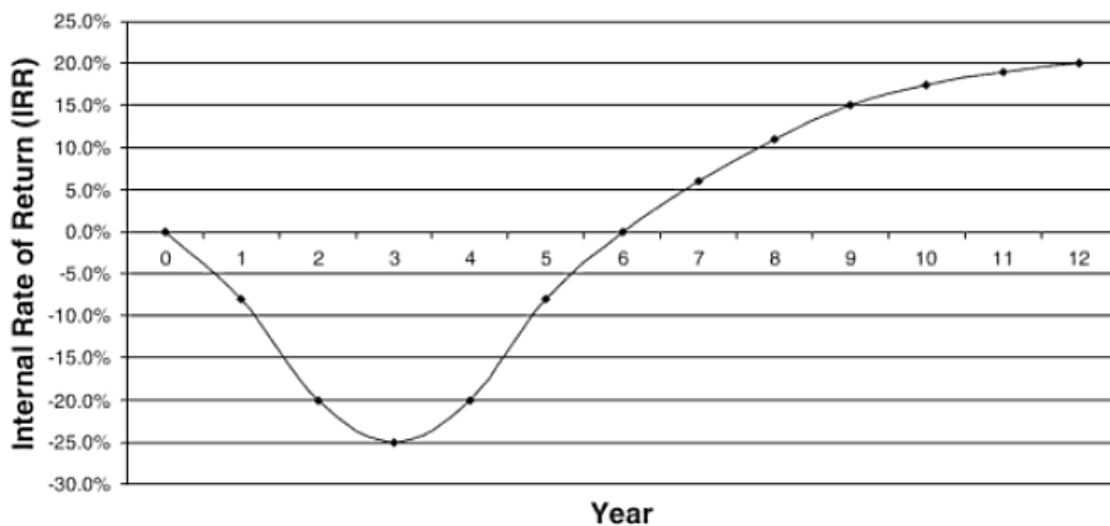


*Source: Fraser-Sampson (2007)*

It is because of this both misleading and uninformative to compare funds from their initial returns. This is important if you want to measure performance in relative terms, comparing funds based on their vintage year. A vintage year is the year that the fund was raised, in other words started. The start of the fund is important because of the changing conditions for private equity investments. It is because of this not so relevant to compare funds across of these vintage years, since they have had different conditions for their investments. It can be compared to evaluating the performance of an equity fund over a period of time; you would have to have a comparable index for the same time period to be able to do this with

meaning. Relative comparisons like this are only useful if you are deciding between funds, not for deciding if you want to invest in the asset class. You will not be able to compare the risk of the different funds either, since the returns will be reported in the way we have seen earlier in most cases as IRR or value multiples (Fraser-Sampson 2007).

Many studies have been done on the actual performance of private equity. Kaplan and Schoar (2005) find that net of fees private equity is performing similarly to the Standard & Poor 500 (S&P 500). It is highly debatable if this is actually the case though. Phalippou and Gottschalg (2006) claim that the previous study is overstating the performance of private equity funds, after correcting for the biases that they believe are in the study they find that the return of private equity is 3.83% lower than for S&P 500. On the other side Moskowitz and Vissing-Jørgensen (2002) find that the asset class outperforms the public market when comparing risk and return. It is difficult to assume that the asset class on average provides excess returns since studies show differently, but it seems to be clear that the top private equity funds give higher returns than you get in the market. Since the private equity market is not an efficient market, there should be opportunities to get excess returns because of this. This is not something that will be available to everyone though; general partners will only be able to manage a certain amount of capital and still give high returns. Because of this will it be difficult to get access to the best funds, which can choose its investors themselves; because the fees charged do not change greatly because of excess demand (Idzorek 2007).

**2.3 Private Equity in the Nordic Region**

Finally in the introduction of private equity I would like to take a look at the current Nordic private equity market. The Nordic countries are defined as Denmark, Finland, Sweden and Norway. Here the industry is still relatively young in comparison to in the US where the industry has been significant since the change of investment rules for pension funds in 1979. In Europe the UK have had the earliest developed private equity industry, but other European nations are catching up. In 2007 the Nordic countries represented 9% of the total capital raised in Europe and are becoming increasingly important. In the Nordic market there is also a big difference between the countries. Sweden is the most developed market with 79% of the funds raised in the region in 2007. Common for the other three markets,

Norway, Denmark and Finland, is that they have a higher proportion of venture capital compare to buyout than other European markets (EVCA 2008).

**Figure 3: Nordic Fundraising 2006 and 2007**
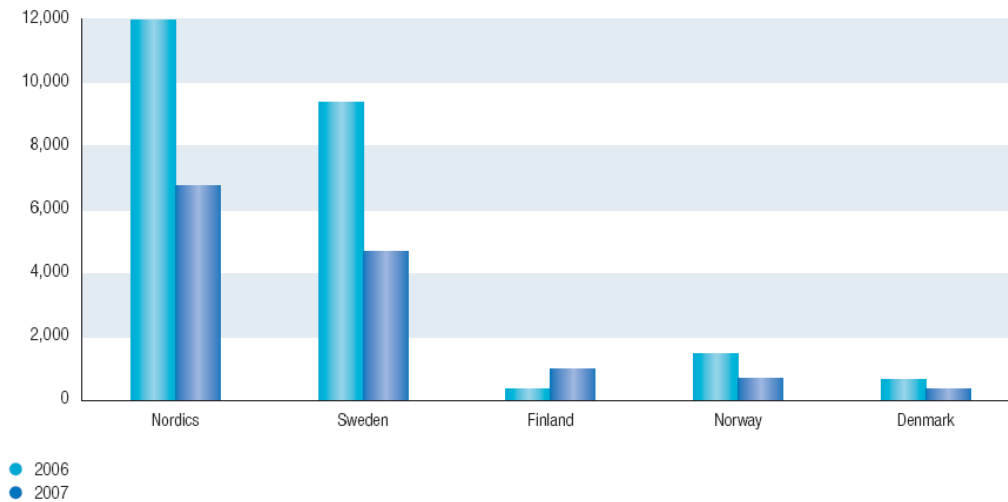


Source: PEREP_Analytics

<div align="right"><em>Source: EVCA (2008)</em></div>

In the figure you can see fundraising by Nordic private equity funds (million Euros) in 2006 and 2007. Here we can see how important the Swedish market is to the total Nordic fundraising. We also notice that fundraising in total fell significantly from 2006 to 2007; this was largely due to EQT Partners closing a fund of 4.3 billion Euros in 2006. With the focus this paper has, on limited partners, it is interesting to see that more than half (56%) of the capital was raised domestically in 2007. Only Sweden raised more capital from abroad than they did domestically, both in 2006 and 2007. At the same time Nordic limited partners are believed to have high allocations to private equity, and as we have seen they are focused on investing locally (EVCA 2008).

As mentioned, the venture capital market has been especially important in some of the Nordic countries, one of the most active in Europe with around a quarter of all deals in Europe 2007. The average deal size has also been significantly increased, up 50% from 2006 to 2007. One of the most important factors to the high activity in this market is the high R&D spending in the Nordic countries compared to the rest of Europe. The most important segments for venture capital investments have in recent years been: Business and industrial products, life science, and computer and consumer electronics. It is important to note as

well that as much as 97% of the investments were made from domestic private equity funds (EVCA 2008).

The Nordic buyout market is not as significant in terms of portion of the European total, 11% of amount invested in the region in 2007. It has had a great increase in recent years though, as rapidly as 38% from 2006 to 2007. The positive sentiment is in many ways due to many factors, but some that has been highlighted is privatisation of public services, consolidation in many industries, good financing, and export focused industries and companies. Especially the mid-market deals have increased significantly, with few large buyouts in the region. There are some of the same industries that are dominating the buyout as the venture capital market: life science, business and industrial products and services. Nordic private equity firms are dominating in terms of buyouts deals as well, but not as significantly as we saw were the case in the venture market, between 63% and 93% depending on the country (EVCA 2008).

In the most recent period that I have some data for, first half of 2008, it seemed like the Nordic private equity market experienced a slowdown together with the global downturn. Fundraising fell by 58% compared to the previous year, while investments and divestments also experienced similarly less activity (down 33% and 36%). Norway though increased fundraising by 32% in the first half of the year, as the only country in the region. Investments in venture companies also remained quite stable in terms of capital invested, even though the number of investments decreased (EVCA 2008).

## 3 Modern Portfolio Theory

Since modern portfolio theory will be analyzed as a method for finding an optimal asset allocation to private equity, I will include some theoretical background about this common method for deciding allocations to assets and asset classes. In chapter five I will use this theoretical method to find an optimal allocation for a Nordic investor investing in private equity; after having discussed different methods for including private equity in this framework and alternatives.

Modern portfolio theory was introduced by Nobel laureate Harry Markowitz (1952). When combining securities into a portfolio, diversification leads to a reduction in total risk. This diversification risk is only present when securities are not perfectly correlated. This implies that the optimal portfolio is decided by the securities return, risk and correlation with each other. To calculate the expected return of the portfolio we have to sum the weighted expected returns for each of the securities[2]:

$$\overline{R}_P = \sum_{i=1}^{N} w_i \overline{R}_i$$

The stocks listed on the New York Stock Exchange (NYSE) have an average variance of 46.619 and a covariance of 7.058 when calculated using monthly data. When more securities are included the variance of the portfolio will go towards the average covariance; in this case 7.058. Even with a few securities you will decrease the risk significantly though: ten stocks gives a portfolio with 11.014 in expected variance and with 30 stocks it is down to 8.376. The risk that remains after a wide diversification is called market risk or systematic risk, while firm specific risk has been eliminated. For this study indices will be used, so there will be a much larger amount of securities included, but it is still important to note how diversification effectively reduces risk (Elton et al 2007).

It is more complicated to calculate the variance of the portfolio, especially if there are more than two securities. I will later explain how it is effectively calculated in Excel using matrix functions. The portfolio variance is the weighted sum of variance and covariance for all of

[2] Formulas in this chapter from Wright (2008; 2)

the securities. Calculated with the following formula where N is the number of assets and $w_i$ and $w_j$ is the weight in each of these assets (Harris 2008):

$$\sigma_P^2 = \mathrm{Var}(R_P) = \mathrm{Var}\left(\sum_{i=1}^{N} w_i R_i\right) = \sum_{i=1}^{N}\sum_{j=1}^{N} w_i w_j \sigma_{ij}$$

When combining the different securities you get feasible portfolios that have different returns and risk, the ones that have the least risk for a given return is an envelope portfolio. There are two envelope portfolios that have the same risk, but the one of them with the highest return is then also an efficient portfolio. In other words this means the ones that are above the global minimum variance portfolio. The frontier above the minimum variance portfolio is concave, while it is convex below this portfolio. Together the efficient portfolios form an efficient frontier (Benninga 2000):

Figure 4: Feasible Portfolios
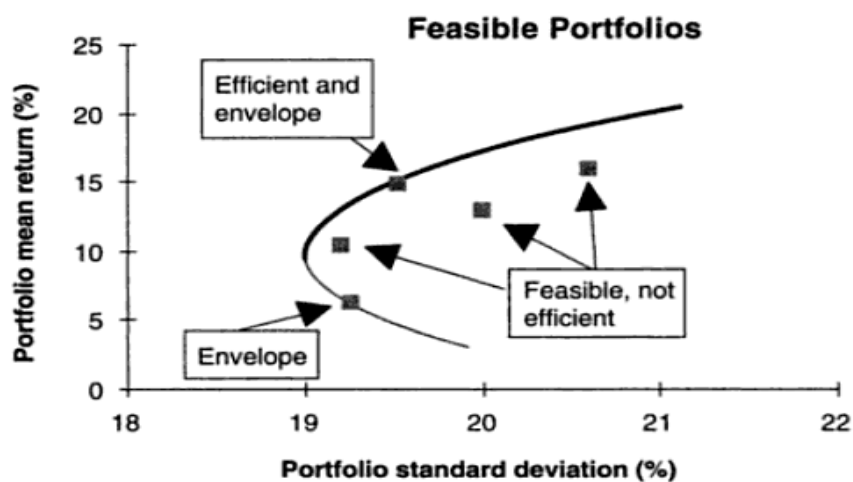


Source: Benninga (2000)

When finding this frontier one possibility is to plot all the portfolio combinations available with the asset that is in the portfolio, but this would be impossible because of the infinite possibilities. The points on the efficient frontier can be found with the following maximization problem for all possible K (Wright 2008, 2):

$$\underset{w_i,i=1,...N}{Max} \ \overline{R}_P = \sum_{i=1}^{N} w_i \overline{R}_i$$

*Subject to :*

$$\sum_{i=1}^{N}\sum_{j=1}^{N} w_i w_j \sigma_{ij} = K$$

$$\sum_{i=1}^{N} w_i = 1$$

It is a linear function, but since one of the constraints is not, it will need non-linear programming techniques to be solved. The method for solving this problem with Excel will be presented in the method section of the actual mean variance analysis, but then again matrix calculations will be used. When adding a risk free asset to the opportunity set we can find the capital market line (CML). Then there is only a choice between two different assets, the risk free asset and the tangency portfolio:

Figure 5: Efficient Frontier with CML
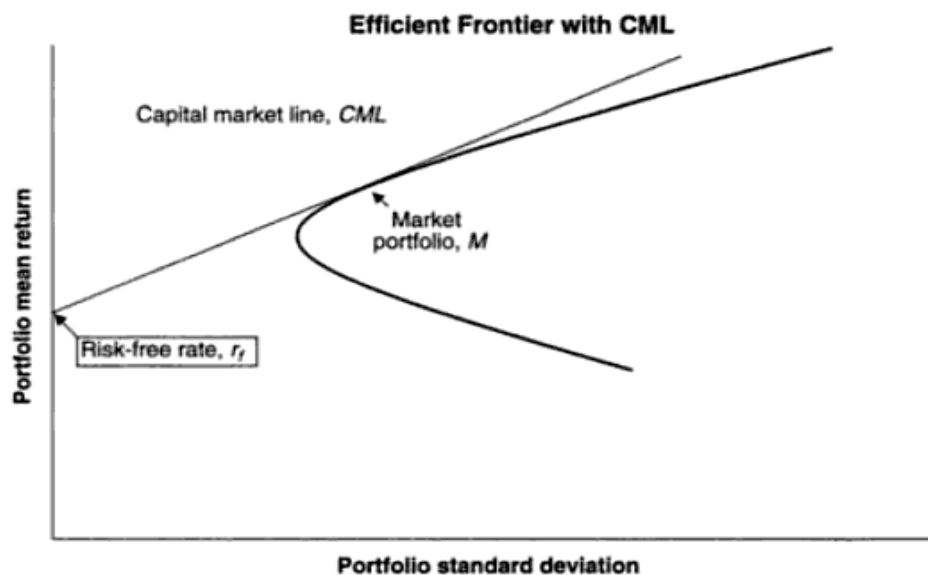


Source: Benninga (2000)

The tangent portfolio can be found by solving an optimization problem. This is the ray from the risk free asset connected to the risky portfolio with the greatest slope (Elton et al 2007). The portfolio can then be found be solving the following formula; the excess return of a

portfolio over the risk free rate divided by the total risk of the portfolio. This is also known as the Sharpe ratio (called the reward-to-variability ratio by Bodie et al (2008)); which it will be referred to in the subsequent chapters (Harris 2008):

$$\max \Theta = \frac{E(r_p) - r_f}{\sigma_p}$$

The choice will then be based on the investor's preference for risk. This is a passive strategy that generates an investment opportunity set along this line. The result is called a separation property because there is two tasks that have to be done: first calculate the optimal portfolio of risky asset and then use personal preference to decide how much to have in this portfolio and in the risk free asset (Bodie et al (2008)).

Important to notice about the CML is that investors can borrow to invest in the portfolio, so it is extended longer than just to the tangency portfolio. One assumption behind the CML is that you can both lend and borrow at the risk free rate. This is practically not possible, borrowing at this rate. According to Brennan (1971) the model can be easily adapted to this situation. In this situation there is not one, but two tangent portfolios and return have to be between these two (Elton et al 2007). I will not take this into consideration in my analysis though, I will assume that investors can lend and borrow at the same risk free rate. This theory should provide a basic understanding of the analysis performed and the theory behind it, while the practical methods will be explained in the study.

# 4 Private Equity in Optimal Portfolios

Many studies have been written about including private equity into portfolios and different aspects around this subject. I have decided to look at two different views, which do not have to be contrary, of investing in private equity from a portfolio perspective; modern portfolio theory to find the optimal allocation, and other theories and aspects that are important in the case of private equity.

## 4.1 Modern Portfolio Theory with Private Equity

Both finding a return measure for the performance and valuation data without any bias is difficult with private equity. Without the proper data it is also difficult to find risk and correlation to other asset classes. The object of looking at previous studies of private equity in asset allocation is to look at the use of different proxies for private equity and the different optimal allocations to private equity found. All of the studies that I want to look at in the first part are based on Markowitz's (1952) framework for asset allocation, but there might be some minor differences in the methods used in the five studies that I have had a closer look at. The deviances are not large and do not make much of a difference since the results and uses of proxies are the most important part for this paper.

Ennis and Sebastian (2005) have studied optimal portfolios containing domestic stocks (US), foreign stocks, bonds, real estate and private equity. They have based their results on modern portfolio theory; maximizing return while minimizing standard deviation and correlation. They have used a long time period from 1978 to 2004 to find historical data for return, standard deviation and correlation among the asset classes. The traditional asset classes and real estate are represented by the following indices: Wilshire 500 Stock Index, MSCI World excluding the US, Lehman Aggregate Bond Index and Wilshire Real Estate Securities Index.

As a proxy for private equity they have used Venture Economics Post-Venture Capital Index (PVCI). This index tracks a stock from its public offering date until it has been traded for ten years and contained 610 companies in June 2004. The index is revalued every day and returns exclude dividends. From the nature of this index one would suspect that it is highly correlated with the stock market, and this is backed up by a correlation coefficient of 0.9 for the period 1978 to 2002 between the PVCI and the Wilshire 500 Stock Index.

Expected returns have in this case not been calculated as historical returns, but by finding a beta for the asset class and then using the capital asset pricing model (CAPM). From this they find an expected normal return of 11.3% per year for private equity.

