

NHH



Private Equity Buyouts in Norway

*Inferring company valuations from public financial statements, and
an analysis of the Norwegian buyout market*

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Master Thesis in Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

Abstract

This thesis presents a framework to infer prices paid for companies from public financial statements. It shows that prices and valuations can be estimated accurately, as long as the buyout is done using common stock and that the company's debts at the time of the transaction are not very different from the balance at year-end.

Using this framework, a novel dataset of 44 buyouts in Norway from 1999-2012 is constructed and analyzed. Summary statistics of average valuations, valuation multiples, changes in capital structure and the use of equity instruments other than common stock are presented.

Two findings from the literature are tested to see if they also hold for Norwegian data: Axelson et al.'s analysis on how access to credit affects the valuation of companies acquired by buyout funds, and Gompers and Lerner's analysis of how fundraising to venture capital funds affects valuations of the companies acquired by venture capital funds.

The credit spread does not seem to have affected pricing of companies acquired by Private Equity funds in Norway, contrary to the findings of Axelson et al. I am also not able to recreate the results of Gompers and Lerner on the effect of fundraising to the industry; however this seems to be caused by a combination of a small sample size and low data quality on fundraising. More research is therefore needed to conclude on this subject.

Preface

This thesis marks the end of five great years at NHH. I want to thank lecturers and my fellow students for making it an interesting and fun period.

I owe many people thanks for their help in writing this thesis. Fredrik Andersen Kavli at the NHH library was particularly helpful with getting the financial statements I needed. Anders Yttervik at HitecVision was a great help in explaining how the industry structures buyouts, as well as supplying financial statements. For digging up 15-year old financial statements from their archives, I'm grateful to Tove Hauge at NorgesInvestor. Jazmina Naini of Altor Equity Partners also helped with financial statements. A special thanks to Marie Salbuvik at Norvestor for financial statements and for sending me her thesis.

At Argentum I want to thank Investment director Henning Fredriksen for his advice; Charlotte Rakner and Kristina Evensson helped with data on fundraising as well as great advice.

At DNB Markets I want to thank Magnus Vie Sundal for giving me access to their proprietary data on credit spreads for Norwegian companies.

Stian Pedersen at PwC was a great help with constructive feedback on my thesis as the deadline was approaching.

Last but not least I want to thank my supervisor Carsten Bienz for letting me tap into his network in the Norwegian Private Equity industry, and for advice on writing the thesis.

Bergen, December 2013

Magnus Nestor Robberstad

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1. Introduction

Private Equity as an asset class has grown rapidly in Norway and the rest of the world in the past two decades. In Europe funds raised for Private Equity funds grow from 8 billion Euro in 1996 to 23.6 billion Euro in 2012 (European Venture Capital Association (EVCA), 2012). Although Private Equity is becoming an increasingly important asset class, there are still many unanswered questions for research into this field. One of the major problems is the lack of data, since Private Equity is largely exempt from public disclosure requirements. In recent years databases like Preqin and Thomson Reuter's VentureXpert have started to provide substantial amounts of data, but much of the information is based on self-reporting by Private Equity funds. This can lead to sample selection bias, since some funds or companies might be unwilling to contribute information to the database.

In this thesis I propose a way to infer the price a fund has paid for investing into a portfolio company based on public financial statements. Since the method uses only publically available information, it does not face problems from self-reporting by funds. The method also provides a framework to analyze more deals and to infer the price paid when the portfolio company is exited. This provides data that can be used to estimate returns on investments that funds have made, as well as a range of other topics.

Using this method I construct a novel dataset of Norwegian buyouts from 1999-2012 containing 44 buyouts, with the aim of describing the Norwegian Private Equity market and comparing the findings to financial theory and empirical results from other countries. The pricing of companies bought by Private Equity funds are examined and valuations and valuation multiples are reported. I also try to analyze what drives pricing through a regression analysis. In these regressions I try to explain pricing through factors such as sales, EBITDA, valuations of similar public companies and risk. Controlling for these variables I test two findings that have been shown by Axelson et al. (forthcoming in the Journal of Finance) and Gompers and Lerner (2000), to see if they also hold for Norwegian buyouts. Axelson et al. show that enterprise valuations in buyouts are negatively correlated with the high-yield credit spread, so that when credit spreads are low, buyout funds pay more to acquire companies. I run a version of the same analysis on the sample of Norwegian buyouts using the credit spread for interest rates paid by a sample of Norwegian

companies with similar characteristics as the companies in the sample. Gompers and Lerner showed that higher inflows of capital to venture capital funds were associated with the funds paying more to acquire firms. This analysis is run on the sample of Norwegian buyouts using Argentum's data on fundraising for Private Equity funds in Norway.

In addition to exploring the pricing of companies that Private Equity funds have acquired, I report statistics related to corporate governance. The leverage ratio before and after the buyouts for the companies in the sample are reported, as well as the average ownership share the Private Equity fund has of the target company after acquiring it. I also look at the use of equity instruments other than common stock, to see how it affects enterprise valuations, and whether it seems to be motivated by a desire to mitigate agency conflicts or as a way for Private Equity funds to expropriate value from less sophisticated co-investors.

The most important result in this thesis is that it is possible to infer prices based on public financial statements with great accuracy. Using the method on a dataset of 11 buyouts made by an anonymous Norwegian Private Equity fund showed that the inferred price was on average 0.7% above the true price paid, with the largest error being 3.4% above the true price. The positive bias of the method is likely due to transaction costs being part of book values. Although price can be determined very accurately, the most important limitations of the method are when inferring enterprise valuations based on the price paid in the deal. Debt at the time of the transaction is usually not available, so the debt used to calculate enterprise valuation is the debt taken at the balance date, which could be substantially different from the debt at the time of the deal. Another limitation is the use of special equity instruments such as preferred stock which Private Equity funds sometimes use when they invest. Since these securities give different cash flow rights than common stock, they give a different implied valuation of the company. Adjusted valuations that take this into account can be calculated using option pricing methodology and publically available information about the characteristics of the securities used, but rely heavily on the assumptions made on the riskiness (volatility parameter) and expected time before the Private Equity fund exits the investment.