Real estate has been restricted to maximum 10% in the portfolio. With less than 60% in equities (domestic and international stocks and private equity), there is no allocation to private equity in a well diversified portfolio. Even at 90% there is no more than 6% allocated to private equity.[3] This means that from this study it looks like private equity should only be included in an all equity portfolio. I would say that the choice of proxy for this study is not optimal, since it is not actually private equity investments. The development when held privately can be significantly different from how it performs after going public and some of the private equity investments will not go public, trade sale, still held privately, bankruptcy, etc, so the data might be biased. Personally I feel that a time period back to 1978 is too far back considering the changes we have seen in the private equity industry since that time, but I guess it will be needed in order to get ten years of data after going public.

In a study by Idzorek (2007) he uses listed private equity as his proxy, as I have done in my analysis. It has to be pointed out that this study has been sponsored by Red Rock Capital, a provider of listed private equity indices. Two indices from Red Rock have been used to represent private equity in this study; US private equity and non-US private equity. I will tell more about listed private equity in my analysis of optimal portfolios for Nordic investors. The other asset classes included in this study is: cash, US and non-US bonds, and US, non-US and emerging market stocks.

At first he has found an optimal portfolio using historical returns. With a time period from 1997 to 2006 and with this proxy, private equity has outperformed other asset classes significantly; for instance has US private equity an arithmetic annual return of 29.8% compare to US equity of 10.1%. This is much higher than private equity returns in the same period represented by other benchmarks like the Cambridge Associates LLC US Private Equity Index and Thomson Financials' Private Equity Performance Index; 14.7% and 16.3%. One of the reasons for this difference might be the fact that these listed private equity

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[3] Detailed information about the efficient portfolios can be found in exhibit 5 in Ennis and Sebastian (2005)

indices have backfilled histories using the constituent weights at the time of inception. This might indicate that there is a survivorship bias in the funds included and their weights. So in addition to using the indices, he has calculated historical optimal portfolios adjusting them with time variant market capitalization of the original funds in the indices. When using the backfilled historical data the average improvement to the efficient frontier from including the two private equity indices where 6.33%. From the alternative method of calculating the data we only have an average improvement of 0.46%. At a standard deviation of 20%, portfolio dominated by equity, Idzorek recommends an allocation between 0% and 7%, which is quite a big range and it illustrates the difficulties of finding an optimal asset allocation for all investors when including alternative investments.

When he takes a forward looking approach, similar to the one used by Ennis and Sebastian (2005) calculating expected returns using CAPM, the results are similar to their study as well. Private equity only makes a difference to the portfolio that has higher risk, a standard deviation over 19%. This means a portfolio of around 85% in equity to compare to the results found by Ennis and Sebastian that had similar results. An allocation between 0% and 10% are believed to be a reasonable allocation using this forward looking approach. There are only two types of investors that should have more than 10% allocated to private equity according to Idzorek. The first one is those that believe that private equity has higher returns than stocks, which we have seen is highly debatable. The other is those that believe they have portfolio managers that with an active approach think that they can get higher private equity returns, which actually can be possible if you are in a position to pick and get access to the top quartile funds. The opportunity to use tactical asset allocations also with private equity, using listed private equity, is a new way of use private equity in portfolio management that has not been possible earlier because of the illiquid nature of the asset class.

Artus and Teïletche (2004), in a research paper for EVCA, write about asset allocation to venture capital focusing on smoothing of returns and how to correct for this. For this study a time period from 1994 to 2003 have been used with European bonds, equity and venture capital, and buyout is also introduced to the portfolio after adjusting venture capital data. In this case all of the assets have been adjusted for management fee, also bonds and equities. Data for venture capital are taken from Thomson Venture Economics. At first they study an

optimal portfolio without correcting the data used. The optimal portfolio, when the Sharpe ratio is maximized, has 8% in venture capital; 2% in equity and 90% in bonds.

As mentioned, they focus on correcting for stale pricing (smoothing of returns). I will not go into details about calculations, but will shortly present the thoughts.[4] One of the methods they use to adjust the data starts by regressing venture capital returns against public equity returns. This is done because it is believed that the observed venture capital returns are averages that are explained by the equity market and the state of the economy in general. The standard deviation and the correlation to equities are also corrected based on the regression. These changes tend to cancel each other out though, but a slightly different optimal portfolio has been found. Recommended allocation to venture capital is now 3%; down from 8% while the bonds allocation is increased with the same. Because there was not sufficient evidence for stale pricing being a problem in the case of buyout a similar correction was not needed for this type of private equity. In the maximum Sharpe ratio portfolio as much as 26.5% should be allocated to buyout and nothing to venture capital. It has been a period which buyout has performed relatively better than other types of assets that that has been studied here. Their conclusion is therefore that private equity should be a significant part of European institutional investors' portfolios, but even though they have adjusted for stale pricing there are still improvements to be done on this issue. In my opinion is it a problem that there are too few observations when you use a proxy like this. With quarterly data the volatility will be lower than if you use weekly or monthly data that is recommended to use in modern portfolio theory, but in this instance the volatility will be lower for all of the asset types. This was possible in the previous example we looked at, Idzorek (2006), when we had daily market prices.

Schweizer (2008) represents the largest study I have found in terms of number of asset classes included. In addition to the two traditional asset classes US equity and bonds he has included five alternative asset classes; asset backed securities, commodities, hedge funds, buyout and venture capital. The methods and data used are similar to some of the other studies, but it is interesting to see how the inclusion of more possible investments affects

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[4] For details about the calculations it can be found in appendix 1 in the research paper and in the article.

the results. As proxies for the private equity types he has decided to use CepreX US Buyout and Venture Capital a time period from 1998 to 2006. CepreX are indices calculated from unlisted private equity, not listed as Idzorek (2007) used, and returns are calculated from data about private equity transactions. Schweizer do not follow a modern portfolio framework exactly because he finds that some of the alternative investments are not normally distributed. Instead he uses a model where investors can choose two benchmarks and what degree of risk they want. I have included it in this part because it is based on Markowitz (1952).[5]

Two constraints have been used for the calculation of the portfolio; none of the asset classes can have an allocation higher than 30% and short sales are not allowed. He presents three different risk regimes; low, medium and high risk, and have different optimal portfolios for each of these. With low risk both buyout and venture capital have allocation as high as the allowed weights, in this category their weights are 30% to 25% and 30% to 27% respectively. With medium risk they both have around 20% allocation. Finally, with high risk venture capital gets 20% and buyout 17% allocations. We see that with this modified model we get much higher allocations to private equity, but at the same time it is difficult to compare because the results are presented differently. I cannot comment on how effective this model is for deciding asset allocations, but it is another way to deal with the difficulties including alternative investments compared to how to adjust private equity returns to fit into the theoretical framework that we see in the other studies.

At last I would like to mention a study by Kaserer and Diller (2004) that studies the cash flow from 794 European private equity funds. It is an interesting approach since it circumvents some of the problems around private equity reporting and only takes the actual cash flows distributed to limited partners into consideration. The data for this study have been provided by Thomson Venture Economics and while some of the funds were raised as early as 1972 most of the funds have a vintage year after 1985. I will only shortly present the calculations of performance measure and focus on the findings from their asset allocation study.

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[5] Information about the use of the alternative method and finding an alternative to normal distribution can be found in the article.

The study shows that 25% of the invested capital is drawn down at the start of the funds on an average and after three years 63% of the total committed capital has been distributed. When it comes to disbursements, 53% of the total disbursements have been paid out within the first six years. Maybe more important to limited partners are that it takes on average 7.4 years before they have gotten their invested money back. The calculations of the performance of the asset class have been done on a fund level. This means that total cash flows from all portfolio companies have been studied instead of individual companies. Returns, risk and correlations have been calculated using a public market equivalent (PME) in this paper because of the limitations of the IRR measure, but the PME results are based on IRR that they have found from the cash flows.

A basic portfolio with European public equity, bonds and private equity is used to study optimal asset allocations. One important point to note is how the private equity cash flows are reinvested though. The two alternatives are either to reinvest cash flows from private equity in equity or bonds; MSCI Europe Index or J.P. Morgan European Government Bonds Index. When using bonds for reinvestment they find an optimal portfolio containing 3% private equity when maximizing the Sharpe ratio as done by Artus and Teïletche (2004) as well; with 6% equity and 91% bonds. When using the same time period, 1972 to 2003, with reinvestment in public equity they find that there should be no allocations to private equity. When adjusting the period to start in 1989 instead they find an allocation of 4% in this case. Finally they have a look at how buyout and venture capital have different roles in asset allocation. The optimal portfolio with reinvestments in government bonds and the original time period then has 5% invested in venture capital and 3% in buyout.

A problem with this study is that many of the funds have not yet been liquidated. We have seen how cash flows for funds typically develop with the j-curve. It is therefore obvious that this will influence the study. In some years though the data material will be more significant than the 95 funds that now have been liquidated and more correct calculations can be done; the average age of a liquidated fund are 13 years according to the study. Kaserer and

Diller have used different methods to improve their data material, but having actual cash flows would make the study more correct since this is done to avoid estimated valuations.[6]

These five studies represent a variety in terms of methods and data used to calculate optimal allocations to private equity. Other studies could have been included, which I will just shortly mention, but they do not represent much more in terms of other results or methods. Schmidt (2006) finds an optimal allocation to private equity of around 15% using CEPRES Private Equity Analyzer to find returns for private equity. Chen et al (2002) finds that for venture capital an allocation of 9% is warranted when including the asset class in the portfolio. This means that we have a wide range for recommended allocations to the asset class or types of private equity.

From the five studies we have seen the use of five different proxies for private equity as well. Private equity investments after they have gone public, both listed and unlisted private equity indices, return data for private equity funds, and at last cash flows from private equity firms have been used. There are advantages and disadvantages to all of these methods as we have seen. I have myself decided to use listed private equity because it fits conveniently into the modern portfolio framework; I will come back to this choice in my analysis. The main problem with the data available for private equity returns is the problem of stale pricing and too few operations to directly incorporate in the Markowitz (1952) theory.

Ennis and Sebastian (2005) found that more than 80% should be allocated to equity before private equity should get a significant allocation. Idzorek (2007) finds that allocation should be between 0% and 10%. Artus and Teïletche (2004) find that private equity should be a significant part of a European portfolio. It is difficult to get an exact recommendation, but when maximizing the Sharpe ratio as much as 26.5% should be allocated to buyout. Schweizer (2008) recommends a high allocation to private equity as well, between 17% and 30% to each of the types, venture capital and buyout. This gives an allocation that, depending on how much risk you want to take, has more than half of its investments in private equity. Kaserer and Diller (2004) find that it is optimal to allocate between 0% and

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[6] Details about the improvement of the data can be seen in chapter 3.2.5; "Increasing the Data Universe".

8% to the asset class totally. In my opinion it seems reasonable with an allocation from 0% to 15% depending on the type of investor you are. Some of the findings from the studies will not be possible for many types of investors; liquidity will be an issue for many and large investors will have trouble finding enough good private equity investments with a much smaller opportunity set than for other types of investments.

**4.2 Difficulties Using Standard Theories in the Case of Private Equity**

The uncertainty and the nature of private equity raise other problems when it comes to asset allocation involving private equity. Some of these issues are due to the difficulties finding sufficient information about performance, but also issues that arise because of the illiquidity and inefficient markets. I have looked at some studies that analyses this with different views.

Ennis and Sebastian (2005) do not only discuss private equity in a modern portfolio perspective in their article, they also recognise that there are other matters that have to been taken into consideration when deciding an allocation to the asset class. One issue you have to take a stand to as an investor is whether you have the knowledge needed and can get access to the best investments. It has become a well know aspect of private equity that you have to get access to the upper quartile of funds to get excess return from investing in the equity market. It might only be possible for the large investors to hire the professionals needed to get high returns, while for smaller funds having this expertise is too expensive. One way to get this without having it internally is to invest in a fund-of-funds, but then there will also be extra costs that have to be taken into consideration.

From their study they point out that private equity is a risky investment, and that it therefore has to be considered thoroughly before it is included. Liquidity, the relative small amount of private equity investment opportunities that available compared to other asset classes, and the organization's, the employees', and the board's experience with the asset class is important for how well suited you are for investing in private equity. One point that is not discussed so often is if your institution will be able to keep information from the general partner confidential. There might be legal constraints for the limited partner when it comes to publishing the information that they have. These are just recommended issues

that have to be analyzed ahead of investing in private equity and not an answer to how much to allocate.

They recommend to look at how other similar institutions are allocating, investor practice. For instance if you are a pension fund you would look at other pension funds, but maybe also other long term investors like endowments to see differences. In a study in 2003 by Goldman, Sachs & Co they found an average of 5.9% allocation to private equity for public pension funds that invested in the asset class. For corporate pension funds and endowments the allocation was 7.7% and 14.2%. In another study it was shown that only around half of the pension funds invest in the asset class, so the number for all pension funds are much lower, 2.9%. Since so many decide not to invest in the asset class it will therefore be relevant to ask yourself first if you should invest, and why would private equity investments be a better choice for your institutions than these other similar investors. If you decide to invest using the average for those that invest might be a good start for making further analysis.

Swensen (2009) recognise that unconstrained mean variance optimization provides solutions that are not reasonable. David F. Swensen is the chief investment officer of the Yale endowment, which is considered by some to be the most successful and knowledgeable institutional investor there is. One of the aspects that have been focused on when it comes to their investment strategy is the high allocations to private equity. Among the problems using a mean variance analysis are that returns often is not normally distributed, correlation between asset classes may not be stable, and it does not take all aspects like liquidity and marketability in to account. It is obvious that this especially will be the case with alternative investments like private equity.

Since the modern portfolio theory does not fit so well it opens up for the need to incorporate some qualitative judgements. For instance, investors may have restrictions that limit the maximum allocation to any asset class by setting a limit at 30% percent of total assets. Swensen argues that it is also reasonable to limit changes in asset allocations, so that radical changes are not made. Limiting the number of restrictions and that they are sensible is especially important when going away from the theoretical framework. He claims that the historical data and mean variance provides a reasonable starting point, but the return, risk

and correlations should be reconsidered. One method proposed by Swensen is the use of a factor model, which I will come back to, but at first I want to focus on some of the other aspects that he recommends to address. When it comes to measuring private equity performance many of the same problems that we have seen and he finds it reasonable that the asset class has an expected return of 12% and 30% standard deviation. This is therefore the asset class with the highest return in his opinion, but also the one with the highest risk; also among the alternatives.[7] Because it is believed that historical data provide limited guidance for what to expect of performance for the asset class it has been focused more on the expected relationship it has to public equity and the higher risk it has, leverage for buyout and undeveloped markets for venture capital, together with the illiquidity. The historical numbers that have been modified showed a return of 12.8% and standard deviation of 23.1%. One aspect that is important is to simulate the future and possible scenarios and see what kind of allocations that actually fit your investment profile the best. It can be another portfolio, on or off the efficient frontier, which is better for your institution.

There are three issues about the management of asset allocation that is worth mentioning as well, since the process of investment is continuous; rebalancing, active management, and leverage. There are obvious difficulties to rebalance when you hold illiquid securities. This aspect will I come back to with an article from two of Swensen's colleagues, but I want it to be clear that rebalancing is important to manage the risk of the portfolio. Optimally, rebalancing to get to target allocations should be a continuous process, but this is not only impossible also very costly. Strategies are therefore to have limits that they can float before you rebalance or do it at certain times; daily, weekly, monthly, or quarterly. Active management is a strategy chosen my many portfolio managers. I will not discuss the reasonability to do this, but rather state that if it is the chosen strategy there is many pitfalls to get caught in; biased portfolios that do not represent the benchmarked they have used in their study of risk/return, a bias that can lead to hiring professionals with the same bias in their mindset of investing and not having the time period perspective that the strategy used requires. Many investments can lead to higher leverage than is directly observable which

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[7] Table 5.2 in Swensen (2009) shows the modified risk and return for all of the asset classes.

investors have to have an understanding of. Holding riskier asset than the market portfolio and derivates are among the securities that can give you a higher leverage than you believe you have, while cash has a opposite effect. This might lead to deviations from the policies set.

As an alternative to using a modern portfolio theory approach Terhaar et al (2003) recommends using a factor model. This approach is also recommended in Swensen (2009), but I will look more into detail on it here. In a factor model historical data is not used in the same way as we are traditionally used to, it is more of a forward looking method. The authors argue that using a traditional approach with historical data is not correct for alternative investments because of biased data. At first using modern portfolio methods have been looked at to have a comparable to the factor model. For this study they use a portfolio of US and non-US equity and bonds together with different alternative investments; private equity, real estate, natural resources, and hedge funds. It shows that it is difficult using historical data; portfolios are dominated by the alternatives at reasonable risk levels.

Swensen (2009) proposed that assets with the same fundamental drivers have the same risk characteristics, this is because there can be big differences within one asset class. One example of this is bonds; investment grade bonds are very different from junk bonds that in many ways have more common with equity in terms of risk. This is the thought behind the use of a factor model which I will explain closer. In the study by Terhaar et al (2003) twelve primary factors have been used to capture the systematic risk as best as possible for the asset classes. Some of these factors are the equity market, currency, fixed income and other data that can explain the risk of all of the conventional and alternative assets. After doing this regression method for all of the assets a covariance matrix is made using the results from the regression and the covariance of the factors. To find the return and the risk of the asset classes a similar approach like the CAPM has been used with a world market portfolio of traditional and alternative assets. So risk is in this way measured to the world market of all types of financial investments, not only to one factor like is usual with a market equity

return.[8] Another issue that has been considered is the need for a liquidity premium for the alternative investments. This has been done using a multi period Sharpe ratio instead of a one period calculation. To avoid the possibility of biased data they have also decided to use a simulation approach instead of a mean variance approach. For a medium risky portfolio, 5% percent is recommended to be invested in private equity.[9] Important to note is that this is not an optimal portfolio, but what the authors call an appropriate mix. Totally 20% were allocated to alternative assets in this study which compared to the more traditional methods were they found that alternative assets dominated the portfolio significantly it is quite a difference. They also point out two aspects about investing in alternatives that cannot be adjusted completely for in the calculations and that an investor has to address when deciding on the target allocation; that the increased diversification actually improves the risk/return relationship and that the liquidity premium is important when looking at the performance of these asset classes.

One aspect of private equity investments that is not directly about the optimal asset allocation is how much to commit to private equity each year and how to rebalance portfolios. Takahashi and Alexander (2002) and Nevins et al (2004) are among those that have helped finding appropriate rules for this aspect of private equity investments. The reason why this is an issue for private equity is because of the illiquidity and uncertainty in terms of when drawdowns and distributions will come. When you have decided on a target allocation for private equity using previous mentioned methods it will then be an issue about how to stay relatively close to this target in the long term.