A sample of 44 buyouts in Norway from 1999-2012 is constructed using information from public sources. In the sample I find that the average enterprise value paid in 2012 values was 418.7 MNOK, while the smallest and largest enterprise valuations were 43.5 MNOK and 2287.4

MNOK respectively. The average EV/EBITDA multiple for the companies with positive EBITDA was 10.3, which is higher than the multiples paid for large LBOs as reported by Axelson et al. The EV/EBITDA multiple varies between funds and industries, where the information- and communications technology sector had the highest multiples. The average EV/Sales multiple in the sample was 1.1, with the highest multiples found in the high-margin energy sector.

The funds typically secured more than two-thirds majority of total equity when investing, which gives a higher degree of control than a simple majority. The average leverage ratio of the target companies increased from 15% to 30%, where the biggest increase in leverage was found for the consumer products sector. In eight of the 44 deals special equity instruments were used so that they had a substantial impact on the implied enterprise valuation. My analysis indicates that the instruments were typically used to mitigate agency conflicts between the Private Equity firm and the owner-managers of the companies they invested in, not to expropriate value from co-investors.

The regression analysis was not able to recreate the findings of Axelson et al. that the credit spread is negatively correlated with pricing of companies. This could be because the deals in the sample are not as aggressively levered as Axelson et al.'s LBO sample, so that the effect of cost of debt has less impact. Using assets the company could use as collateral for loans as a proxy for the availability of credit proved not to have a significant effect on pricing.

The analysis of fundraising for Private Equity funds on pricing of target companies showed no significant effect. However this result should be attributed to problems related to the lack of data and small sample size, so no firm conclusions can be made.

My master thesis is a direct continuation of M. Salbuviik's master thesis (2013), where she estimated prices paid by for companies acquired by the Private Equity fund Norvestor from public financial statements. The difference between my thesis and Salbuviik's thesis is that she estimates prices based on the consolidated financial statement of the group formed by the acquisition, by looking at changes in goodwill and other assets, while I use the separate financial statement of the acquiring company. While Salbuviik finds that her method on average gives a price that is 27% too high, the method presented in this paper is on average 0.7% too high. Apart

from Salbuvik's thesis, no research has been done to infer prices for private equity deals from public financial statements as far as the author is aware of.

My work also touches upon asset pricing- and corporate governance literature. The regression models used in the analysis, where the value of the firm is regressed on its characteristics, is treated in numerous articles, but my model follows most closely to the model used in Gompers and Lerner (2000). The analysis of how the availability of credit affects firm valuations in buyouts is covered in Axelson et al. (forthcoming in *Journal of Finance*), while the analysis on how inflows of capital to buyout funds affects prices is covered by Gompers and Lerner (2000). The use of special equity instruments in private equity is discussed in Metrick & Yasuda (2011), and the role of capital structure in corporate governance, in particular debt, is treated by Jensen (1986).

The rest of the thesis is organized as follows: Section two describes the institutional set-up and accounting rules that allowed me to construct the sample, and documents how the method works and what its limitations are. The third section describes the data collection process and the variables in the dataset. The fourth section shows the results of the analysis, while the final section concludes and draws up areas for future research.

2. Institutional Set-Up

In this section I will describe the institutional set-up that allowed me to get the information needed to construct the dataset. I will first go through the availability of financial information in Norway, and briefly discuss the availability in some other countries that are relevant to this paper. Next I will present two possible ways to infer transaction prices in Private Equity transactions from public financial statements, and discuss how well they will work based on the accounting principles used to prepare the financial statements. In the third part of this section I address how to infer enterprise valuations from the transaction price found in the first step. I then move on to address the drawbacks and limitations of my method, before I in the fourth part of the section apply the method on a dataset given to me by an anonymous Norwegian Private Equity fund. The final part of the section summarizes the method.

2.1. Availability of financial information

The first requirement in order to use the method to infer prices presented in this paper is that financial statements must be publicly available. I will therefore go through the availability of financial statements in Norway and other countries that are relevant to this paper.

According to the Norwegian Accounting Act §8-1, all limited companies must make their financial statements public by filing their financial statements to the Brønnøysund Register Centre. Anyone can search the Brønnøysund Register Center through web sites such as www.proff.no or www.ravninfo.no, to find financial information about a company. Through these web sites one can look at the financial statements of a company for free, and view information on who owns the company and the company's subsidiaries. However the full financial statement including the notes must be purchased for 50 NOK. This system is the same in Sweden and Denmark, where the information is available from www.bolagsverket.se and www.cvr.dk, respectively. Financial information on companies across Europe is available from the European Business Register (www.ebr.org) which includes 54 countries, although not all the member countries give access to as much information that it is possible to get from the Scandinavian countries.

In Norway financial statements for the previous year are usually available for the public around August, meaning that the information is available earliest approximately 8 months after the transaction if the transaction happened near year-end. If the transaction happened early in the

year, it could take up to approximately 20 months before the information is available. The Norwegian Accounting Act allows that the first financial statement of a new company covers a period of up to 18 months (§1-7), this means that if a transaction happened after the 1st of July the financial statement of the buyer could first be available approximately 25 months later, which is a considerable time lag. However I have seen that many Private Equity funds choose to make financial statements that cover the period from the transaction until year-end, even when the transaction happened in December. The same rules also apply to Sweden.

For information on US companies it is possible to search the Securities and Exchange Commission's (SEC) database EDGAR to find an electronic copy of a company's filings to the SEC. Relevant info for public companies can be found in the 10-K or 10-KSB annual report (10-KSB for small companies). Private companies are not required to file with the SEC, so finding information about them is much more difficult (Library of Congress, 2013). Possible data sources are Dun & Bradstreet reports, although these contain mostly credit information, and the PrivCo database which contains finance research coverage. Both these sources are available by subscription (Library of Congress, 2013).