A simple rule of thumb proposed by Cardie et al (2000) is to commit an amount equal to target allocation every second year. In practice many institutional are using similar rules to this, which is easy to follow. While it is practical it does not take all aspects into account; it does not give a mechanism for modifying future commitments based on past performance and does not have a theoretical argumentation. Past experience also shows that the private

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[8] Other aspects have also been taken into account when calculating risk and return which can be seen in the paper because markets are not actually fully integrated.
[9] Exhibit 8 in Terhaar et al (2003) shows the complete portfolio.

equity industry is more cyclical than other asset classes and continuously changing, so a more flexible model is needed.

This theory will not be directly relevant for the studies I do in this thesis so I will only present how the authors try to solve the issue, but I feel that is important to notice the problem when discussing allocations to private equity. Takahashi and Alexander's model, which are used by the Yale endowment where they are employed, try to take many of the mentioned aspects into account without making it complex. It tries to analyze the portfolio impact of varying return scenarios, changing rates of investments and distribution. The model gives an output that shows the capital contributions, distributions and net asset value. An analysis of these three cash flows and values numbers gives the investor an opportunity to at any time see how their allocation is compared to the target and how much they can invest when they are considering participating in new funds. For the Yale endowment this is obviously important since they are trying to continuously rebalance their portfolio, which is difficult with private equity.[10] Nevins et al (2004) presents a model that is more complex, but gives more of a straight forward answer to what the exact commitment every year should be. From this study they find when doing a sensitivity analysis that target committed capital should be between around 15% and 20% each year depending on the returns in both the public and private equity market.[11] This leads us to another important point about having a target that changes depending on market conditions. With large changes in market values of asset classes that is not perfectly correlated, which we have been a witness to with the financial crisis, you can get trouble rebalancing your portfolio because illiquid investments cannot be changed so rapidly. Having a flexible model like this that takes changes in returns into account will help you to allocate more properly though.

It is obvious that there are many issues with the performance and investments of private equity that cannot be perfectly considered in a traditional mean variance study. In the next two chapters this thesis will have the same focus; at first looking at a possible optimal allocation for Nordic investors before I study how they actually are allocating and their

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[10] The paper from The Journal of Portfolio Management goes through an example on how they have done this for venture capital, but the model is flexible enough to use for other illiquid asset classes as well.

[11] Exhibit 8 in Nevins et al (2004) shows the complete sensitivity analysis.

thoughts around this choice. I suspect to find that when investing in private equity these limited partners are using qualitative methods, not only theoretical. As we have seen, this makes sense because the private equity market is not actually efficient and it is difficult to find how it has performed historically while it is still an industry developing and changing quickly. Having the knowledge of the best portfolio managers and access to the best funds are therefore essential to making good investments in the industry. We have also seen ways to look at expected returns for private equity not in the sense of historical data, but methods to predict the future return and risk. I will not apply any of these in my study, but I have presented them because they contribute with valuable information about how to solve the problem we have with smoothened valuations, illiquidity and recent changes in the industry.

## 5 Optimal Allocation for Nordic Investors

The details around the calculations done in a modern portfolio study of mean variance optimization and how much Nordic investors should allocate to private equity will in this chapter be studied closer. From the previous chapter we have seen that there are many complications when doing this with alternative asset classes, but the volatile markets that we have observed lately will also influence this study. This will be used as background information for the observations found about how much Nordic LPs allocate to private equity and how they actually settle on their allocation. Doing an exhaustive study of optimal allocation is not the intention of this paper, it will be enough for a paper on its own, but I still feel that it is important to include calculations on the topic to be able to explain better what kind of approximations and issues that will have to be dealt with if you want to use this method to find your target. As we already have seen from previous studies, there will also be many other aspects that have to be considered when you invest in private equity.

The proxies used for this study will at first be presented with focus on the one used for private equity, which we have seen is important for the study and also what kind of adjustments that can be done to the data. This portfolio will be fairly basic, and include: equity, local equity for the Nordic countries, bonds and private equity. With this information an optimal portfolio for a global investor will be found before the same is done for a Nordic investor. The latter study will be done in US dollars with Nordic equity in the portfolio to reflect a domestic bias. It has been done in US dollars since there is no common Nordic currency and the currency risk can be hedged by investors themselves.

### 5.1 Data
Calculations will include three different asset classes; equity, bonds and private equity. Other ones could have been included like real estate, commodities, and hedge funds, but I want to use a basic portfolio to see how the inclusion of private equity affects the traditional portfolio in this case. Equity will in my calculations be divided into global and national equity by using two different indices in the model. This would have been interesting to do with private equity as well, but with the proxy used there is no index for Nordic private equity. All of the data used for this analysis have been collected from Thomson Reuters Datastream; indices, exchange rates and risk free rates. All of the indices

included are total return indices, which mean that dividends, coupons etc are invested in the index again. The time period used in the study is from 1$^{st}$ January 1994 to 1$^{st}$ January 2009. This period has been chosen because the proxy used for private equity does not go further back in time, which in the case of private equity is good since the industry has matured and developed a lot from how it was before this time. Another issue is that listed private equity, which I will use, is a relatively new type of securities. I have chosen to use monthly data, weekly would have been to prefer, but during periods some of the indices have only been calculated monthly. With a different proxy for private equity only quarterly data would have been available and these would also be subject to stale pricing, which would make it difficult to calculate risk and correlation. This should not make a big difference to the result in anyway though. Generally the most widely used indices have been chosen as proxies for all of the asset classes in the portfolio; MSCI World, MSCI Nordic, Barclays Global Aggregate and LPX 50. I will explain the choice of these indices and give some more information about them, especially in the case of the private equity proxy.

*Global Equity*

The MSCI World index, which is published and researched by MSCI Barra, is the most widely used proxy for global equity, and also the one that I will use here. It consists of 23 developed markets in Europe, including the Nordic countries, North America and the Asia-Pacific region. The index is targeting an 85% free float-adjusted market capitalization in each market[12]. This means that it has a very broad coverage in the markets it includes. The total return index includes the market performance and dividends reinvested in the index on the day that the stock is quoted ex-dividend (MSCI Barra 2009).

*Nordic Equity*

Here I will look at the Nordic countries generally, while the alternative would be to study the four countries individually. In the case of the individual countries local indices like OMXC (Denmark), OMXH (Finland), OBX (Norway) and OMXS (Sweden) or MSCI indices for each of the countries could have been used. MSCI Nordic has been chosen as the proxy used for

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[12] More information about calculations of MSCI Barra Equity Indices can be found on:
http://mscibarra.com/eqb/gimi/stdindex/MSCI_Nov07_STMethod.pdf

Nordic equity. This index also has a broad coverage. When constructed every listed security in the market is identified and it is also free flow-adjusted, like the MSCI World index (MSCI Barra 2009).

*Bonds*

Barclays Global Aggregate Index, formerly known as Lehman Global Aggregate Index[13], is a broad-based index of global investment grade debt markets, which is the standard index to use when calculating bond performance (Elton et al (2007)). Investment grade means that it only includes bonds and treasuries with rating down to Baa. The rating presentation used here is Moody's, but the rating used for the securities in the index is a median of Moody's, S&P and Fitch. I have chosen not to include any bonds that do not have investment grade because of the similarities in risk and return to equity, and again the fact that I want a portfolio that is as basic as possible. An alternative would be to only include government related securities and then using another index. The Global Aggregate index includes North American, European and Asia-Pacific securities, so many of the same markets as the developed markets included in MSCI. As shown in the diagram underneath it is dominated by treasuries (49% of total market capital), and the same is therefore the case for the highest rated (Aaa) securities 54.8%) (Barclays Capital 2008):

**Figure 6: Barclays Global Aggregate Index**
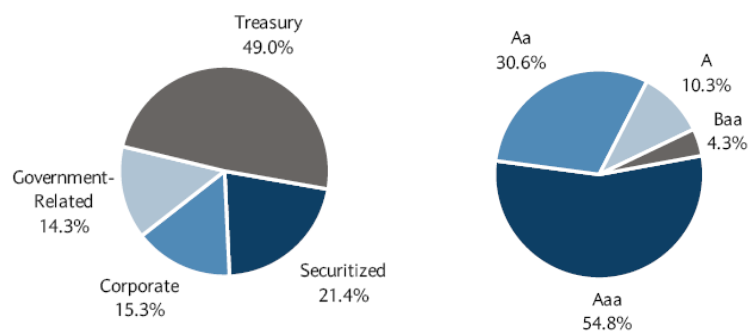


*Source: Barclays Capital (2008)*

Important to note when using this index is that there is no total return index available in Thomson Reuters Datastream, but you can find information there about how to find an

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[13] More information about the Global Aggregate index and details about the rebranding of Lehman Brothers benchmark indices is available here: https://ecommerce.barcap.com/indices/download?rebrandingDoc

equivalent on your own. To calculate the desired index you have to download data for since inception total return and adjust it so that it starts at 100 instead of 0:

Total Return = Since Inception Total Return + 100

*Private Equity*

From the previous studies we have seen reported data used in terms of valuations and cash flow, listed and unlisted private equity indices and data for companies previously held by private equity funds as some of the proxies for private equity. The reasoning behind the choice done for this paper will be explained more thoroughly than the proxies we have looked at so far. Important to remember when including private equity in portfolio theory is that you need to be able to find time series data in the same way as you do with other asset classes. This is because, as we have seen from the modern portfolio theory, that you need to be able to estimate return, variance and covariance with other asset classes to do the needed computations.

Since there is no efficient secondary market for private equity, will we not be able to use a broad market index in the same way as we do with the other asset classes. Even when it comes to returns we have seen in chapter two that there are no returns available in the same way as with publicly traded securities. I will not go into the discussion about IRR and other performance measures for private equity here again, just say that we need a comparable to other securities. The same thing will be the case when it comes to the risk of private equity. The variance of private equity returns will again be based on the performance measure used, and we will not be able to observe fluctuations in market value as with other securities. Indices based on reported valuations by private equity funds are available from Thomson Venture Economics and Cambridge Associates among others. There will be problems using these indices for portfolio calculation though, in my opinion. Valuations are, as mentioned, based on reported numbers by the funds included. This does not only imply uncertainty in the valuation of portfolio companies that have not been realised yet, but also an incentive problem, since funds do not want to report losses. This might give us overvalued estimations. More concerning is the stale pricing problem that we have seen some methods to overcome in the previous studies, but recalculating data in this way might introduce other issues. The reported data only gives us quarterly data as well,

which is not a big problem when it comes to estimating returns, but we will not have the desired data to compute variance for the index and covariance with other asset classes.

Because of these reasons a listed private equity index has been chosen as the proxy in my calculations. These indices take advantage of the fact that in the recent years many private equity firms have issued public equity for funding of different vehicles. Both direct investment companies and fund-of-funds have decided to raise capital in this unconventional way for private equity funds. One immediate difference between equity in general and listed private equity will be the ability pay out dividends, since they still have a long term approach in their investments and will not be able to pay dividends at a regular basis. While private equity funds have a fixed lifespan, listed private equity companies do not. This means that when they have raised capital for their IPO, will they have a capital base to use for investments. When portfolio companies are sold, proceeds will usually be kept for reinvestments. They can of course raise more capital or pay dividends, but they will not have to (LPEQ 2009).[14]

Having daily market prices are obviously what are most desirable about listed private equity when we are looking at the private equity in the light of modern portfolio theory. We are able to calculate returns in the same way that we do with other asset classes. Estimating the risk of private equity and correlation to other assets classes, in this case equity and bonds, will be done more correctly with more observations. For investors there are also advantages with listed private equity: retail investors will get access to some of the best GPs that they are not able to invest in as LPs, liquidity that you will not get as an LP, transparency in reporting. The liquidity also gives you the possibility to rebalance continuously and change your allocations tactically also for private equity, as you can with conventional asset classes (LPEQ 2009).

A disadvantage about using listed private equity is that since it is traded daily on stock exchanges will it probably have a higher degree of correlation with equity than private equity as an industry has. Listed private equity has a higher liquidity than traditional private

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[14] More information about listed private equity can for instance be found at LPEQ's website: http://www.lpeq.com/index.html

equity, but still not as liquid as equity. It is therefore maybe not a totally efficient market, but a much better proxy than we would have had otherwise. We have seen that there will be a liquidity premium when you invest in an illiquid asset class, this will not be reflected for private equity when using this proxy. It is also claimed that listed private equity is traded at a discount to their net asset value, but I would claim that a market price is more correct than an estimate like this (LPEQ 2009). To conclude I would therefore say that for my purpose, using listed private equity is the best proxy available at the time of this study. We saw that in the study by Idzorek (2007) he adjusted the indices because the data might have a survivorship because of the way the data from before the inception is found. This is also an important disadvantage with using an index like this to be aware of. A similar adjustment of the data has not been done here; there are differences in the calculation of the indices and the period after inception is longer so it will not be so influential.

There are many different listed private equity indices that I could have used for my studies. Red Rocks Capital started to publish three different indices; LPE Index, International LPE Index, and Global LPE Index, in 2007 (Idzorek 2007). Standard & Poor also started to publish an S&P Listed Private Equity Index in 2007. LPX GmbH has many different indices that track the development of listed private equity in general, more specific types of private equity and different regions (LPX 2009). I have decided to use an index from LPX called LPX 50 since it is the most widely used proxy. S&P's index only goes back to 2003, and will therefore have a too short historic dataset. Red Rocks' have a longer history, dated back to 1995, but it is not as widely used as LPX 50 that also can be invested in using a tracker fund from UBS or other investment banks.

LPX GmbH is a company based in Switzerland and with Professor Heinz Zimmermann from University of Basel as one of the founders. Their index family was introduced in 2004 and consists of 11 different indices for different geographic regions and types of private equity. LPX 50 measures the performance of 50 listed private equity companies, and as my other indices it has a high degree of global diversification. The research behind the index was started in 1999, but it has been backfilled to $31^{st}$ December 1993. This is therefore the reason behind the choice of time period. For equity and bonds I would, with the recent market situation, have chosen to use a longer time period, but it is important to note that if the LPX50 index had older data it would be questionable how well it would work as a proxy

for private equity since listed private equity is a relatively new phenomena (LPX 2009). As we can see from the first diagram, more than 60% of the market capital in the index is buyout. This indicates that the largest listed private equity securities in market capital are of this type, which is natural since these funds need more capital. Geographically it is, not surprisingly, dominated by North America and Europe, but still quite well diverse for being a private equity index (LPX 2008):

**Figure 7: LPX50**
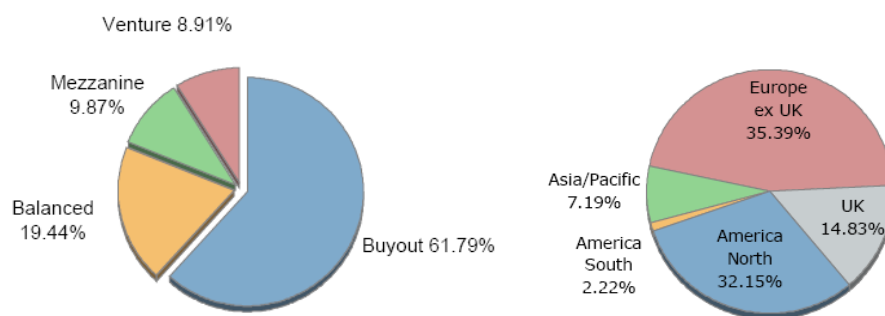
To be included in the fund there are some liquidity requirements that have to be fulfilled in addition to the market size. Requirements for LPX 50 includes: a maximum average bid-ask spread of 3%, an average minimum market capitalization of 80 million Euro, an average minimum trading volume per trading day of 0.08% of market capitalization, and a minimum of 150 observations is included on the exchange. On 31$^{st}$ December 2008 some of the biggest listed private equity companies were: Eurazeo, Wendel, Ratios, 3i Group, and The Blackstone Group. For a company to be included in the index, private equity has to be the predominant market purpose of the company (more than 50% of net assets) (LPX 2009)[15].

*Exchange Rates*

The only index that needs to be recalculated into US Dollars in this case is the LPX50 index from Euros. To do this I have downloaded monthly exchange rates, Euro to US Dollars, for

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[15] For more information about the methods used to calculate LPX indices visit:
http://www.lpx.ch/fileadmin/images/indices/LPX_Guide_to_the_Equity_Indices.pdf

the whole period. All calculations for the optimal allocation for Nordic investors will also be done in US Dollars.

*Risk Free Rate*

For risk free rate I have for a global investor, with investments in US Dollars, chosen to use US three months treasury bills as a proxy for the risk free rate. I have chosen to use the same risk free rate for the Nordic portfolio. Using one of the interbank rates for one of the countries or the EURIBOR is an option, but since my calculations are in US Dollars I have decided to use the US risk free rate in this case as well. The risk free rate that I have used for my calculations are the average over the whole period I have available. The alternative would have been to use the rate at the end date of my data period, 1$^{st}$ January 2009, but in a long term perspective I feel that the average will be more correct.

## 5.2 Methodology

In the following the methods used will be explain step by step, having in mind the portfolio theory presented in chapter three. All of my calculations have been done in Microsoft Excel. First step is to calculate returns for each of the indices. From the data I computed monthly simple returns, which is the price in one period minus the one in the previous and then divided by the previous price:

$$R_1 = \frac{(P_1 - P_0)}{P_0}$$

From these again I have computed mean, historical returns using the Excel AVERAGE() function. These historical averages will be used as a best approximation for expected returns in the future; I will discuss what kind of implications this involves with the data used later.

After having calculated returns I need to find the variance for each of the asset classes and covariance between them. This has been done calculating a variance-covariance matrix; which is the square symmetric matrix that gives variance of each asset on the diagonal and the covariance between each of the assets of the diagonal in the matrix. Since there is more

than two securities/asset classes it is more convenient to use this method than to calculate this manually. Using Excel MMULT() function I am able to multiply matrixes[16]:

$$V = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \cdots & \sigma_{1N} \\ \sigma_{21} & \sigma_2^2 & \cdots & \sigma_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{N1} & \sigma_{N2} & \cdots & \sigma_N^2 \end{bmatrix}$$

Having calculated historic returns, variances and covariances I can start to find the efficient frontier. To do this I have calculated two portfolios using Excel Solver. By minimizing risk for each of the portfolios for two different possible returns I can combine these portfolios to find the efficient frontier. The combination of these minimum variance portfolios have been combined with different weights with an Excel Datatable, and created a figure.