Many Private Equity funds are based in tax havens, where transparency is low. HitecVision, one of the most influential private equity firms in Norway, have all of their funds incorporated as limited partnerships in Guernsey (HitecVision AS, 2013). The same is also the case for Altor Equity Partners and Norvestor Equity's funds. The Guernsey Limited Partnership law requires that the partnership keep accounting records, but is not required to have them audited or make them public (AO Hall Advocates, 2011). Furthermore the law does not require that the names of the limited partners be a matter of public record, only the general partner(s) name and address (Russel, 2013). This level of discretion, combined with tax-transparent taxation has made the Guernsey limited partnerships a popular investment vehicle for private equity funds (Russel, 2013). However the lack of transparency makes it impossible to find information on the fund directly.

In addition to information from financial statements I have made extensive use of the Argentum database available at www.argentum.no. Argentum is a private equity fund-of-funds firm owned by the Norwegian Ministry of Trade, and part of its mandate is to develop the market for private equity in Norway (Argentum, 2011). The database is one of the best sources of information on

private equity transactions in the Nordics and aims to track all transactions in the Nordics by publishing information that is available on the portfolio manager's or portfolio companies' website, or in the media. The database is excellent for getting an overview of a deal which often is necessary to make sense of the information from the financial statement. I have also frequently used the web sites of the PE-firms to get information on the deals I have analyzed.

2.2. Ways to find transaction prices through accounting information

There are (at least) two plausible ways to infer transaction prices from financial statements:

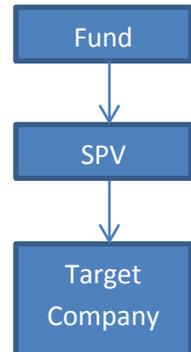
1. From the parent company's financial statement. When a fund or the subsidiary of a fund acquires another company, the transaction will be recorded in the acquirer's balance as a financial asset. If the fund or its subsidiary has acquired more than one company in the same fiscal year, it will be difficult to separate the prices paid for each company, although it should be possible to find the transaction price for each investment disclosed in the notes.
2. From the parent company's consolidated financial statement. When a company gains control over another company (usually by gaining >50% of the voting rights), it becomes the parent company and is required to prepare consolidated financial statements using the acquisition method. This involves assigning the purchase price to identifiable assets, liabilities and goodwill (see IFRS 3 "business combinations" (IFRS Foundation, 2010) and the Norwegian Accounting Act (NAC) §§§3-2, 3-6 and 5-18 (Lovdata, 2013)). The purchase price should therefore be possible to infer from the spike in net assets and goodwill following an acquisition, although other acquisitions and investments will make it difficult to isolate the accounting effect of the acquisition. However the transaction price might be disclosed in the notes.

Since an acquisition is a transaction between the old owners of the target company and the Private Equity fund, and not the target company itself, an acquisition has no effect on the target company's financial statements. It is therefore not possible to infer the transaction price by looking at the target company's financial statement.

Next I will discuss how well each of these methods will work, but first it is prudent to look at how buyouts typically are structured. This will be helpful to keep in mind the two ways of inferring prices are discussed.

According to Henning Fredriksen and Anders Yttervik, Investment Director at Argentum and Portfolio Monitoring Officer at HitecVision respectively, deals in Norway are often structured in the following way: When a Private Equity fund invests in a portfolio company, it organizes the investment through a special purpose vehicle (SPV) which then invests in the portfolio company, see figure 1. The SPV is usually a holding company whose only function is to be the legal owner of the investment in the target company. There can also be several layers of holding companies between the fund and the target company.

Figure 1 – Typical deal structure



This structure makes it easy to infer prices, since the purchase price of the investment can be read directly from the balance of the SPV. If the SPV's only function is to be the legal owner of the investment in the target company, then the financial assets balance should reflect the price paid for the investment.

However deals can be structured in different ways than described above. According to Henning Fredriksen at Argentum, it is more common for larger PE-funds to incorporate the SPV in countries like Jersey, Guernsey and Luxembourg. In this setup financial statements for the SPV are not publicly available. However I have not faced this problem in my analysis, indicating that this way of organizing a deal is seldom used.

I will now discuss how the two ways of inferring prices work in more detail. In the discussion I will focus on how accounting laws and accounting principles affect how each method works. For the purposes of this paper, Norwegian Generally Accepted Accounting Principles (NGAAP), Swedish Generally Accepted Accounting Principles (SGAAP) and IFRS are relevant. This is because the sample contains Norwegian and Swedish incorporated companies, and some of the companies use IFRS instead of the local accounting principles. NGAAP and SGAAP are very similar, so assume that the rules are identical unless differences are pointed out. Usually the first note of the financial statement will clarify the accounting principles that have been used for preparing the financial statement.

Using the Parent Company's Financial Statement

According to NGAAP, an investment in another company that is of a strategic and long-term nature is considered to be a non-current asset (NAC §5-1), and is measured at acquisition cost (NAC §5-2). Acquisition cost is defined as the purchase price plus any expenses incurred with the purchase (transaction costs) according to NAC §5-4. Such expenses can be lawyer fees or fees to investment banks that facilitate the takeover. This means that the book value will be higher than the actual transaction price, which should be taken into consideration.

The purchase price (or consideration) is measured as the fair value of assets transferred to the old owner and liabilities that the new owner takes over, including conditional payments (The Norwegian Accounting Standards Board (NASB), 2010). This is straight-forward if the payment is in cash, and there are no conditional payments, since the purchase price is simply the amount of cash paid. However, sometimes the payment includes agreements to adjust the payment conditional on future events, or the payment can be done by transferring assets (such as paying with stock) or taking on liabilities. One example of a conditional payment is an 'earn-out' agreement that makes the payment conditional on the future performance of the acquired company. Another conditional payment is that sometimes the seller guarantees against losses from a pending law suit or a bad contract. For both conditional payments and payment made by transferring assets other than cash, fair value is used as the book value in the financial statement. The fair value is an estimate made by the acquiring company that could be subject to measurement error. Since Private Equity funds normally pay in cash and not by transferring assets, this factor is usually not something one needs to worry about.