When I include a risk free asset I can find the capital markets line; I have done this first without any restrictions and then not allowing for short sales. The capital markets line is the combination of the risk free asset and a tangency portfolio connected by a straight line. Again I have used Excel Solver to do this, but this time I have not minimized risk. Instead of minimizing risk I have maximized a theta where we have expected return of the portfolio minus risk free rate divided by the standard deviation of the portfolio.

All of this has been done for both the global and the Nordic portfolios. I have chosen to do it for two different time periods for both the global and the Nordic perspective, so that we can see how the market development in the recent year is influencing the results.

### 5.3 Results

Only the most relevant results will be presented in detail here, for more details about the portfolios it can be found in appendix A. I will look at an optimal portfolio using monthly data from the period 1st January 1994 to 1st January 2009. At first this has been done for a global investor with a portfolio of equity, bonds and private equity. Because of the turmoil in the financial markets in the last year of the time period I have also found an optimal portfolio with a period ending at 1st January 2008 instead to compare it to the one I have

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[16] Formulas have been taken from lecture notes in FIE438 Applied Portfolio Management "Security Performance and Efficiency" by Dr Brian Wright (2008). The methods used are also from this course.

found previously. Since this study has a focus on Nordic limited partners' asset allocation I have included another asset class with Nordic equity to reflect the domestic bias that many investors have when investing. Also for the Nordic portfolio have calculations been done in US Dollars, a further study would look at how the currency risk will affect the results, but here I will assume that it can be perfectly hedged. The results from this study will be used as an indication about how much Nordic investors should allocate to private equity, but as we have seen will differences in methods and data give quite different results. These will then be used to compare it to how much Nordic LPs are actually allocating to the asset class.

*Global Investors*

Of the three asset classes in my global portfolio, investment grade bonds are the one that have performed best in the last 15 years with 6.2% average yearly return. Global equity has given 6.04% return while private equity has an average yearly return of 5.07%. With the risk (yearly standard deviation) being as we might expect in terms of ranking; global equity 0.15, bonds 0.06 and private equity 0.20, we can already assume that the optimal portfolio will be highly dominated by bonds.

Underneath we can see the efficient frontier with capital market lines both with and without short sales restrictions for the whole period. There is not much difference in the two different optimal portfolios in this case; both have the same expected return, but the one with short sales restrictions are slightly riskier. The efficient frontier with short sales restrictions has not been included in the figure:
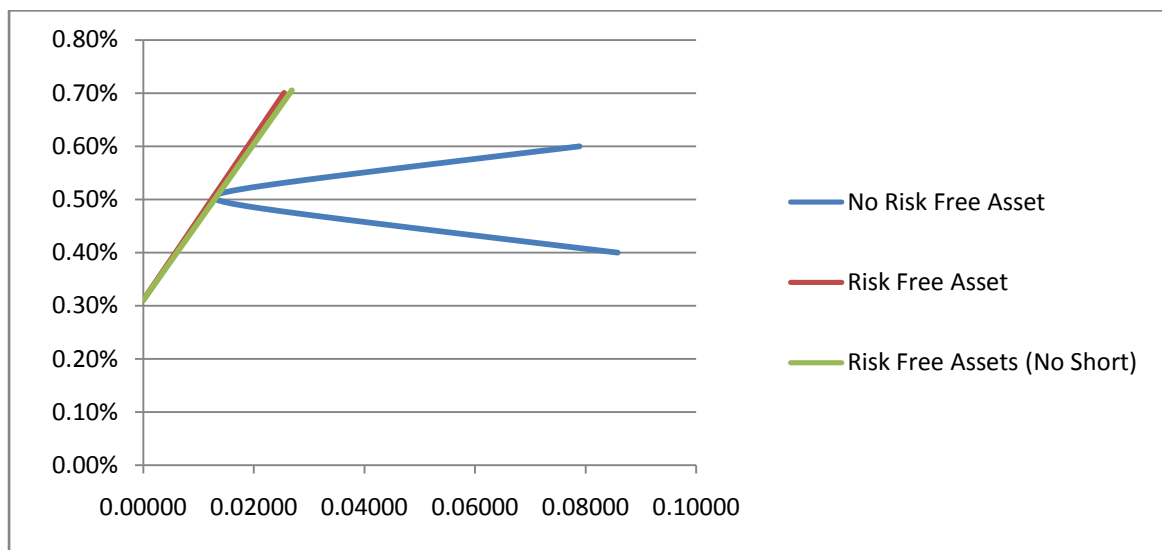
The tangency portfolio or the optimal portfolio without any restrictions has -11.9% in global equity, 98.5% in bonds and 13.4% in private equity. The allocation to private equity does not sound surprising after the studies we have looked at, but the negative allocation to stocks based on historical performance is of course a surprising result. If we do not allow short sales the portfolio will look like this: 0%, 90.8% and 9.2% (equity, bonds and private equity). The reason that private equity is part of the optimal portfolio is mostly due to the fact that it has a negative covariance with bonds. This means that it can play a significant part in reducing risk by diversifying, when investing in the asset class.

For the period ending 1$^{st}$ January 2008 we observe higher average, historical returns; yearly returns for global equity 9.81%, bonds 6.28%, and private equity 11.60%. For equity and private equity this might be a more correct expected return based on the risk of the asset classes. Results from the optimal mean variance study show that there is no need to impose a no short sales restriction when using this time period. The optimal portfolio then looks like this: equity 2.2%, bonds 83.6%, and private equity 14.2%. Still is the allocation to equity is very low with only 2.2%, which we have seen in other studies as well, but generally it would be suspect to be higher because of the importance of public equity in financial markets.
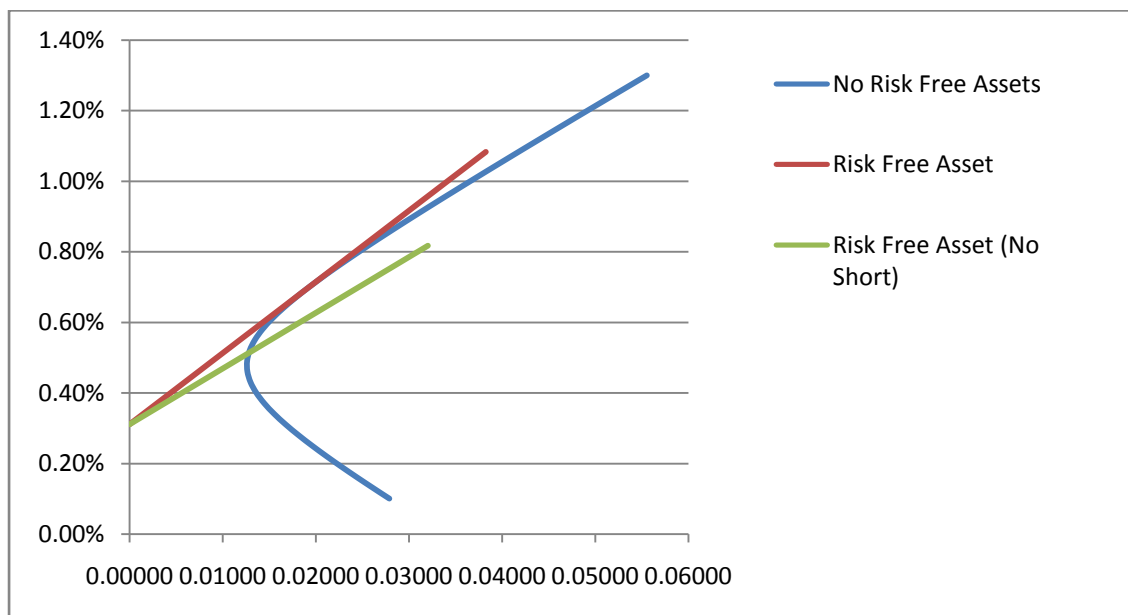
*Nordic Investors*

In this case I have studied the Nordics in a whole, finding a general optimal portfolio for investors from all the countries. An alternative would be to study the individual countries,

and then also find differences between the countries because of different domestic markets and exchange rates development. For this study, since it is not an exhaustive study of optimal portfolios, looking at the region as one should be good enough to find an optimal allocation to private equity that we can use to compare with results from the survey among Nordic LPs. The same proxy have been used for global equity even though all of the Nordic countries are included in the global index, it is only a small fraction of the index though so it should not make much of a difference if the Nordics are included or not.

Nordic equity performed very well also when including the last year with an average return of 12.86% yearly; compared to global equity 6.04%. With twice as high return than any of the other asset classes it seems reasonable to expect it to be a significant part of an optimal portfolio. The following figure shows the efficient frontier with capital market lines in the same way as for the global portfolio:

Figure 9: Efficient Frontier and CMLs Nordic Investors



In the optimal portfolio 12.6% is allocated to private equity, so around the same as we previously found for the global investors. The rest of the asset classes should have the following allocations: global equity -57.6%, Nordic equity 33.2%, and 111.8% in bonds. When introducing Nordic equity the allocations in the optimal we see more extreme results, and even though the results for private equity is reasonable the same is not the case for all of the other asset classes; global and Nordic equity. A portfolio not allowing short sales is

also found in this case. Because of the influence in the portfolio by the Nordic equity, only 3.5% should be allocated to private equity in this portfolio while global equity get 0.0%, Nordic equity 11.5%, and bonds 85.0%.

At last a mean variance optimal portfolio with the shorter time period is created. This portfolio has -28.5% in global equity, 22.9% in Nordic equity, 92.1% in bonds, and at last 13.4% in private equity. With this period there is less differences in the returns from Nordic equity and private equity, so an optimal allocation to private equity is then 9.3% when not allowing short sales.

*Conclusions and Suggested Improvements*

In the portfolios that I have studied here allocations to private equity are varying from 3.5% to 14.2% depending on the time period, what assets that are included, and if short sales are allowed. The following figure shows the four different portfolios not allowing short sales:

**Figure 10: Optimal Portfolios No Short Sales**

|                | Global | Global 2008 | Nordic | Nordic 2008 |
|----------------|--------|-------------|--------|-------------|
| **Global Equity** | 0.0%   | 2.2%        | 0.0%   | 0.0%        |
| **Nordic Equity** | -      | -           | 11.5%  | 12.5%       |
| **Bonds**         | 90.8%  | 83.6%       | 85.0%  | 78.2%       |
| **Private Equity**| 9.2%   | 14.2%       | 3.5%   | 9.3%        |

The main concern about these portfolios is the low weights in global equity. Changing the time period improves this, but they are still negative when introducing Nordic equity. Some possible solutions to getting other, more reasonable results would be use another proxy for equity, which might give other results, or to calculate/predict expected returns differently than done in this analysis. From Artus and Teïletche (2004) we did see similar results though, with only 2% in public equity.

From this study I will conclude that private equity should be a significant part of a Nordic investor's portfolio. An allocation to private equity between 3.5% and 14.2% is not exactly a very conclusive answer, but if we divide it up in investors with a bias to Nordic equity and those that want to have a global portfolio smaller ranges can be found. For a global investor

between 9.2% and 14.2% in the asset class is recommended, while a Nordic investor should invest between 3.5% and 9.3%.

It is arguable if it is correct to not include the most recent year in the way that it has been done; a financial crisis of this extent is something that comes around seldom, but in the long term perspective it will have to be taken into consideration. With a longer time period it would therefore have to be included for sure, but with the great significance it has on the results I find it natural to include two time periods in the study. In this case I am not able to use a longer period since the LPX50 index does not go further back in time. At the same time do I believe that the private equity industry has developed much since before 1994, so it would not be reasonable to use a longer period either.

Institutional investors usually take an active approach to estimating expected returns, and I could also have done this in my study. A theoretical approach to doing this would be to find betas to global equity and calculate expected returns using a single index model (CAPM) as done by Ennis and Sebastian (2005). I have not done it here, because as I have said I want to make is as basic as possible and therefore I feel that historic averages are the best estimate that I can use. A less theoretical approach, but one that has shown good results in the past is Swensen (2009) that adjust the risk and return found from historical data to better match the risk interpret by him. The latter would not be a good method to use without having the same experience and do not fit well in a master thesis.

Here I have used the CML to find the optimal portfolio, other portfolios on the efficient frontier should also be considered though; Swensen (2009) also proposed studying portfolios that are not efficient to find one with a risk/return-relationship that is desired for the investors. If we do not include a risk free security in the portfolio, all solutions on the efficient frontier; from the minimum variance portfolio to the maximum return portfolio. The optimal portfolios have been studied in this way in the previous studies of optimal private equity. Two methods that we have seen to analyze the optimal portfolio is to look at how much equity, versus bonds, there is in the different portfolios and maximizing the Sharpe ratio. The first method would not give so interesting answers when using the whole time period, since the return of the assets are quite similar while the risk is quite different. With expected returns corresponding better to the risk of the asset class investors can place

themselves better on the efficient frontier accordingly with the type of investor it is using personal judgment.

Other possible changes that I will come back to in the final conclusion are other ways to do the study. One that I have mentioned already is to look at the Nordic countries individually and comparing them. In this instance it would be interesting to find a proxy for private equity in these countries as well, but then listed private equity could not have been used with the difficulties that come with it. In general it would not improve the results though, but be an interesting study. The good performance of the Nordic market and the opposite of global equity with the proxies used in this study can be solved by adjusting expected returns from the ones found historically or changing the proxies. For private equity that is the focus of the paper the results found here is reasonable when compared to the previous studies we have looked at. Where in this range Nordic investors put themselves will be interesting to see. I will not look at geographical preferences in the following survey, but suspect that Nordic investors have a preference for Nordic investments. Indications of this we have seen in the Nordic private equity markets as well, with most of the capital raised domestically. This would imply and allocation from 3.5% to 9.3% according to my study.

# 6 Survey

With the theoretical background in place, I want to have a look at how it is applied in the real world, and how LPs take it into consideration when they are managing their capital. We have now seen through various studies that recommended target allocation varies a lot depending on how you approach the problem. To some extent the decision cannot be based on theory alone either since it is difficult to find a proxy for private equity that fits well for using in modern portfolio theory and some qualitative decisions have to be done to find an efficient portfolio that fits with the type of investor and other issues concerning their investments; liquidity, risk etc.

In this last part of the thesis I will start by explaining how I approached getting information about how much Nordic investors actually have allocated to private equity and the reasoning behind their choice. Starting by explaining the methods used to come in contact with LPs, then the reasoning behind the questions asked in the survey, before I present the results and relate them to the discussed theory or other important information.

## 6.1 Insight and Methodology

I will shortly present some relevant, previous research, before I explain how I conducted the survey, to get some background knowledge for my survey and about thoughts of Nordic limited partners. There is very few papers written on the topic, but I have looked at a survey about how European limited partners are thinking about their future allocation and some information about Nordic private equity markets; that also include a little about how different fund managers and other market players think about the market.

*Almeida Capital Survey*

Almeida Capital is a British private equity advisor firm which provide different types of services to private equity firms and investors; placement agents raising capital for funds, advisors to both general and limited partners, and advice in secondary transactions. In recent years have they done a survey among limited partners about their view on the coming year. As with my thesis, it has the aim to gain understanding about investment strategies of limited partners (Almeida Capital 2008).

I have to base my discussion of the survey on the survey from 2008[17], there was published a new survey for 2009 in February, but this has not been made public yet and therefore I have not been able to study it. This survey has 130 respondents globally, with more than half of these being from Europe. That means that, as with my survey, that results are not statistically significant, but they give an indication about what direction the market is going. When coming up with the questions for my survey I wanted to use some of the ones used for this survey, so that I would be able to compare the results. The first one that I looked at was how investors were thinking about their total allocations to private equity in the coming year, in this case for 2008.

| | Increase | Remain same | Decrease |
|---|---|---|---|
| All LPs | 42% | 50% | 8% |
| Funds of Funds | 32% | 57% | 11% |
| Asset Managers | 36% | 55% | 9% |
| Insurance Companies | 73% | 20% | 7% |
| Public Pension Funds | 45% | 55% | 0% |
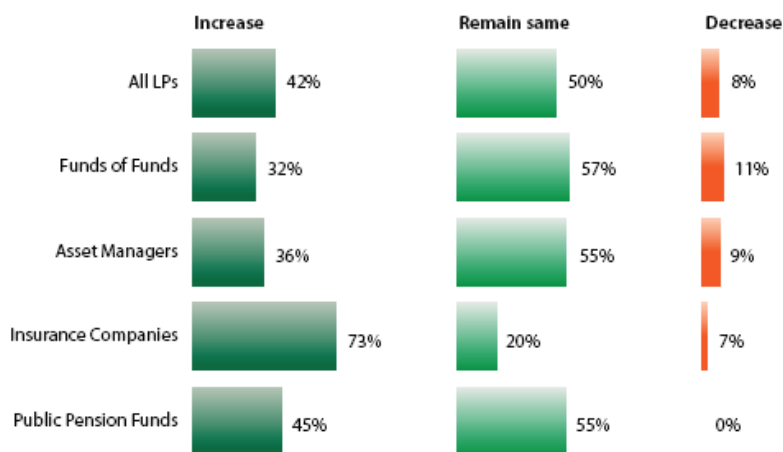
*Source: Almeida Capital (2008)*

For all of the 130 limited partners we see that they were still positive about the asset class since they state that will increase their allocation to private equity. The fact that only 8% of the respondents will decrease their allocation in a situation when we were starting to see that credit markets were getting tighter is a strong result that shows that there is and has been an increased focus on the asset class. We will see that there is a change other than increased appetite for investing in private equity funds, but also a change in what types of private equity investors are looking at.