For investments in foreign currency, the corresponding amount in the home currency at the time of the transaction is used to measure the investment (NAC §4-1.).

Relevant disclosure and presentation requirements include §7-6, which states that information about large transactions must be included in the notes, §7-15 requires disclosure of parent company and subsidiaries, including name, business address, ownership share and share of votes in the parent/subsidiaries. §7-18 requires the specification of investments in companies where the ownership share exceeds 10%; the items to be specified are the name of the company, its book value, market value (if applicable) and ownership share. Also the current NGAAP standard requires that the parent company's financial statement must include the date the target company

was acquired and a description of the consideration paid, including conditional payments (The Norwegian Accounting Standards Board (NASB), 2010, p. 16). The financial statements of SPVs or subsidiaries that prepare their financial statements according to NGAAP are therefore full of information, as they are required to disclose the book value of all their investments, which are measured at acquisition cost.

According to the latest standard from IFRS, IFRS 9 – *Financial Instruments*, paragraph 4.1, a financial asset can be recognized either at amortized cost or fair value. If amortized cost is used, the book value of the investment is measured as the transaction value plus transaction costs according to paragraph 5.1.1. This is the same rules as for NGAAP. If fair value is used, the book value at the end of the year will reflect the market value of the investment, although this market value is set by the company itself so it will be a subjective estimate. To infer the transaction price when the deal was made one must then look at the income statement to find the line for change in value of financial assets, and add/subtract this to the book value.

IFRS 9 is only mandatory from 2015, so for the companies in the sample the most relevant standards are IAS 39 and IAS 27 – as a main rule, investments in subsidiaries should be accounted for using IAS 27. This standard is very similar to IFRS 9 in that investments in subsidiaries are accounted for at cost or fair value.

Of the 44 companies in the sample, none of the companies accounted for investments in subsidiaries using fair value, so this is does not seem to be very important in practice, but it could become more important in the future as more financial statements are prepared using IFRS.

Relevant disclosure and presentation requirements are found in *IFRS 12 – Disclosure of interest in other entities*, and in IAS 27. “Investment entities” are required to disclose the name, place of business and incorporation, and proportion of ownership and voting rights of the companies they have invested in. The investment entity must also disclose the name of its parent company if it has one. They are unfortunately not required to disclose the book value of each of their investments in subsidiary companies, unlike NGAAP. This can make it difficult to infer prices if the parent company has ownership interests in more than one company, since it will be difficult to separate the book value (which is the sum of the book value of each investment) into separate parts.

Using Consolidated Financial Statements

According to the most recent IFRS standard, IFRS 10 - “Consolidated Financial Statements”, paragraph 4, a parent company must present consolidated financial statements. However there is one exception that is relevant for our purposes. In paragraph 4 (c) “investment entities” are exempted from preparing consolidated financial statements. This is discussed in more detail in paragraph 31 (IFRS Foundation, 2012):

“[...] , an investment entity shall not consolidate its subsidiaries or apply IFRS 3 [Business Combinations] when it obtains control of another entity. Instead, an investment entity shall measure an investment in a subsidiary at fair value through profit or loss in accordance with IFRS 9.2.”

An investment entity is according to paragraph 27 defined as an entity that:

“(a) obtains funds from one or more investors for the purpose of providing those investor(s) with investment management services;
(b) commits to its investor(s) that its business purpose is to invest funds solely for returns from capital appreciation, investment income, or both; and
(c) measures and evaluates the performance of substantially all of its investments on a fair value basis.”

A private equity fund can therefore be characterized as an investment entity and be exempted from preparing consolidated financial statements according to IFRS. IFRS 10 has only recently become mandatory to use, for the previous periods IAS 27 is relevant. IAS 27 also gives some companies the opportunity not to prepare consolidated financial statements, although there seems to be no exception for investment entities.

Similar rules apply for NGAAP. NAC §3-8 states that a subsidiary can be exempted from being consolidated if the investment in the subsidiary is of a temporary nature and with the intent of later sale, much like the IFRS rules for investment companies. Although the term “temporary nature” in NASB standard 17 is defined to be a period of maximum 12 months, they have allowed longer expected ownership periods (The Norwegian Accounting Standards Board (NASB), 2010), which has been the way the rule has been practiced over the last decade.

There are also two other exemptions from preparing consolidated financial statements under NGAAP, but they are not equally important. Small businesses are exempted from preparing consolidated financial statements according to the NAC §3-2 that can be used for investments in companies where two out of the three conditions are met: i) Sales revenues are less than 70 MNOK, ii) Total assets are less than 35 MNOK and iii) the company has less than 50 employees. The conditions for the exemption must be met looking at the group as one unit. This could be used for some of the smaller buyouts in the sample, but most of the buyouts will not go under this exemption. A parent company can also be exempted from consolidating a subsidiary if it is itself a subsidiary of another company (NAC §3-7). However the ultimate parent company who prepares the consolidated financial statements must be in a country that is part of the European Economic Area (EEA), and must abide by chapter 8 of the NAC which regulates that the consolidated financial statement must be public information. This exemption is therefore not valid when a fund is incorporated in countries like Guernsey or Jersey, since the fund does not have to make financial statements public (States of Guernsey, 2013).

When constructing the dataset I found that in many of the deals the parent company did not prepare consolidated financial statements, which is a serious limitation to this method.

For the cases where consolidated financial statements are prepared, the acquisition is accounted for using the acquisition method according to both IFRS 3 and NGAAP. This involves assigning the price paid to the fair value of identifiable assets, liabilities and goodwill. Therefore the transaction price can be identified as the book value of the target company plus increases in assets and goodwill beyond the target's book value. NGAAP provides some leeway on how to account for goodwill – it can either be capitalized as the majority owner's share of goodwill, or fully capitalized as all shareholders' part of goodwill (Salbuvik, 2013). To properly estimate the purchase prices one needs to know which method has been used.

It will in most cases be difficult to isolate the effect of the acquisition since the acquiring company often will have made several other investments into capital equipment or other acquisitions, but this is usually not the case for PE-investments bearing in mind the typical deal structure presented in figure 1, where the parent company is usually only a holding company with no activity of its own. However the target company will make investments into capital equipment etc. which will make it difficult isolate the effect of the transaction. Sometimes the parent

company includes a note to the consolidated financial statement showing how it applied the acquisition method in the buyout, but they are not required to do this according to both NGAAP and IFRS. But in the cases where this note was included it is relatively easy to infer the transaction price. Because parent companies are not required to show how they applied the acquisition method in the notes, it is difficult to isolate the effect of acquisition on the group's assets and liabilities. Without being able to properly isolate that the changes in assets, liabilities and goodwill that arised from the acquisition, it is impossible to make a precise estimate of the price paid in the acquisitions.

For a study where this method has been used, see Marie Salbuvik's master thesis (Salbuvik, 2013). In her study Salbuvik uses confidential data from the Norwegian Private Equity fund Norvestor to estimate prices paid, based on the change in goodwill and other assets after an acquisition. She concludes that the method is to inaccurate to be used for inferring prices paid in Private Equity transactions.

Based on the discussion of the two methods, I conclude that using the parent company's financial statement is the best way to infer the transaction price paid. This method is simple and should be accurate. The method of using the consolidated financial statements has several limitations: first, sometimes the acquiring company does not prepare consolidated financial statements at all so that the method cannot be used. Second, isolating the effect of the acquisition on assets, liabilities and goodwill can be hard, leading to potentially large errors when inferring prices, as shown by Salbuvik (2013).

2.3. Moving from Transaction Price to Enterprise Value

After uncovering the transaction price paid for the PE-firm's stake in the portfolio company, the next step is to find the implied valuation of the company from the deal. The metric used for company valuation in this paper is enterprise value, which is defined as the market value of equity plus the market value of debt minus cash (E+D-Cash). A brief overview of how debt is treated is therefore in order.

Debt

Long-term debt, which is debt that has more than one year until maturity, is valued at present value (amortized cost) regardless whether IFRS, US GAAP or NGAAP is used (Ernst & Young Foundation, 2010). This means that long-term debt is usually valued at approximately market

value and can be used directly. The exception is when the firm's ability to repay its debts has been reduced; in this case the market value of long-term debt could be lower than the book value. Also, if interest rates in the economy change, the market value of debt can be affected. Normally, floating rate debt is not affected by changes in interest rates, but the value of fixed interest rate debt usually changes. E.g. if interest rates in the economy rises, the value of fixed rate debt falls since one can get higher returns by lending to projects with the same risk and time to maturity. According to IAS 39, firms can account for this by adjusting their debt to market value and recognize a profit or loss, but if they intend to keep the debt until maturity no adjustment is normally made. In the latter case the book value of debt cannot be used directly. NASB standard 18 describes how debt is treated under NGAAP. According to this standard, companies *cannot* adjust the book value of debt *down* to market value and recognize a profit, and are *not required* to adjust book values *up* to market value and recognize a loss. Therefore the book value of debt is normally not adjusted to market value, so that book values cannot be used directly. Short-term debt does not need to be valued at present value, but with less than one year until maturity the effect on value is usually small.

The debt used to finance a buyout can be found either in the target company or in one or more of the SPVs between the fund and the target company. When inferring the transaction price, I use the book value of the investment from the parent company's financial statement. Therefore if the debt used to finance the buyout is found in the parent company's financial statement, the transaction price includes both equity and debt financing. This debt must not be added to the enterprise value, since you then would be making the error of double-counting.

The portfolio company could have debt that is assumed by the buyer – this is the debt that must be added to find the enterprise value. If the parent company prepares consolidated financial statements for the group, a way to find the assumed debt that is added in to get the enterprise value is to take the group's debt minus the debt of the parent company (which was used to finance the purchase of equity). This method is very useful if there are multiple SPVs between the fund and the target company. It also ensures that you don't double-count the debt used to finance the acquisition and only include the assumed debt.

To compute the leverage used in the deal, one should add together the debt of the target company and the parent company to find the total use of debt.

A drawback is that using debt found in financial statements is that it does not give information on the debt at the time of the transaction, since financial statements only give information on debt levels at year-end. If say, the deal took place in July, outsiders will have information on the company's debt six months before the deal and six months after the deal. In the time gap between the two balances and the time of the deal, some debt might have been paid off, and/or more debt could have been raised to finance more investments. Thus using information from financial statements will give an imprecise estimate of enterprise value if there have been a lot of changes from the balance date and the situation at the time of the deal. However many companies will give information in the notes on recapitalizations etc. if there have been major changes.

Only interest-bearing debt should be included when calculating enterprise value, not all debt that is found in the balance. Many of the posts in the balance can be subject to discussion if they should be viewed as interest-bearing or not. These are complicated topics that are important in the valuation of firms, but are beyond the scope of this paper. These posts include deferred tax, which is tax that eventually must be paid when gains are realized, but is commonly seen to have a present value of zero as long as the company does not have a limited life (such as a mining company where the company will only be in business until the mine is empty) (Kaldestad & Møller, 2011). Accounts payable and outstanding salaries to employees are normally considered to be a part of working capital, and are therefore not included as interest-bearing debt. However, net pension liabilities, which is found under outstanding salaries, should be treated as interest bearing debt and be adjusted for estimation error (Kaldestad & Møller, 2011).

Leasing can be divided into two parts: operational- and financial leasing. Leased assets that are treated as operational leases are not activated in the balance and costs are accounted for as operational expenses, while leased assets treated as financial leases are activated in the balance and costs are accounted for as interest expense (Norwegian Accounting Standards Board (NASB), 2008). Normally financial leases are treated as interest-bearing debt and operational leases are not treated as debt, but if the two parties in the transaction agree that some of the operational leases should be financial (or vice versa), then the price paid to equity holders will be different. This will make the inferred enterprise value wrong since it is based on the price paid and the debt in the financial statement found under financial leases, while the real figure for financial leases is different.