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[17] The complete 2008 survey can be downloaded at: http://www.almeidacapital.com/LP_Allocation_2008.pdf

**Figure 12: Almeida Capital Allocation to Different Private Equity Types 2008**



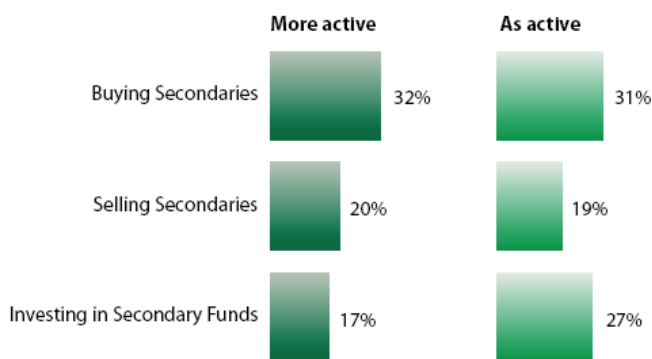| | Allocation increase | Allocation decrease |
|---|---|---|
| Special Situations | 50% | 2% |
| Small Buyout | 48% | 2% |
| Growth / Development Capital | 45% | 6% |
| Medium Buyout | 35% | 7% |
| Infrastructure | 29% | 2% |
| Cleantech / Sustainable Energy | 28% | 4% |
| Venture Capital | 27% | 12% |
| Mezzanine | 23% | 8% |
| Direct Secondary Purchase | 17% | 8% |
| Real Estate | 16% | 9% |
| Dedicated Secondary Funds | 12% | 14% |
| Large Buyout | 5% | 49% |
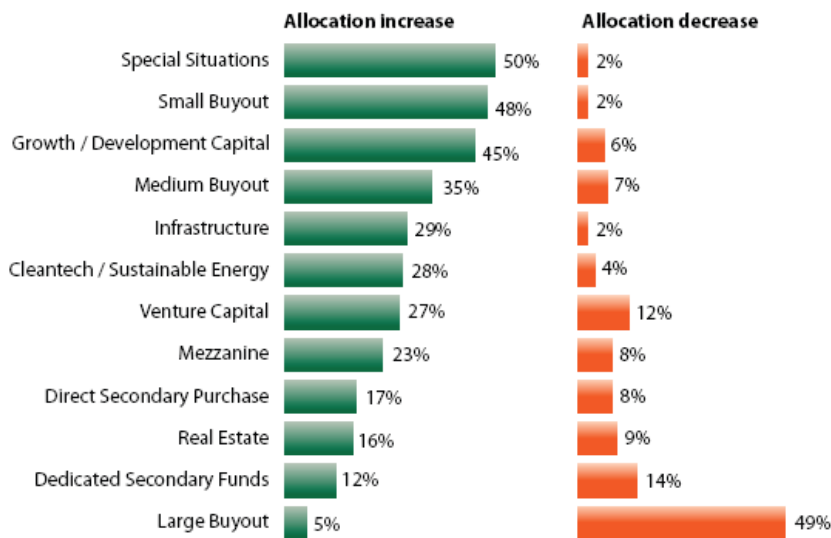
*Source: Almeida Capital (2008)*

From this figure showing what types of private equity investors wanted to increase or decrease their allocation to we can see this change. In the survey conducted for this thesis not all these types have been included, so I will only have a look at those types that are. Small and medium buyout will get a higher focus than in the previous years with 48% and 35% stating that they would increase allocations. This might indicate that they were thinking that these types would be less exposed to the turmoil in the credit markets. For large buyout that in the previous years have had a very high focus and raised large amounts of capital could expect to experience the opposite. In fact 49% wanted to decrease their allocation to this type that usually is highly levered. For venture capital and mezzanine the situation would be quite stable, but to some degree limited partners want to increase their exposure. Few investors have considered changing their investments in secondaries, but this might be because they have not been so active in the secondary market previously either.

**Figure 13: Almeida Capital Allocation to Secondaries 2008**



|  | More active | As active |
| --- | --- | --- |
| Buying Secondaries | 32% | 31% |
| Selling Secondaries | 20% | 19% |
| Investing in Secondary Funds | 17% | 27% |

*Source: Almeida Capital (2008)*

Since Almeida also acts as a consultant for limited partners buying and selling secondaries they have also included a part about how investors look at this type in more detail. This will be interesting for me to look at as well though, because of the current market situation LPs will probably see opportunities to buy investments from distressed investors and others are trying to capitalize their illiquid investments. The results from Almeida also show some tendencies that they see opportunities for buying secondaries and selling less of their private equity investments, but again might this just reflect the fact that limited partners are looking at opportunities for increasing their allocations to private equity. Other than the questions I have decided to include in my questionnaire, they have also looked at differences among regions and types of investors within these questions that I will not go into detail about here, but look at for the results from my survey.

*Recent Comments about the Nordic Market*

As I have mentioned, are there few studies of Nordic investors. In December 2008 the European Private Equity and Venture Capital Association (EVCA) together with KPMG published their first EVCA Nordic Report. This focuses on the status of the private equity market in the Nordic countries: fundraising, investments/divestments, and other issues concerning Nordic general partners and fund-of-funds managers in particular which we included in the presentation of the Nordic private equity market. What I find relevant for my study is the contribution by some Nordic fund managers about what they think about the

market in 2009 and what they believe will be important to it. It is not a quantitative study, but gives some interesting perspectives.

On how the Nordic private equity firms have reacted to the tougher market situation and if they have affected how they are doing business the respondents focused on risk management. One example is Joachim Høegh-Krohn, CEO at Argentum, which states: "Currently, it is a good time to allocate capital to private equity funds, even if risk management needs to be strengthened." The fact that the merger and acquisition market has very low activity now means that funds have to wait for the worst to pass, but it also gives them time to focus on the management of the investments they have and other parts of their operations. On the issue of how Nordic markets are dependent on what happens to the global economy more than one points out how dependent, especially Nordic technology venture companies, are of getting access to international markets and will therefore experience bad conditions. Some see possibilities for these companies to perform well when the markets turn again. Omid Ghanel at Altor Equity Partners was quoted having this view: "As Nordic companies are oriented towards the export market with a focus on high-technology products and companies, when the global markets turn and demands products using the latest technology, Nordic companies will have new opportunities." Maybe even the funds have to change their business model for some investments and use more equity, lower gearing, because of trouble getting as much credit as before and at a higher price. Especially healthcare is highlighted as one of the industries that will do well (EVCA 2008).

The Unquote Nordic Report 2008 includes an interview with five international LPs about their opinion about the region, their changing allocations, and how general partners should act in the current market. Since private equity has established itself as an accepted form of finance in the region and previous returns have been high, they all state that the region is attractive for investing in. This is also a drawback they conclude though, since it is a highly competitive industry here. The high penetration means that entry levels are high and returns will not be as high as we have historically seen. Again do they state that they would like to see general partners focusing on the investments that they have already made while they wait for markets to stabilize, but some also see opportunities in distressed companies (Unquote 2008).

*Private Equity Insight*

With this short part about views on the Nordic market I go on to explain how I have gotten in contact with investors and the reasoning behind the questions asked in the survey. Contact information was found from Private Equity Insight and Argentum, so I will start by telling about these two sources.

Private Equity Insight is a comprehensive database containing information exclusively about the private equity industry. The database can be divided into three major areas: Deals information tracks private equity deals and gives information about GPs and their investments. Deal/Portfolio company performance information gives performance data for the industry. The information used for this thesis is gotten from the third area, fundraising/investor relations information; here information about LPs is available. On continuous basis information for the individual limited partners are updated through interviews with key employees at the different institutions. This includes information about how much assets the LP has under management and how much of this they have allocated to private equity. Useful for general partners is the information given about how much investors are planning to invest in the asset class in the coming years, what types of private equity they are interested in and whether or not they would like to get contacted by funds raising capital (Private Equity Insight 2009; 1).

I was hoping to be able to use information from the database about how much Nordic LPs have allocated to private equity and compare this to the allocation targets I have found myself in the theoretical part of my thesis and other research discussed. I found that much of the information was outdated and the time period it was gathered from varied a lot. Contact information to different LPs was therefore the information I got from this database, which was useful to get in contact with the institutional investors I needed to perform my survey.
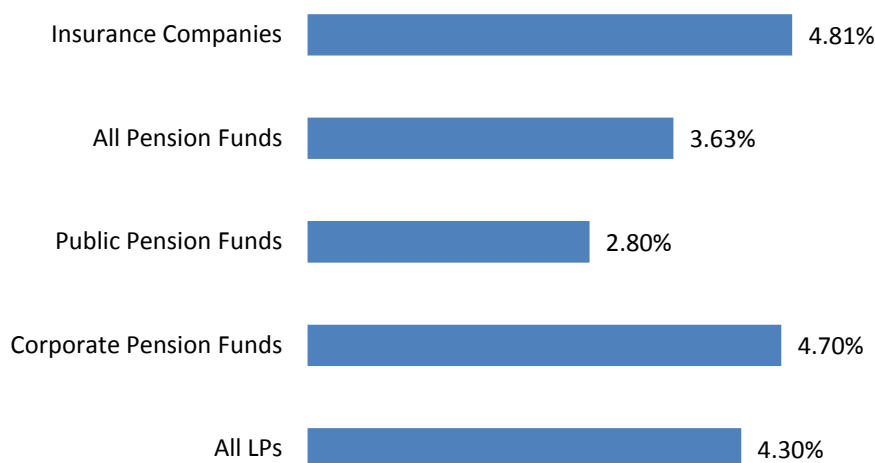
*Argentum*

Argentum is a Norwegian, government owned investment company, but it also has private investors. With an aim to create a developed private equity industry in Norway it invest in both new and established private equity funds. In addition, they want to promote the

Norwegian market and the potentials of private equity, it gives the government a possibility to indirectly invest in local industries that has market potential (Argentum 2009; 2).

Together with the LPs I found from Private Equity Insight I got access to Argentum's co-investors and contact information for many of them. Previously they had done a mapping of their co-investors allocation to private equity which I also have studied. This data are more comprehensive when it comes to number of institutions that they have data for, than what I have gotten from my survey, but at the same time they are from the start of 2008 and a lot have happened to international financial markets since then. I will use the figures to compare with the numbers I get from my survey though.

From the data I have taken out private equity fund-of-funds (that naturally have 100% allocated to the asset class), government agencies that has special regulations on how they should invest and corporate investors that often have more of a strategic reasoning behind their investments. This leaves me with 36 institutions that I have numbers for. I will especially focus on pension funds and insurance companies since we have most data for these, and therefore more reliable numbers (Argentum 2009; 1):

**Figure 14: Argentum Allocation to Private Equity Nordic LPs**



Insurance Companies 4.81%
All Pension Funds 3.63%
Public Pension Funds 2.80%
Corporate Pension Funds 4.70%
All LPs 4.30%

*Source: Argentum (2009)*

As we can see, had all limited partners, excluding the mentioned types, an average allocation to private equity of 4.30%. I have not calculated a value weighted figure since

assets have been reported in different currencies and at slightly different times, so it would not be exact, but I will do this for the numbers that I get from my survey. Public pension funds have a slightly lower allocation, 2.80%, than the other types of institutions looked at. This might be due to the more strict regulations of these funds and their allocations to alternative investments. I will come back to this later. I also want to point out that these types of investors have a long investment horizon and should therefore not be overly concerned about the illiquidity issues of investing in private equity that we have discussed earlier.

**6.2 Creating and Conducting the Survey**

My survey has three parts; information about the investor, how they think about allocation to private equity and their view on valuation techniques. For me it has been important to make it as to the point as possible, both because it will give better answers and be less time consuming for limited partners to respond. That means that there are a lot of other questions I would like to ask and I could be more detailed on the ones asked, but I will not focus on this here. The complete survey can be found in appendix B.

*Information*

To get some practical information about the LPs the first part is information about them. This includes basic questions about their country of origin and what type of institution they are. More interesting is the questions regarding the LPs' actual allocation. To start with I have asked what types of private equity the investor has; small buyout, large buyout, venture capital, mezzanine and secondaries (both direct and secondary funds). These will also be the types that I will focus on in other questions. I could have chosen to use more categories, like Almeida Capital has done in their survey, but I do feel that the ones I have chosen covers the most important types. One of the things I wanted to get an answer to with my survey is how much Nordic investors actually have allocated to the asset class. Therefore, have I asked about how much assets they have under management currently; both totally and to private equity. The private equity portion have I divided into buyout and venture capital again, to get more information about their allocation. As we have seen, is it difficult to find an exact number for optimal allocation to private equity, but using the

knowledge we have from the previous chapters I want to see what Nordic investors are doing compared to this.

*Allocation*

Some of the questions in this part are similar to the ones we have looked closer at in Almeida Capital's report; these are about how the investors look at the market in the coming year. First focusing on their general view of the asset class in the coming year, but then also going more into detail about the different categories. Including these questions was done on the basis that I also would like to know how limited partners react to the current market conditions. We have also seen an increased focus on private equity in the previous years, and it will be interesting to see if this trend continues among investors. How LPs view secondaries, both buying and selling, have also been included since I am expecting that this will also be increasingly important to investors looking at how they can make good investments when other investors are in trouble.

How investors have found their asset allocation target is also something I would like to learn more about. I therefore want to know what the allocation target for their private equity investments is. From the talks I have had with various people before I conducted my survey, I got the impression that they believe that many Nordic investors do not have a very strict policy on how much they should invest to the asset class. Those that have one will not be certain if it will also be how they view the asset class in a more long term perspective. If I get enough information about target allocation it will be interesting to compare the results to how they have actually allocated. This might give an indication about how they will behave in the coming years.

To continue looking at their asset allocation I would like to know how they have decided on their target if they have one. I have included a question about the methods used to do this. The alternatives that I have given are as follows: industry standard, optimal mean-variance, factor model, regulations, same weight on all asset classes, or other. I do not believe that there exists an industry standard on how much you should invest in private equity, but I would believe that many investors look at how comparable institutions are allocating which also was recommended by Ennis and Sebastian (2005) as a supplement to a mean variance analysis. Modern portfolio theory as I have discussed, finding an optimal mean-variance

portfolio, would be the theoretically correct way of deciding the allocation, but as we have seen is this not so easy to do this with alternative investments. The factor analysis, recommended by Therhaar et al (2003), might be used by some LPs. Regulations will be deciding a lot when it comes to allocations for many investors; government institutions might have rules on how they should invest, funds might have limitations on how much they can allocate to alternative investments or private equity etc. One alternative I do not find likely that investors use is to allocate the same portion to all asset classes or alternative investments.

Many investors have an active approach when they do their investments, but also when they decide on their asset allocations. For instance they might believe that one asset class will do better than others for a period and then increase their investments in these types of assets. With private equity might this be more difficult, since it is quite illiquid, long term investments, but I am still wondering whether Nordic LPs change their allocations over time and how they do this. If they do not change the weights they would have a constant-weighting strategy, rebalancing the portfolio fairly often, if not constantly. With a tactical or dynamic approach they will be taking more of an active view changing allocations after how they believe different asset classes will perform. An insured asset allocation means that you set a limit the return has to stay above, if it is above you do active management, but when it falls below you invest in a risk free asset. At last we have the integrated strategy that includes aspects of all of the above, but of course it has to be either tactical or constant-weighting. On these two last questions I will have to expect that investors often give an answer without giving it too much of a thought if they do not have an exact policy. I still believe that it should be possible to get an indication about how investors are thinking though.

*Valuation*

A part about valuation and how investors look at the way private equity funds valuate their investments and report have been included because there have been some changes in the practice in the last years and it is still a hot topic that has implications to the allocation process. The EVCA's "International Private Equity and Venture Capital Valuation Guidelines" call for a fair value valuation of private equity investments. It is clear that this implies

difficulties in the case of private equity since it is not publicly traded at a regular basis. There is not room here for giving a full presentation of the EVCA guidelines or discuss other issues, but I will briefly mention some issues that are important in private equity reporting. [18]

Many private equity funds have been marking to market like it is suggested in the guidelines for years, but we are now seeing a change that everyone will have to do so. In the Financial Standards Accounting Board's Statement 157 (FAS 157) it says that all investments should be reported at fair values.[19] Even though the new regulations does not concern all private equity funds yet, it seems like it is on its way to become the new industry standard for all types and regions.

In the terms of allocation valuation methods become important when there is large changes in market prices, as we have seen lately. If private equity values would not have been adjusted to fair values in a case like that investors would have had much higher allocations to private equity that they could not change immediately because of lower values of other assets. This is the same problem as we have seen about stale pricing earlier, more continuous updates of valuations would decrease this problem, but introduce others. These values might stay high, if there is no adjustments of them from the general partner, which makes investors commit less capital to private equity for a period of time than they would have done if they had fair values of their investments. Of course limited partners could do their own valuation calculations, but they would have limited information about the portfolio companies as well.

What I want to look at within this topic in my survey is whether Nordic investors have any requirements to the general partners they invest in when it comes to reporting. To begin with I have tried to find out more about by asking directly if they have any demands to the funds they invest in terms of how they want their reporting from the general partner. We have already looked at the possibility of mark-to-market. Mark-to-matrix is maybe not so relevant for private equity, it involves using another more actively traded security to find a

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[18] For the full EVCA "International Private Equity and Venture Capital Valuation Guidelines" it can be found here:http://www.evca.eu/uploadedFiles/Home/Toolbox/Industry_Standards/evca_international_valuation_guidelines_2009.pdf

[19] FASB has publish a brief summary of FAS 157 that can be valuable to understand better what the standard requires: http://www.fasb.org/st/summary/stsum157.shtml

price for the illiquid investment that you are valuing. When you are marking-to-market you often use mark-to-model in the case of private equity, it could be that some always want reports of these valuations in addition to market values if they are available. At cost and book values will in most cases be available to investors, so it might be that there are no special demands about this, but I have included it as an option for those that prefer calculating their valuations themselves.

With more focus on incentive problems, incorrect valuations and other important issues involving investments the financial crisis might have changed the view on valuation in the industry in some way. I would like to know if they have actually done this, but more important is it to hear why they have done this in this case. I am not exactly sure about what kind of responses I can expect at this question, but it gives an opportunity to get some information about issues that Nordic limited partners are focusing at currently.

At last I want to know if limited partners think marking private equity to market is actually positive or negative. There will be many reasons to think either way, but I have tried to find the most obvious ones for the participants to choose between. On the positive side it will give more information to the investors about the portfolio companies and possibly give more efficient secondary markets because of the increased flow of information. Among the negative aspects that I think are most evident is the possible higher volatility of private equity values, the fact that valuations are performed by fund managers and might not be accurate and the increased focus on values in the short time instead of the long term development of investments. This is of course not the only possibilities, and participants will also have the opportunity to come with other views that they might have on the issue.

*Conducting My Survey*

To start with I had gathered a list of around 120 Nordic institutions that had previously invested in private equity when I combined the ones I had from Private Equity Insight and Argentum. I were not able to contact all of these since I did not have contact information for some of them and the contact information I had were in some cases outdated. In the end I was able to contact 97 limited partners directly, by e-mail or phone. In the selection process the only criteria for me to contact the investors were that the institution is of Nordic origin and that they have previously invested in the asset class.

The survey was first sent out to one or, in the cases where I had more than one contact person, two key employees at the institutions (head of alternative investments, portfolio managers or CEOs in most cases). This was done twice, but because I felt that I needed more responses in order to get some information out of the survey I also had to call some of the investors. The survey was conducted in March and April 2009, and the long time period indicates that it was more difficult than I would have hoped to get in contact with investors that had time to help me. In the end I have gotten responses from 36 limited partners, a hit rate of over one third, which was also what I hoped to get when I started so I believe I have enough data to present fairly reasonable results. They will of course not be statistically significant with such a small population, but that will not be possible either with so few limited partners in the Nordic countries and they also differ a lot.