Another important topic is that the buyer and seller often agree to adjust the purchase price to changes in working capital, which is common in deals where the target company's working capital varies a lot during the year. In this case a 'normal' working capital level is set, and the purchase price is then adjusted for the level of working capital at the takeover date versus the normal level. Thus parts of the purchase price will include compensation for working-capital. However the effect on enterprise value should be small.

For an in-depth treatment of accounting adjustments when valuing Norwegian companies please see Kaldestad & Møller (2011).

In constructing the sample, I have not tried to adjust for whether leases are financial/operational, made adjustments for pension plans or that the market value of debt could be different from the book value, because it is time-consuming and difficult to get right without inside information. More importantly there is no clear bias with respect to the effect on enterprise value these factors would have on an aggregate level for the whole industry. The debt that is added to equity to get enterprise value is all loans from banks and financial institutions, bonds and financial leases. Cash is taken as the book value of cash and cash-equivalents.

Shareholder loans from the new shareholders are here defined as equity, because shareholder loans typically have the lowest priority of debt and can be converted to equity at the shareholders' discretion. Shareholder loans were used in many of the deals in the sample.

When inferring valuations, one should also take into account the equity instrument used in the transaction. Some securities such as preferred stock or participating preferred stock can make the implied valuation substantially different from what the valuation would have been if the deal was done using common stock. I will therefore present a framework to make adjusted valuations for the market value of equity when other equity instruments than common stock are used.

The effect of equity instrument used

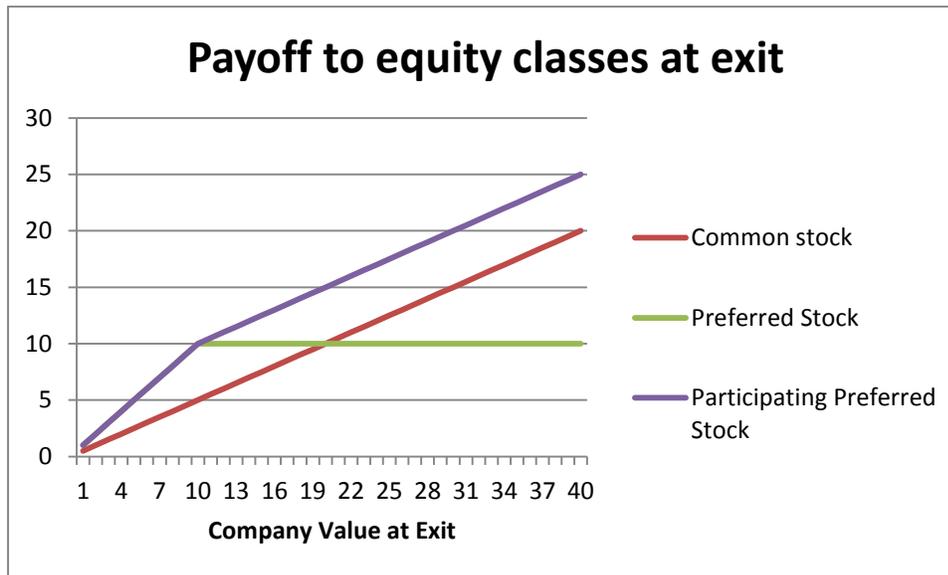
The use of more complicated equity instruments when investing in target companies is usually done in order to avoid agency conflicts that may arise between the PE-fund and the other investors, particularly if the PE-fund is a minority investor. These features are more common for Venture Capital investments than buyouts; see Metrick & Yasuda (2011) for an overview.

In buyouts one sometimes sees the use of preferred stock with debt-like characteristics in addition to common stock. Participating preferred stock can also be used, although this is rarer. A presentation of these instruments is therefore in order.

Common stock is the class of equity that has the lowest claim on proceeds from the company, while preferred stock is senior in priority to the common stock (Metrick & Yasuda, 2011, pp. 515, 527). Preferred stock comes in many different forms, and could include the right to an annual dividend and/or the right to convert the preferred stock to common stock (Metrick & Yasuda, 2011, p. 163). The participating preferred stock has similar rights to the preferred stock, but also includes an “as-if” conversion into common stock. This means that the holder first gets his preferential allocation of proceeds from the company, and then participates in the share of proceeds to common stock holders as if holding common stock (Metrick & Yasuda, 2011, p. 526).

The different investments are best understood using so-called exit diagrams, which show the payment to each equity class in the case of an exit (e.g. sale, IPO, liquidation). In figure 2 I have assumed that each equity class has invested 10, and holds 50% of the total equity in the firm, while the other half of total equity consists of common stock. The preferred stock is assumed not to have the option of converting to common stock, thus the payoff is similar to a debt claim. The participating preferred stock has similar characteristics as the preferred stock, but gets a piece of the upside potential by participating in the payoff “as if” it was common stock when the value at exit exceeds the initial investment of 10.

Figure 2 – Payoff to equity classes at exit



Using option pricing theory it is possible to value the different equity classes. The methods used follow from Metrick and Yasuda (2011), chapter 14. To value preferred stock that does not have the option to convert into common stock (sometimes referred to as redeemable preferred stock), Metrick & Yasuda utilizes the payoff characteristics seen in Figure 2. Up to when the value is 10, the preferred stock holders have the right to 100% of the firm value, while after 10 the slope becomes flat. This can be interpreted as owning the company, but having written a call on the company with strike equal to 10 which is given to common stock holders. Thus if the company is sold for 11, the preferred stock holders get 11 less the payout to common stock holders of 1. In general the value to preferred stock holders can be expressed as:

$$(1) \text{ Valuation of Preferred Stock} = V - \text{Call}(RV)$$

Where V is the value of the company and RV is the redemption value, i.e. the capital that goes to preferred stock holders before any distribution to common stock.