## 6.3 Results

The results from the survey will be presented in detail and analysed in terms of what they say about the Nordic private equity market and related to the analysis already studied. Results will be presented as figures for easy understanding and discussed afterwards. I also have to mention that all of the results presented are the answers given by the investors, that means that some of the numbers might be approximates and I cannot guarantee that they have given correct numbers in all cases even though I have tried my best to make sure that their answers make sense; by choosing the questions and alternatives wisely.

*Participants*

As mentioned, were there 36 participants in the survey, and I will start by looking at how they divide themselves in terms of country of origin and type of institution. Altogether these institutions have almost 320 billion Euros of assets under management. The individual institutions will not be linked to the answers given, which I felt was necessary to get institutions to reply on the survey and it does not give much more useful information. The following information should be enough to get the information that is useful about these institutions:
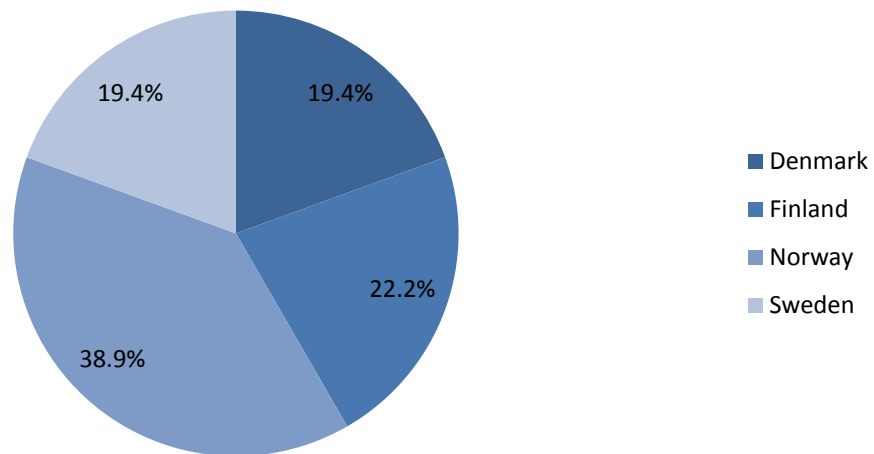
Most of the replies on the survey came from Norwegian limited partners, 38.9%. This might be because they have been more interested in participating since I am a student at the Norwegian School of Economics and Business Administration, but at the same time will I say that they are fairly equally distributed. I have selected as many institutions as possible to contact, so there should not be any bias in the selection process other than that Argentum as a Norwegian fund-of-funds might have more Norwegian investors, but these have been supplemented with as many institutions as possible from Private Equity Insight though; those that there were updated contact information for.

Figure 16: Types of Institutions
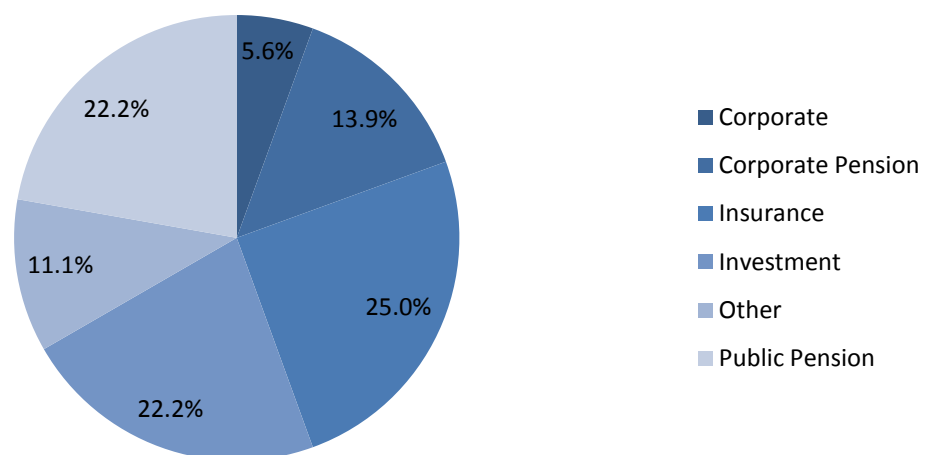
Pension funds and insurance companies are the types that dominate the list of companies that have answered my survey, 36.1% and 25.0%. The group called investment institutions are also large, but it consist of both fund-of-funds and different types of government agencies, so it is a fairly broad category. Insurance companies and pension funds (corporate and public) are the types I will focus on when it comes to how they are allocating their capital; and these types are fairly well represented among the participants.

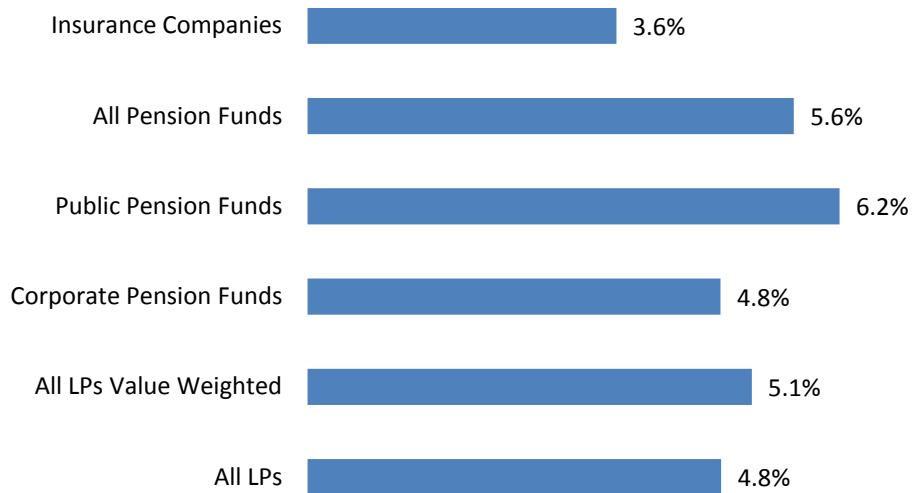**Figure 17: Types of Private Equity Invested in**
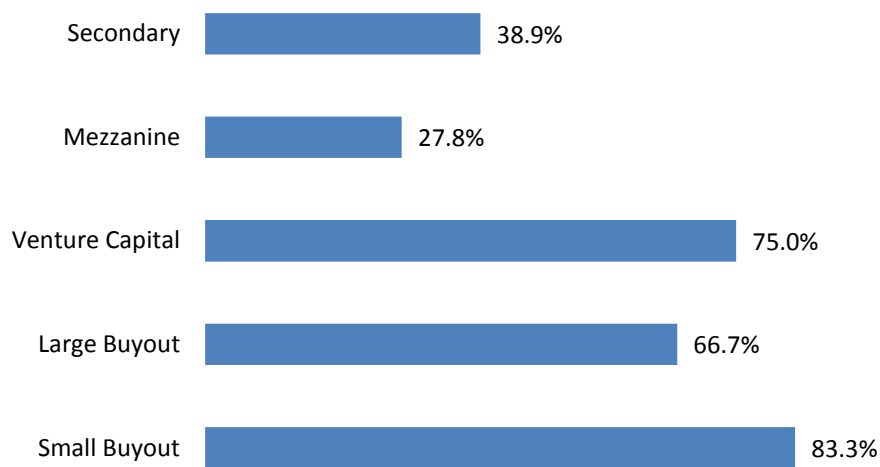


As mentioned earlier, all of these institutions have already invested in private equity, and in terms of which types they have invested in small buyout and venture capital are not surprisingly the most popular. More surprisingly is it that so many of the investors have invested in large buyout since this type is not so common in the Nordics. In the survey I have not stated a clear distinction between small and large when it comes to actual value, which might be the reason why many have stated that they own this type of private equity. Mezzanine and secondaries are there fewer of the investors that own, which also is expected.

*Allocation*

I will start by looking at the different types of institutions and how they allocate, in the same way that was done with the data provided by Argentum from 2008. One would expect them to have changed slightly with all the changes that we have seen of values of other securities

as well as private equity investments. With changes in valuations of private equity lagging market changes, allocation might have changed just because of this.

**Figure 18: Actual Allocation to Private Equity: Institution Types**



| Institution Type | Allocation |
|---|---|
| Insurance Companies | 3.6% |
| All Pension Funds | 5.6% |
| Public Pension Funds | 6.2% |
| Corporate Pension Funds | 4.8% |
| All LPs Value Weighted | 5.1% |
| All LPs | 4.8% |

Generally I would like to say that allocation is pretty similar to how it was in the numbers retrieved by Argentum. The institutions that I have numbers for are not exactly the same as those included in the previous study, and with a population of this size a small change in any direction is expected. Again, I have not included fund-of-funds, government agencies, family offices and corporate investors in these figures because I believe that doing so might give results that are not so meaningful. An increase from 4.3% to 4.8% in the overall allocation is too small of an increase to comment on, it might come from investors investing more in the asset class, changes in valuations, or just a different set of institutions. There is also a slight difference between the average allocation for all LPs and the value weighted average, which indicates that the larger institutions allocate not only more capital, but also a larger share of their assets managed to private equity. The largest institutions in this survey are the public pension funds.

There is quite a significant difference in the allocation at the insurance companies and pension funds; and then especially public pension funds. Both should be relatively long term investors, but one might believe that it is slightly easier for the pension funds to correctly predict their future cash flow requirements. This might give an opportunity to invest more in illiquid securities. Private equity also seem to be a favoured asset class among Nordic

pension funds even in troubled times according to a study by the Nordic Region Pension & Investments News (2009); where 44 percent of the pension funds said that they wanted to increase their exposure to private equity. A case study of different types of institutions might have revealed more information about why there are differences among the types of institutions. Possible answers is that they have differences in regulations, need for cash flows, preference etc.

**Figure 19: Actual Allocation to Private Equity: Countries**
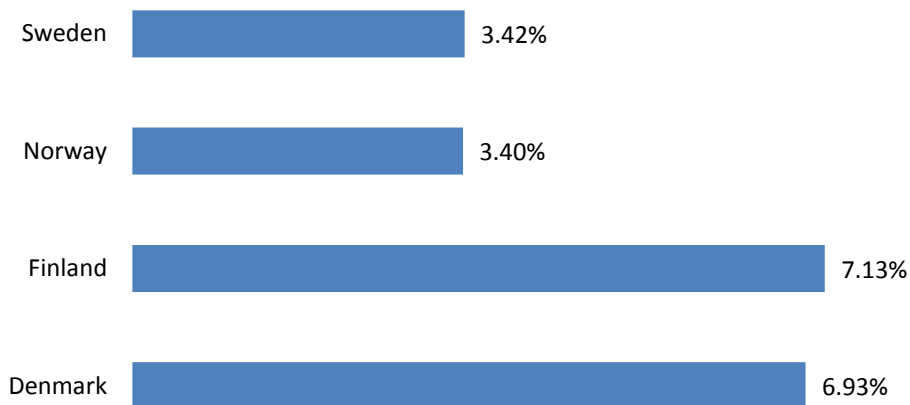


The allocation for each of the Nordic countries above indicates that Finnish and Danish investors allocate more to private equity. In my opinion, one should be careful to put much emphasis on this since the selection is small. It would be a very interesting result if it is the actual case for all investors though, since Sweden is believed to have the most developed private equity industry in the region and at the same time has the lowest allocations to the asset class; together with Norway. They are attracting a lot of foreign capital according to the EVCA 2008 Nordic Report, so the focus might not be so strong among the local investors. Some of the Swedish investors that have taken part in this survey have regulations on five percent as their maximum allocation to private equity, which might be influencing the results. This would only be speculations from my side, but a further study of differences among the countries would be interesting to see; both in terms of optimal allocation, as mentioned previously, and how much investors focus on investing in the asset class.

*Target Allocation*

If we continue to look at the targets the investors have for their private equity investments, it will be interesting to see if they deviate from their actual allocation. A difference might be an indication of investors planning to invest more in the asset class in the coming years:

Figure 20: Target Allocation

| All LPs | 6.1% |
|---------|------|

The most evident result from looking at target allocations is how few of the investors that state having one at all, only 61% has one. It has been pointed out many times here that finding an optimal target is difficult, I would expect professional investors to take different approaches into consideration and finding a target allocation for their investments to some extent. It might be that many of those that did not report one, had an approximate without stating it. I recognise fact that it is difficult to invest exactly according to target with an illiquid investment as private equity. Takahashi and Alexander (2002) discuss methods for deciding commitments to private equity in a way that you keep close to your target over time. When an investor are changing his target allocation, it will take some time to get to the new target naturally, since one large commitment will make it difficult later to keep the allocation stable. This is the case for some of the limited partners in my survey that states that they want to increase their allocation to private equity. The same is the case for those that no longer want to invest in private equity, instead of selling their shares in the secondary market they decide to hold them for the lifetime of the fund they have invested in.

If we look at the average target allocation for all Nordic LPs, excluding the same as before, we have an average of 6.1%. This indicates that we can expect Nordic investors to invest more in private equity in the coming years. With this allocation private equity will be a more significant part of their portfolio, and the knowledge needed in this industry should also be developed with this experience. It is positive that it seems like investors are doing changes like this over a longer time period, not rushing to change their investments over night even though the industry has expanded quickly in the region.

Now that we have seen how much Nordic limited partners are allocating to the asset class and what their target allocation is, it would be interesting to compare this to the theoretical framework. Using the optimal allocation that I found for a Nordic investor in the previous chapter of between 3.5% and 9.3% in private equity, we see that all of the observed numbers are within this range. I have discussed the difficulties deciding if the optimal allocation is in the upper or lower part of this array, due to the difficulties deciding expected returns; financial markets might behave differently after a recession that we have now because of structural changes and difficulties deciding if data for the period with a severe downturn should be included in the "short" term future (up to 10-15 years). Since especially public pension funds allocate well above 3.5% there must be something indicating that this maybe is a too low allocation in many investors' view. The target allocation to private equity is also well above, and investors do not have such a negative view on the expected returns. If there should be a correct relationship between risk and return, which there should approximately be even though it is not an efficient market, then the return should be significantly higher than for bonds which it is not if the whole period is used.

Around five percent is viewed by many as a minimum allocation to one asset class, among them Swensen (2009). This is because it takes resources to invest in a asset class since you have to have employees with special knowledge, it is generally time consuming and difficult to find good investments, which we have seen is very important in private equity where only the top quartile outperforms the equity market, and other costs that have to be taken into consideration. Some of the investors I have been in contact with have stated the same. They have experienced that investing in private equity needed more focus than they had been able to give it since they only had a small allocation to the asset class. The decision had then been to either allocate more to private equity or not to invest in the asset classes. The latter has been the choice for the investors that have mentioned this as an issue they have considered in the case of my survey.

*How institutions have found their target allocation*

Just as interesting as seeing how much investors are and will allocate to private equity is it to see what kind of methods they have used to find their allocation. At a first glance the

results might be surprising, but when considering the difficulties finding an optimal allocation with traditional methods it seems reasonable:

**Figure 21: Methods for Finding Target Allocation**
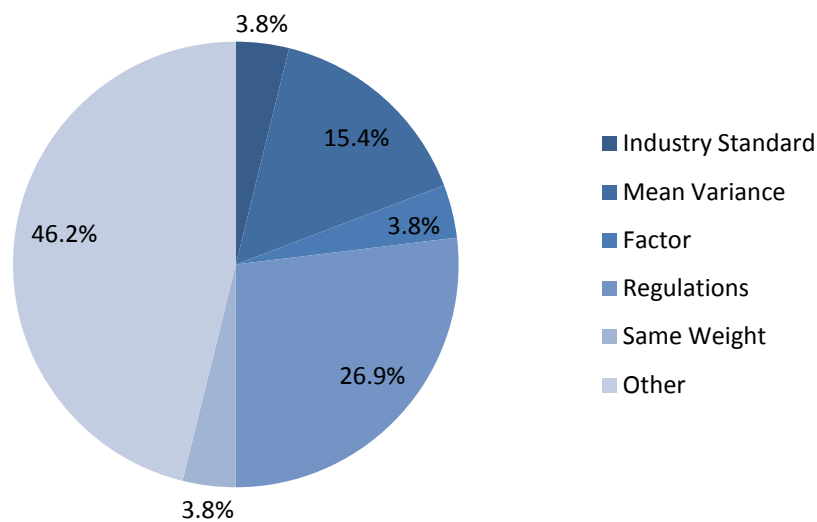


The mean variance approach that I have shown previously is the main method for 15.4% of the limited partners. Many of the ones that say that other methods are their focus also say that mean variance is part of their decision, but they say that it is difficult to use the method to get an allocation that they feel is reasonable. As an example we can look at the 26.9% that say that they use regulations as their main method, some of these have investment rules set by the government or others while others say that regulation is a limit for how much they can invest. When it is a limit they use other methods to decide on their optimal allocation, but regulations means that they cannot invest that much, for instance some pension funds experience this.

In the other category many of the ones that do not have an actual allocation say that they are, but also those that implement different measures in order to get the desired risk exposure when deciding. The answers here are varying, but many of them say that they over time take an active approach and invest on the opportunities that they see. Some of the others are government agencies that I would say that in some way choose their allocation because of regulations, but have chosen themselves to say they use another way of deciding. At last I will mention the corporate investors that obviously have other interests with their investments in many cases than other types of investors because they have more

of a strategic approach to the issue. Investors considering many sides often use both quantitative and qualitative measures. These have been discussed in detail sometimes already; quantitative like mean variance- or factor analysis and qualitative like what other institutions are doing and other risk factors.