Metrick and Yasuda suggests that with dividend payments to preferred stock, the redemption value should be adjusted by the expected holding period, which is the time the PE-firms expects to own the company before selling it (2011, p. 259). Thus an initial investment of 10 will grow to a RV of 13.9 in five years with 8% compound interest ($10(e^{0.08*5} - 1)$).

Valuing the participating preferred stock is similar to valuing preferred stock, but notice that the slope only kinks after company value exceeds 10 instead of becoming flat since it is still entitled to participate “as if” it was common stock. The valuation formula thus becomes:

$$(2) \text{Valuation of Participating Preferred Stock} = V - (1 - \%ownership) * Call(RV)$$

To value the options in the valuation formulas, I use the Black-Scholes framework. The Black-Scholes pricing formula for a European call option is (Hull, 2012, p. 313):

$$(3) c = S_0N(d_1) - Ke^{-rT}N(d_2)$$

Where $d_1 = \frac{\ln(\frac{S_0}{K}) + (r + \frac{\sigma^2}{2})T}{\sigma\sqrt{T}}$ and $d_2 = d_1 - \sigma\sqrt{T}$. S_0 is the price of the underlying asset, interpreted as the value of the company minus its debt. K is the strike, in this case the redemption value (RV). T is the time to maturity measured in years, interpreted as the expected ownership period before the investment is exited. σ is the annual volatility of the value of the firm, and r is the risk-free interest rate.

To illustrate how investing with preferred stock or participating preferred stock affects the implicit company valuation from a deal, assume the following:

1. The expected holding period before the investment is exited is 5 years
2. The volatility of the firm’s value is 50% p.a.
3. The risk-free rate is 5% p.a.
4. The firm is all-equity financed with common stock only

First consider an investment of 10 in common stock to gain 50% of the shares in the company. The implicit valuation is then straight forward: $10/50\%=20$.

Now consider that a fund has invested 10 using preferred stock with a 10% annual dividend to gain control of 50% of total equity. To infer the implicit valuation of the company, assume that the investment’s NPV is zero. This leaves only the company value as unknown in the valuation formula for preferred stock:

$$(4) NPV = 0 = 10 - (V - Call(16.49))$$

The RV is $10e^{(5*10\%)-1} = 16.49$. Equation (4) can be solved using numerical procedures yielding a V that is approximately 27.5, instead of 20 that was found when the investment was made with common stock.

Finally, consider an investment of 10 using participating preferred stock to get 50% of total equity. The security holders get back their initial investment of 10, and then take 50% of all equity distributions beyond 10. Solving equation 2 for V with numerical procedures gives a company valuation of 14.2, which is below the value found for an investment made with common stock.

These examples illustrate a pattern for investments with special equity instruments. If an investment is treated like common stock, the enterprise value of the company will typically be underestimated if the investment was actually made with preferred stock. Because of its debt-like characteristics, it does not participate as much in the upside as common stock, and is therefore worth less (unless it has a very high promised dividend). This leads to an underestimation of enterprise value. The situation is opposite for the participating preferred stock. Treating investments with this security like common stock will tend to make the implied enterprise value too high. This is because participating preferred stock is worth more than common stock, because it has a more limited downside.

To find information on the characteristics of the securities used in order to make adjusted valuations, the first step is to look at the note in the financial statement of the target company that describes the equity in the company. According to the NAC §7-26, a company must describe its different equity classes in a note. The note must describe the share capital by equity class, provisions in the articles of association affecting voting rights and rights that could lead to the issuance of more shares. The note should give information on whether there are special equity instruments that should be controlled for. To get details on the characteristics of these securities it is possible to view the company's articles of association, which can be ordered from the Brønnøysund Central Register.

Summary of the method's limitations

There are three main limitations of using the method presented so far to infer transaction prices and enterprise values from public financial statements. First, since the book value of a financial asset can include transaction costs, the method will be biased upwards when inferring prices.

Second, because we only have information on debt at year-end and not at the time of the transaction, the debt added to get to enterprise value will be inaccurate. However there is no clear bias in any direction on enterprise value from this. Third, when the Private Equity fund invests using special equity instruments, an adjusted valuation that takes into account the characteristics of the security used should be calculated. The methodology for calculating adjusted valuations requires assumptions on volatility of the firm's value and expected holding period that are crucial to the results. Adjusted valuations should therefore be used with caution when inferring enterprise valuations.

Another limitation is that the method is time-consuming and also somewhat costly. Each financial statement costs NOK 50 to order, and has to be read through manually. Typically one needs to order at least two financial statements for each transaction, one for the target company and one for the parent company. The price of ordering the articles of association for gaining information on the characteristics of the different equity classes is NOK 230.

2.4. Using the method in practice

I was given a dataset from a Norwegian private equity fund containing information on 11 transactions they have made through SPVs incorporated in Norway. The dataset contained the names of the SPV and target company, their total investment in the target company as well as information on each investment made, and the equity instrument used (common stock, preferred stock etc.). I was not able to get the enterprise valuations from the fund, so the following discussion only describe how well the method is at inferring the price paid, not how accurately it infers enterprise value. The data was given to me on condition of anonymity, so I will not disclose the name of the fund, names of the target companies or any figures that might lead to the names of the target companies becoming known.