*What is your strategy for varying allocation weights over time?*

Over time we have seen that many of the Nordic investors are varying their allocations according to how they expect financial markets to change. To get more information about this we will look at the strategy they use to do this:

**Figure 22: Methods for Varying Asset Allocation**
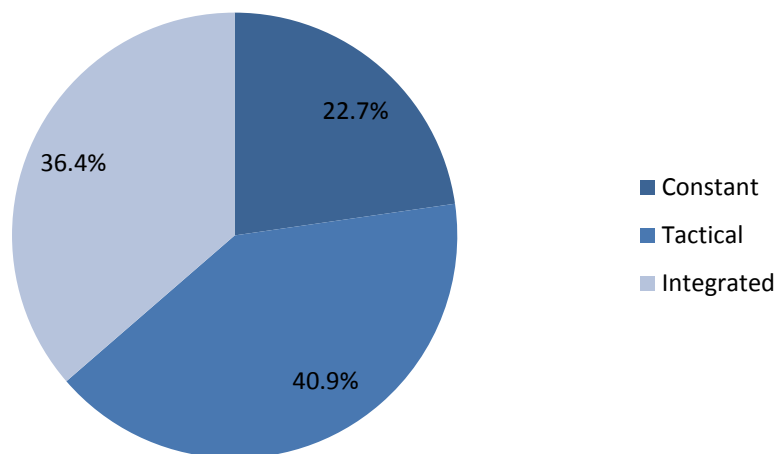


22.7% of the investors operate with a constant weight for their allocation to private equity. It is not given that they do not change it at some times when they revise the input used to find the target they use, but not to actively seek better returns. As many as 40.9% state that they use a tactical approach, seeking excess returns in this way. This active portfolio management strategy should on average not give any excess returns, but will be costly to manage. Swensen (2009) makes a point of the importance to rebalance constantly to be close to your target allocation and to keep it allocations constant over time in order to get high returns, a strategy that has worked well for the Yale endowment, but will be too costly for small investors. One aspect that I feel is important to highlight, and that many investors pointed out, is the difficulties of finding the correct investments in private equity. It is generally known that it is difficult for investors to get access to the best funds, many of the

Nordic investors seems to be focused on the Nordic private equity market as well, and there is a limited number of good funds to invest into in a small region like this. This forces some investors to invest in private equity as they get the chance to, and therefore they also have to vary their allocation over time. Many of these investors, 36.4%, have placed themselves in the last group that take an integrated approach. This combination strategy is chosen by many for the same reasons that they have for choosing the tactical approach in many cases, but can also be a constant weighted strategy were you make certain risk adjustments to your portfolio.

*How do you expect your overall allocation to change in the recent year?*

Focusing more on the short term perspectives of private equity investments we will have a look at the questions that are similar to some of the ones found in the Almeida Capital survey.

**Figure 23: Allocation to Private Equity in the Coming Year**

| 27.8% | 58.3% | 13.9% |
|-------|-------|-------|

■ Increase
■ Remain Same
■ Decrease
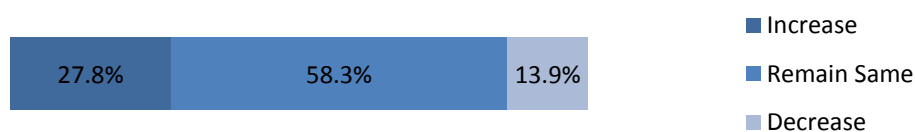
Generally investors seem to be positive to the asset class. As many as 86.1% of the respondents say that they will increase or maintain their commitments to private equity. This was also reflected in the higher target than actual allocation that we saw earlier as well. I also want to remind in that instance that these are only the investors that have already invested in the asset class, so the results might be even more positive if you include investors that are considering investments as well.

For 2008 European LPs were even more positive to investing, with 92% saying that they will increase or remain at the same allocation. It is not a big difference, but 42% reported that they wanted to increase their allocation at that time. Since this is for European investors, not Nordic, it is difficult to say if they have changed their view on the asset class. More investors seem to prefer staying passive until the financial turmoil settle and they get a

better overview of the markets again. I do not think that this only applies to private equity, but also to other types of assets.

*How do you expect your allocation to change by fund type this year?*

Looking more into detail about what types of private equity investors favour in the current market, we will have a look at the five categories viewed earlier; small buyout, large buyout, venture capital, mezzanine and secondaries:

**Figure 24: Allocation to Types of Private Equity in the Coming Year**
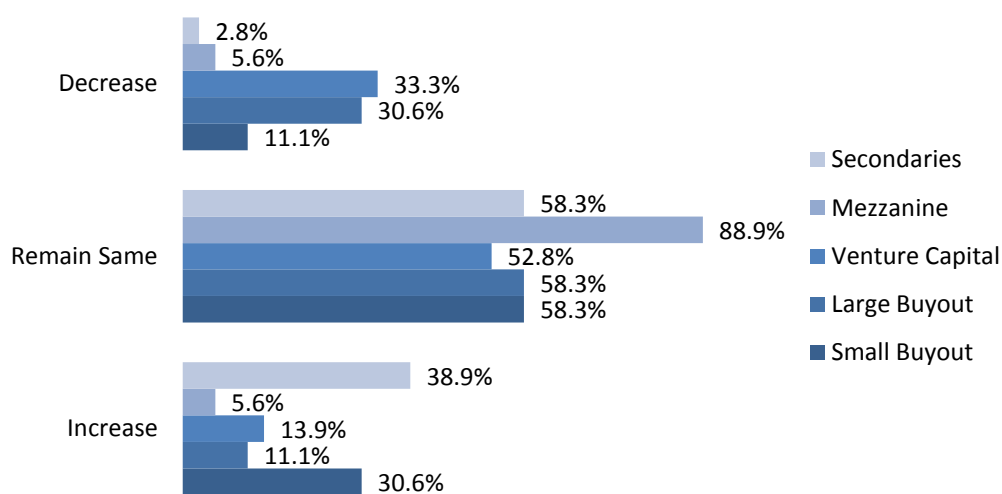


Especially small buyout and secondaries (direct purchase and secondary funds) will be popular among Nordic investors in the coming year. On the opposite side we see that large buyout and venture capital are similarly unpopular. 30.6% and 38.9% of the investors seems to want to allocate more to respectively small buyout and secondaries. Small buyout opportunities should be available in the current market; these types of investments do not use high gearing for the financing, which in unstable credit markets will be desired. Secondaries I have discussed earlier and the fact that investors see the possibility for bargains in the secondary market. This because they expect that there will be a higher supply of private equity investments that distressed investors want to capitalize. Investors want to decrease their exposure to large buyout and venture capital if we look at the types investors are more negative to. I also believe that this reflects the situations in financial markets generally quite well, large buyout is capital intensive while venture capital is risky and the bad market conditions makes it difficult to get established. For large buyout I also

have to point out that there has been very high activity in this category in the recent years, so investors probably do not see so many good opportunities anymore either. Mezzanine most of the limited partners wanted to remain at the same allocation for. This is due to the fact that they have not invested in mezzanine from before, only 27.8%, and are not thinking about doing so.

In the Almeida Capital survey we observed similar opinions, except from when it comes to secondaries that most investors will remain at the same allocation. This might be because of the changes in market conditions that have been in the about five quarters between the two surveys, at the start of 2008 only the start of the financial crisis could be observed. 48% wanted to increase their allocation to small buyout, while 49% wanted to decrease their allocation to private equity. This is even more convincing results, but it points in the same direction as the views of Nordic LPs. European investors were more positive to venture capital than what we can see from my survey, 26% wanted to increase while 12 % wanted to decrease, an fairly indecisive result. I would say that we see some of the same trends for Nordic investors as for European, the difference in when they have been conducted makes it difficult to compare because of the changed market situations.

*How active will you be in the secondary market?*

At last in the part about allocation I want to look at secondaries in more detail because I believe it will have an increased significance for a period of time:

**Figure 25: Allocation to Private Equity Secondaries in the Coming Year**
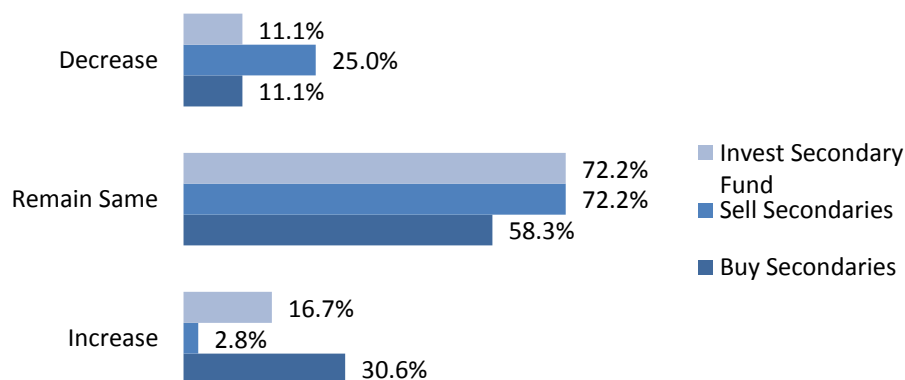
The most significant result when it comes to secondaries is that investors will buy more and sell less directly in the secondary market, 30.6% and 25.0%. Not that many are considering the opportunities in this markets though, with more than half of the investors wanting to remain at the same allocation for all of the types. The secondary market for private equity is not a liquid and efficient market, so in general I believe that not so many of the investors are considering opportunities here, though some are getting more interested now. From the Almeida survey we saw that the situation was differently with more stating that they would decrease their purchases of direct secondary investments. This builds upon the suspicion that secondaries have become more popular since then, with more possibly investors wanting to take advantage of troubled limited partners.

*Does your institution require the funds that you have invested in to use a certain valuation technique for their private equity investments?*

As we have seen, fair value valuations, or mark-to-market valuations, is now a common reporting standard for private equity firms. It is interesting to have a look at what investors think about valuation techniques and reporting for their private equity investments.

**Figure 26: Required Valuation Techniques**
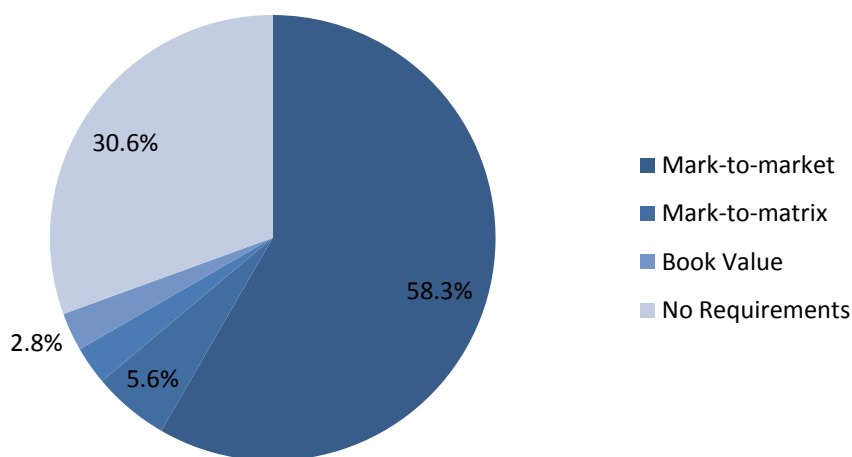


Mark-to-market seems to have become the preferred valuation technique among limited partners in terms of how they want general partners to report. Many of the investors also mention the EVCA "International Private Equity and Venture Capital Valuation Guidelines" as the guidelines they also want their general partners to follow when finding fair values.

Using valuation techniques like this gives investors a better possibility to compare private equity investments to other investments, since they get more continuous updates on how portfolio companies develop and returns over shorter periods of time, even though these figures often is not actual market values. This means that mark-to-model will be the best approximate when there has not been any investments or divestments in the company.

30.6% states that they do not have any actual demands when it comes to reporting from their private equity investments. I did not get very many good reasons for why limited partners do not have any demands on what kind of reporting they would like. Either they are happy with the reporting that they currently get and therefore do not have to demand any special valuation technique or they feel that the quarterly reports with calculated valuations do not give them much more information. Some of the respondents state that the latter is the case; they are not sure how much more information these fair values give them and feel that it is not so useful since they have invested on a long term basis anyways.

*Have you changed your view on fund's valuation techniques in light of the current financial crisis?*

22.2% of the limited partners say that they have changed their view on valuation of private equity in light of the current financial crisis. For some this means that they have acknowledged the fact that they need more information about their investments than they currently get. Few of the investors state that it is because of one of the main reasons I had for including this question; that is the values of their private equity investment goes down with other equity investment they do not have to change their investment plans because private equity has gotten a too big share of their investments. Some of them say that they are trying to do their own valuations using comparables of listed companies to address this problem.

Some bring up an important point about the relationship between LPs and GPs in terms of usage of fair values. They have had experience with fund managers using this to manage their interests. One way for them to take advantage of this with a volatile market like we see now is to hide problems in troubling investments by revaluating valuations in times like these and blame it on market conditions. The limited partners that state this say that they will be increasingly focused on principal-agent issues like this in the future.

*What is your view on private equity funds marking their asset to market?*

The last question asked in the survey is about what LPs really think about mark-to-market valuations for private equity investments, and what it might do to the industry in terms of more information, more efficient secondary markets, higher volatility, or a more short term focus:

**Figure 27: LPs' View on Mark-to-Market for Private Equity**
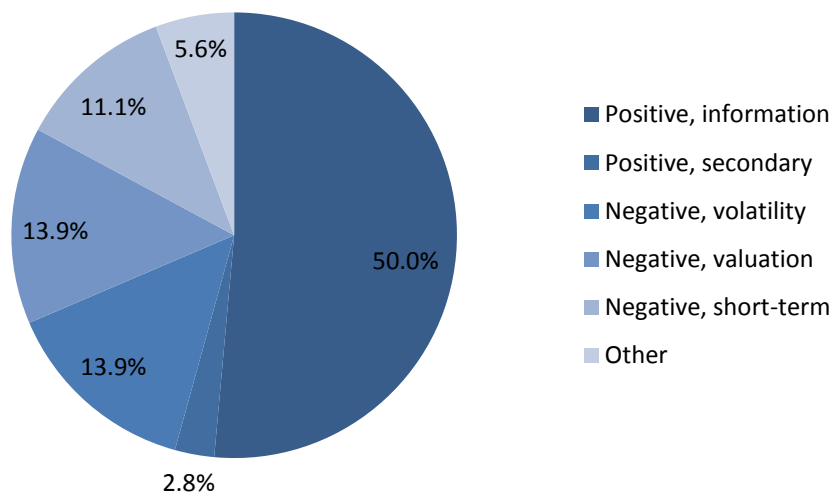


Most of the limited partners think it is positive that private equity firms use mark-to-market because this gives them more information; information in terms of more regular input about the performance of portfolio companies and how general partners view the future. I have already said a fair bit about the positive sides of mark-to-market valuations. As many as 41.6% of the respondents state that they believe this kind of reporting is negative for different reasons. One point is that it get increasingly volatile, private equity is a long term investment and there might not be any use for these calculated values if what you care about is how much return you get in the end. Although, this makes portfolio management somewhat more difficult it is the view of some. The valuation that you get from a general partner is very uncertain if there have been no transactions which can determine a market price. Some say that they rather would like to get the information needed to make valuations they feel are correct instead, so that they have more control of the

approximations used. At last, it was stated by a few limited partners that it gives private equity more of a short term focus. For general partners this means that they might not take the same decisions as they would with the traditional long term focus of private equity, giving them time to incorporate the changes that they want to.

# 7 Conclusions

Many aspects of asset allocation, with a focus on the optimal allocation to private equity, have been discussed in this thesis. The two topics that the analyses have focused on are finding an optimal allocation for Nordic investors and studying how these investors are actually allocating. I will start by summing up the results from these studies, and then focus on how these findings match. Whether or not Nordic limited partners have an optimal allocation will be the final conclusion of this paper, with the different aspects that i have studied around this topic and the difficulties experienced. Finally I will mention some improvements that can be done to this research and possible future studies on the topic of asset allocation to private equity.

## 7.1 Final Conclusions

When choosing a proxy for private equity to use when finding an optimal mean variance portfolio there is many different choices, but listed private equity was used because of its quoted, daily market values. This makes it optimal for including together with more traditional asset classes; equity and bonds. Finding reasonable expected returns proves difficult with a 15 year time period including the last year with large declines in financial market values. Because of this, I have studied optimal portfolios both when including and excluding the last year. For a global investor this gives an optimal portfolio with 9.2% and 14.2% in private equity. Also for Nordic investors calculations were done in US Dollars, because the region was studied as one market by including Nordic public equity into the portfolio. The optimal portfolios when doing this had 3.5% and 9.3% allocated to the asset class. Where in this range that will be a correct allocation will be a decision based on which of the two expected return scenarios that is correct.

From the survey we found that the 36 limited partners which participated had an average allocation of 4.8% (5.1% value weighted average). Generally these investors were planning to increase their allocations to the asset class though. The average target allocation, which not so many of the investors actually had, were 6.1%, higher than the current allocation, and 86.1% wanted to remain at the same allocation for private equity in the coming year or increase it. Pension funds, and then especially public pension funds, seem to invest a larger portion of their assets in private equity when compared to insurance companies. Similar

results can be found when studying the differences between the Nordic countries, but these results are not so informative because there are few observations and there are different types of institutions that are dominant for the different countries. Norwegian and Swedish investors seem to allocate less to private equity though. When finding their optimal allocation few of the investors use a mean variance approach; which were used for the study of optimal allocation in this thesis, as their main method. By many it is included in their study of risk, but more qualitative methods are used for deciding the actual allocation.

In the coming year many of the limited partners will try to adjust their private equity investments so that they are better positioned to the changes in markets. Small buyout and secondaries will be increasingly popular according to the respondents. I would believe that this is due to the opportunities that might come from distressed companies and investors that will create good buying opportunities. At the same time these types will not be so dependent of the difficulties to raise capital. Large buyout on the other hand is believed to be affected by this. Investors want to decrease their allocation to this type which has been very active in the recent years. Venture capital is also not an attractive investment in general in the coming year according to my survey. The market conditions for venture companies are maybe not the best at the time, together with higher risk that investors do not want at the moment.

Mark-to-market or fail value valuation has become a standard for private equity investments and also required by many of the Nordic investors. At the same time many of the participants still have a negative view on this way of reporting valuations of private equity since the valuations will be highly affected by fund managers and their incentives and it gives more of a short term focus when it comes to private equity. Most of the limited partners believe that it is positive since it gives them more information about portfolio companies though. In terms of allocation will these updated valuations mean that investors more effectively can rebalance their portfolios in terms of private equity investments, and commit capital after reflecting how their current investments have developed.

The final question would then be if Nordic investors actually are optimally allocated to private equity? Both the actual and the target allocation are within the range of the optimal allocations that I found in my analysis. This range seems reasonable, but we have to be

aware that it is highly uncertain. Public equity has an unreasonably low allocation in this study, the proxies available for private equity is not optimal, and the private equity industry is still changing significantly so using historical returns might be less correct than for traditional securities. Most of the Nordic LPs have also found their allocations using different methods than I have used, so that their allocations is within my range does not mean that I have replicated their process. In my opinion, is it not correct to ignore the last year with turmoil in financial markets in the model, but at the same time does it give more reasonable risk-/return relationships. I therefore tend to believe that the optimal allocation should be in the upper part of the range. This means that maybe Nordic limited partners are not allocating enough to the asset class based on the mean variance analysis. The use of different methods and many judgements that goes into including private equity in the portfolio defends deviations though.

**7.2 Suggestions for Future Studies**

There are many further studies that I see the possibility to do for a master thesis within the subject that I have written about, both about optimal allocation to private equity and how Nordic investors are managing their investments in the asset class. In that instance I will mostly look at similar studies to what I have done, and how to look at them with another view. Since there has not been written many papers about the subject there will be many other possibilities than the ones I have been thinking about when writing this thesis.

As I mentioned in the introduction, there has previously been written one dissertation about optimal allocation to private equity for Norwegian investors. In my opinion it would be interesting to look more at geographical differences in optimal portfolios, either between regions or maybe even between the Nordic countries. The most evident way to do this is to include different local markets in the way that I have done for local, Nordic equity markets. The main obstacle in this instance will be to find a good proxy for the local private equity markets. LPX has regional indices for Europe, North America and the UK, but finding a proxy for Nordic private equity or even the Nordic countries will be a challenge at the moment. If this can be solved in a way that gives enough data for a study seeing how correlated the markets are and if there is actually as much differences between the Nordic markets when it comes to performance and how it fits into a local portfolio.

My study of Nordic limited partners has been a quantitative study done by contacting as many investors as possible to help me with my survey. Another way to study the topic will be to contact some limited partners to do a more in depth study. This will give you more of an opportunity to get to know details about what issues are important to different types of investors and in the different Nordic countries. This might be in the terms of regulations that limit them from investing as much as they want in the asset class, local private equity funds and their relationship with them, what being the type of institution that they are make private equity a good investment for them, and other interesting questions that is difficult to get answers to through a survey. My experience is that there are many professionals that will gladly share their knowledge if they have the time to, so it should be possible to schedule interviews with some of them for this purpose. A case study like this would have fitted well into my thesis as well, but I chose not to include it because it would mean that the content of my paper would be too large in my opinion. For a paper with this topic in the near future using the results that I have gotten from my studies as background information for the interviews could be interesting and then more answers about why I have gotten the results that I have might be found.

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*Thomson Reuters Datastream*                    *http://www.datastream.com/*

*EVCA*                    *http://www.evca.eu/*

*It's Learning*                    *http://www.itslearning.no/*

*Listed Private Equity*                    *http://www.lpeq.com/*

*LPX GmbH*                    *http://www.lpx.ch/*

*MSCI Barra*                    *http://www.mscibarra.com/*

*Private Equity Insight*                    *http://www.privateequityinsight.com/*

*Social Science Research Network*                    *http://www.ssrn.com/*

## Appendices

*Appendix A*

**Global Investor**

| | Mean Return |
|---|---|
| **Equity** | 0.50% |
| **Bonds** | 0.52% |
| **Private Equity** | 0.42% |

| | VCV Matrix | | |
|---|---|---|---|
| | **Equity** | **Bonds** | **Private Equity** |
| **Equity** | 0.00189 | 0.00013 | 0.00195 |
| **Bonds** | 0.00013 | 0.00026 | -0.00054 |
| **Private Equity** | 0.00195 | -0.00054 | 0.00637 |



| | Portfolio RFA |
|---|---|
| **Equity** | -11.9% |
| **Bonds** | 98.5% |
| **Private Equity** | 13.4% |
| **Sum** | 100% |

| | Portf. RFA (No Short) |
|---|---|
| **Equity** | 0.0% |
| **Bonds** | 90.8% |
| **Private Equity** | 9.2% |
| **Sum** | 100% |
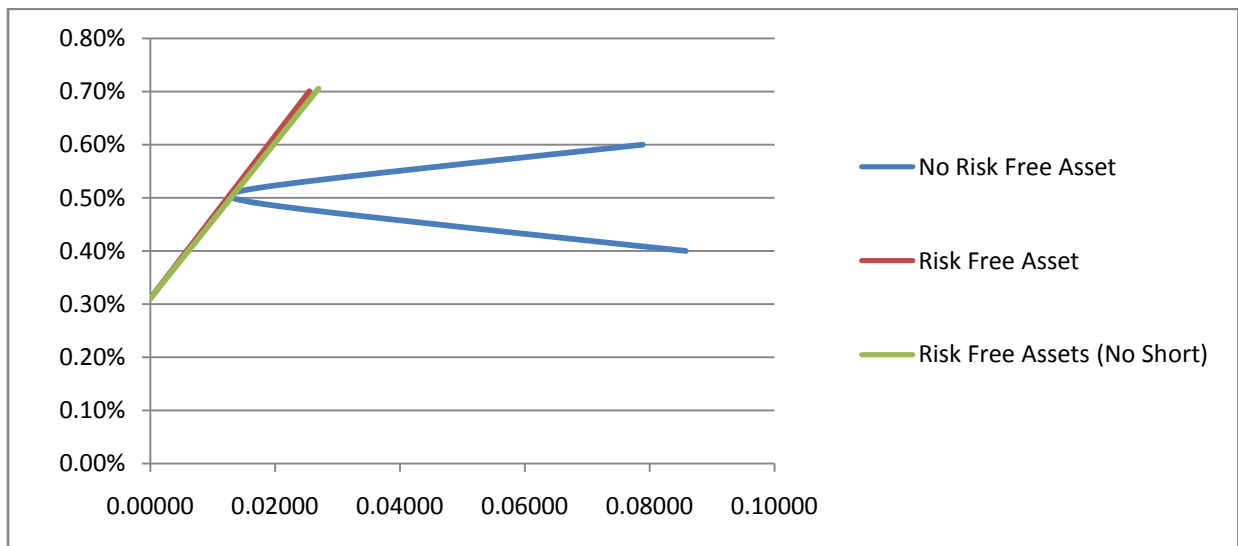
**Global Investor 1994 to 2008**

|  | Mean Return |
| --- | --- |
| Equity | 0.82% |
| Bonds | 0.52% |
| Private Equity | 0.97% |

|  | VCV Matrix | | |
| --- | --- | --- | --- |
|  | Equity | Bonds | Private Equity |
| Equity | 0.00145 | 0.00007 | 0.00154 |
| Bonds | 0.00007 | 0.00024 | -0.00052 |
| Private Equity | 0.00154 | -0.00052 | 0.00560 |



|  | Portfolio RFA |
| --- | --- |
| Equity | 2.2% |
| Bonds | 83.6% |
| Private Equity | 14.2% |
| Sum | 100% |
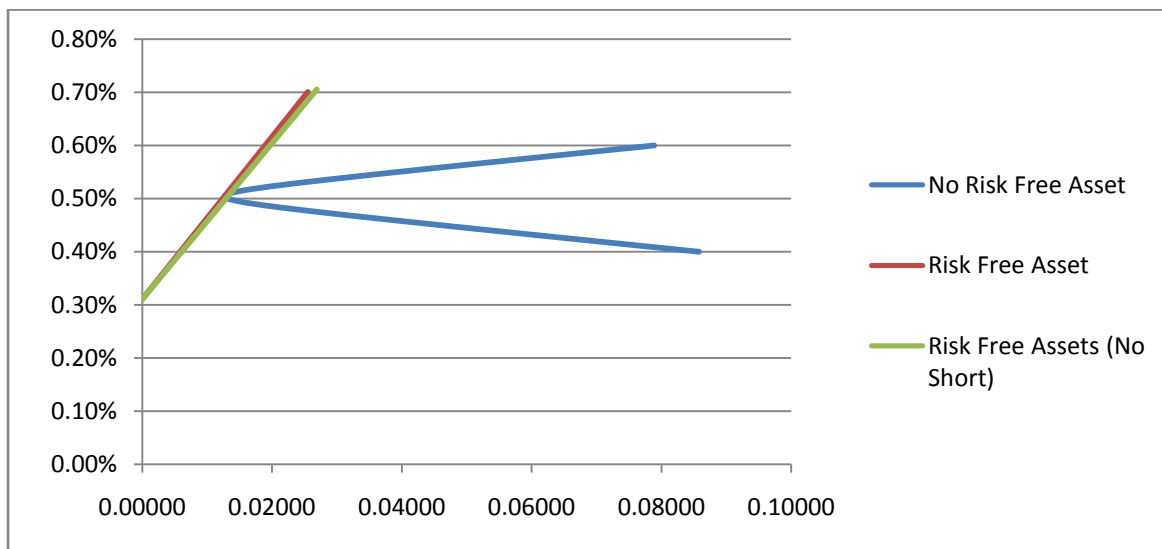
**Nordic Investor**

| | Mean Return |
|---|---|
| **Global Equity** | 0.50% |
| **Nordic Equity** | 1.07% |
| **Bonds** | 0.52% |
| **Private Equity** | 0.42% |

| | VCV Matrix | | | |
|---|---|---|---|---|
| | **Global Equity** | **Nordic Equity** | **Bonds** | **Private Equity** |
| **Global Equity** | 0.00189 | 0.00266 | 0.00013 | 0.00195 |
| **Nordic Equity** | 0.00266 | 0.00519 | 0.00013 | 0.00308 |
| **Bonds** | 0.00013 | 0.00013 | 0.00026 | -0.00054 |
| **Private Equity** | 0.00195 | 0.00308 | -0.00054 | 0.00637 |



| | Portfolio RFA |
|---|---|
| **Global Equity** | -57.6% |
| **Nordic Equity** | 33.2% |
| **Bonds** | 111.8% |
| **Private Equity** | 12.6% |
| **Sum** | 100% |

| | Portf. RFA (No Short) |
|---|---|
| **Global Equity** | 0.0% |
| **Nordic Equity** | 11.5% |
| **Bonds** | 85.0% |
| **Private Equity** | 3.5% |
| **Sum** | 100% |
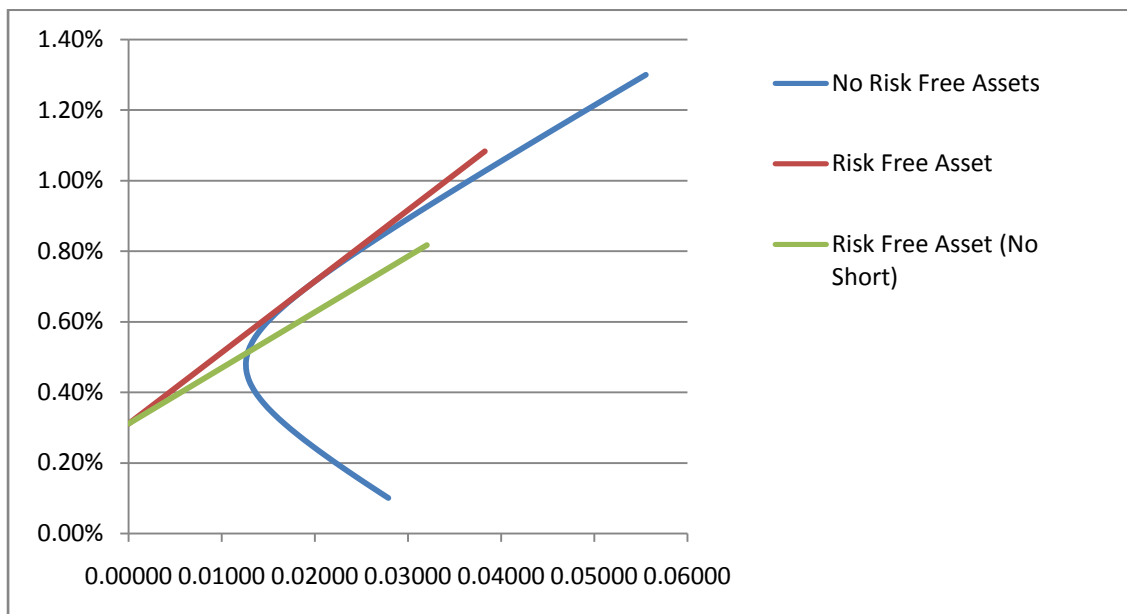
**Nordic Investor 1994 to 2008**

| | Mean Return |
|---|---|
| Global Equity | 0.82% |
| Nordic Equity | 1.54% |
| Bonds | 0.52% |
| Private Equity | 0.97% |

| | VCV Matrix | | | |
|---|---|---|---|---|
| | Global Equity | Nordic Equity | Bonds | Private Equity |
| Global Equity | 0.00145 | 0.00208 | 0.00007 | 0.00154 |
| Nordic Equity | 0.00208 | 0.00444 | 0.00003 | 0.00258 |
| Bonds | 0.00007 | 0.00003 | 0.00024 | -0.00052 |
| Private Equity | 0.00154 | 0.00258 | -0.00052 | 0.00560 |



| | Portfolio RFA |
|---|---|
| Global Equity | -28.5% |
| Nordic Equity | 22.9% |
| Bonds | 92.1% |
| Private Equity | 13.4% |
| Sum | 100% |

| | Portf. RFA (No Short) |
|---|---|
| Global Equity | 0.0% |
| Nordic Equity | 12.5% |
| Bonds | 78.2% |
| Private Equity | 9.3% |
| Sum | 100% |
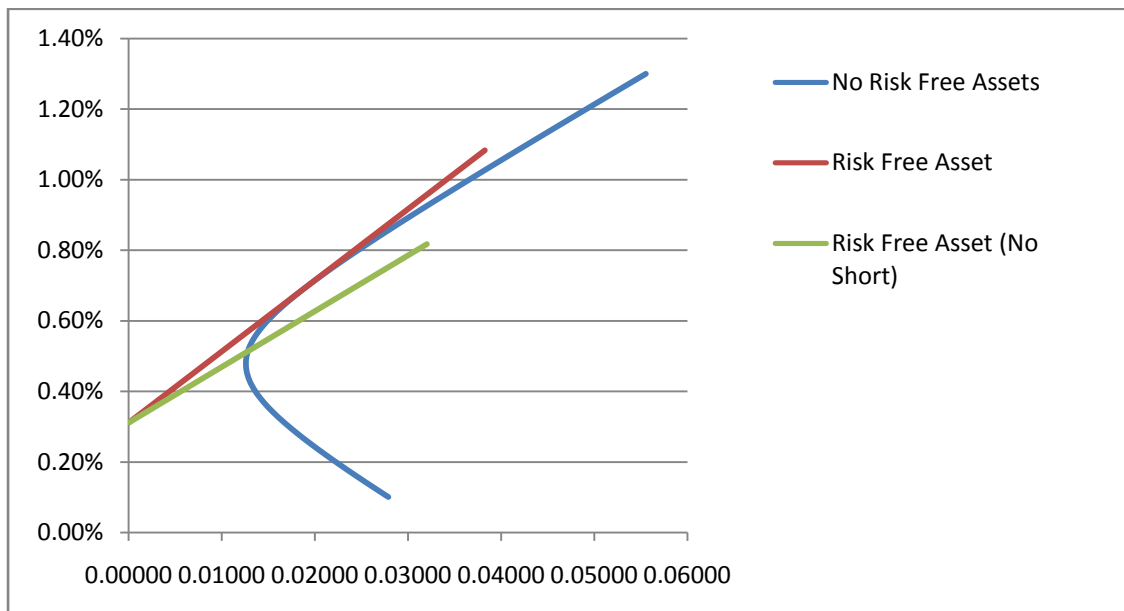
*Appendix B*

Survey about Nordic, institutional investors' asset allocation to Private Equity.

This survey is part of an academic paper concerning Nordic investors' asset allocation and is written as a part of a master thesis at the Norwegian School of Economics and Business Administration (NHH). The survey is totally anonymous, so information from the survey will not be linked to your institution in the final report.

Thank you for participating.

Information:

Which institution do you represent: _____

What is the institution's country of origin (tick one):
☐ Norway ☐ Sweden ☐ Denmark ☐ Finland

What type of institution is your company/organization:
☐ Fund-of-funds ☐ Insurance ☐ Investment ☐ Bank ☐ Asset Management
☐ Pension ☐ Endowment ☐ Corporate ☐ Other: _____

What type of Private Equity investments do you have (tick one or more):
☐ Small Buyout ☐ Large Buyout ☐ Venture Capital
☐ Mezzanine ☐ Secondary (direct and indirect)

Capital under management: _____MEUR

Capital allocated to Private Equity: _____MEUR

Capital allocated to Buyout: _____MEUR

Capital allocated to Venture: _____MEUR

Allocation:

How do you expect your overall allocation to private equity to change in the coming year (tick one):

☐ Increase ☐ Remain same ☐ Decrease


How do you expect your allocation to change by fund type this year:

Small Buyout: ☐ Increase ☐ Remain same ☐ Decrease

Large Buyout: ☐ Increase ☐ Remain same ☐ Decrease

Venture Capital: ☐ Increase ☐ Remain same ☐ Decrease

Mezzanine: ☐ Increase ☐ Remain same ☐ Decrease

Secondary (direct and indirect): ☐ Increase ☐ Remain same ☐ Decrease


How active will you be in the secondary market this year:

Buying Secondaries: ☐ More Active ☐ As Active ☐ Less Active

Selling Secondaries: ☐ More Active ☐ As Active ☐ Less Active

Investing in Secondary Funds: ☐ More Active ☐ As Active ☐ Less Active


What is your target asset allocation to Private Equity (if you do not have, leave blank): _____%


How have you decided on this policy allocation (tick one, leave blank if you do not have a target):

☐ Industry Standard ☐ Optimal Mean-Variance ☐ Factor Model ☐ Regulations

☐ Same Weight on All Asset Classes ☐ Other: _____


If you have used a theoretical basis, please elaborate on your method:

_____

_____


What is your strategy for varying portfolio allocation weights over time (tick one, leave blank if you do not have a policy):

☐ Constant-Weighting ☐ Tactical (Dynamic) ☐ Insured (base return) ☐

Integrated (Risk Tolerance Adjusted)

Valuation:

Do your institution require that the funds you are invested in to use a certain valuation technique for their Private Equity investments (tick one):

☐ Mark-to-market ☐ Mark-to-matrix ☐ Mark-to-model

☐ Book Value ☐ At Cost ☐ No requirements

Have you changed your view on funds' valuation techniques in light of the current financial crisis (tick one):

☐ Yes ☐ No

If yes, please explain:

_____

_____

What is your view on Private Equity funds marking their assets to market (tick one):

☐ Positive, information about funds ☐ Positive, effective secondary markets

☐ Negative, higher volatility ☐ Negative, uncertain valuation

☐ Negative, short-term focus ☐ Other: _____