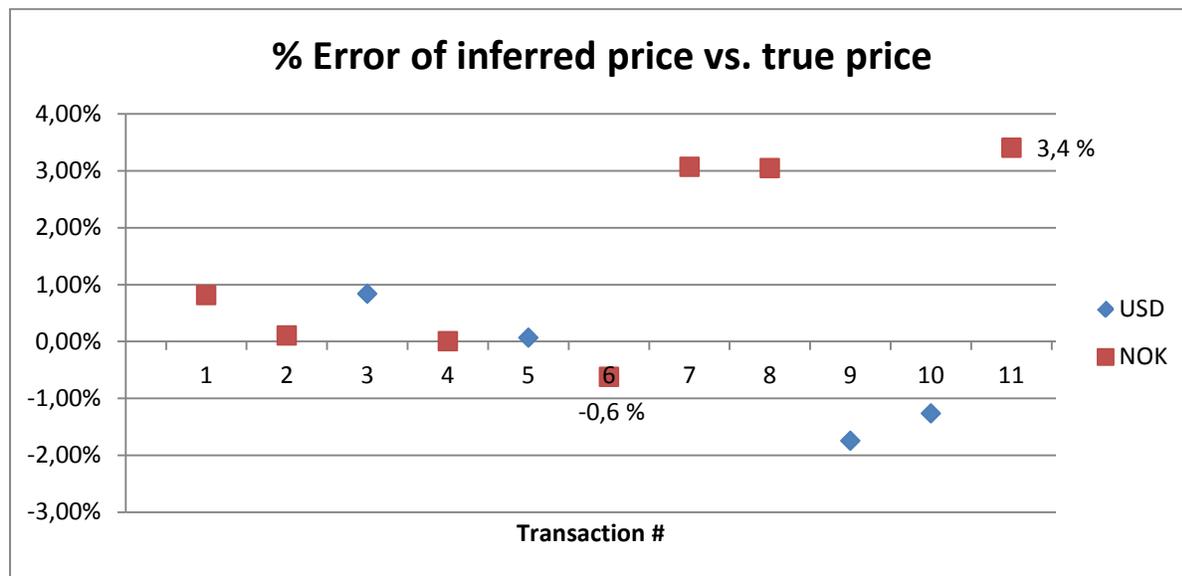
Inferring transaction prices

I added information from the SPVs balance sheet showing their financial assets. In two of the cases I used financial assets plus "other accounts receivables" that was shareholder loans to the target company. Of the 11 transactions, seven were made in NOK while four were made in USD. In order to compare the prices in USD to the accounting figures in NOK, the prices paid were converted to NOK using the official exchange rate from Norges Bank on the day of the transaction (Norges Bank, 2013). This contains two possible error sources: i) The effective

accounting date is different from the date I have been given, thus leading to using the wrong exchange rate and ii) the exchange rate could be different from the official exchange rate, e.g. if the bank charges a spread over the official rate when performing the money transfer. This also means that when transactions are made in a different currency than the currency used in the financial statement, the balance will only show the value in the currency used in the financial statement. To find the transaction price in the other currency, one would need to know the exact date of the transaction in order to find an approximately correct exchange rate to calculate the equivalent sum in the other currency.

In figure 3 I have plotted the percentage error of the inferred price from accounting information versus the true price, as reported by the fund. If the error is zero, then the inferred price is 100% accurate, while if it is higher than zero then the accounting information overestimates the true prices paid (and vice versa if it is lower than zero). Transactions made in NOK are marked in red, while transactions made in USD are marked with blue.

Figure 3 – Results of method to infer prices



From figure 3 one can see that the method is very accurate, and that most of the time the inferred price is slightly above the true price. This is likely due to transaction costs being part of the book values found in the financial statements. For three of the transactions the value is below zero, which is surprising. Two of the deals were made in USD, so it is likely that the error source is

from using the wrong exchange rate. However the deal made in NOK (transaction 6) is more troubling, but the inferred price is only 0.6 percent below the true transaction price.

On average the inferred price was only 0.7 percent higher than the true price. The largest error was for transaction 11, with a 3.4 percent overestimation.

Although the sample is small, this study to a large degree confirms the theory that it is possible to infer prices from accounting information using the parent company's financial statement.

Furthermore the data indicates that it is appropriate to subtract part of the price from the book values to get to the true price, corroborating the fact that book values can include transaction costs. However the data is too small and likely contains error sources to get a precise estimate of how much one should subtract to reflect transaction costs. It is also possible that the transaction costs one should subtract is different based on the size and type of the deal. E.g. a public-to-private deal might require higher transaction costs as a fraction of the transaction price than a takeover of a small private company, due to the increased need for outside help from investment banks and lawyers. From the data in the sample the average was 0.7 percent above the true price, so somewhere around 0.7 percent can be used to account for transaction costs. Calculating the average based on the deals made in NOK, where you don't have the error source on exchange rates that were identified for the deals made in USD, the price was on average 1.4 percent above the true price. However the deals made in NOK were on average almost twice the size of the deals made in USD (enterprise value). Somewhere around 1 percent reduction therefore seems appropriate, with the possibility of changing it to fit the characteristics of the transaction.

Adjusted Valuations for the Firms in the Sample

This section presents adjusted valuations for the companies in the sample where special equity instruments that can distort the enterprise value of the company were used. In the sample two of the deals used preferred stock that had the right to an annual dividend of 8%, which was accrued until exit or if dividend payments were made to common stock. In addition the preferred stock holders were given 95% of payoffs from the company that exceeded their redemption value (RV), while only 5% were distributed to common stock holders. In the other two cases the annual dividend was 12%, but preferred stock holders did not have a claim on proceeds above the RV. The one case with *participating* preferred stock on the other hand was "plain vanilla"; it had the right to get back its initial investment and then participated "as if" it was common stock in the

distribution of payoffs exceeding the initial investment. The characteristics are summarized in table 1.

Table 1 - Summary of security characteristics

	Case 1	Case 2	Case 3	Case 4	Case 5
Description of security characteristics	Participating preferred stock get 50% of proceeds above RV	Preferred stock 8% annual dividend, further proceeds distributed 95% to preferred stock and 5% to common stock		Preferred stock 12% annual dividend, further proceeds distributed 100% to common stock	
Total investment invested into:	100% Participating preferred stock	100% Preferred stock	90 % Preferred stock and 10% common stock	90% Preferred stock, 10 % common stock	100% Preferred stock

As seen in table 1, the preferred stock in case 2 and 3 behaves very much like participating preferred stock, since it gives the right to 95% of the proceeds above the redemption value. The preferred stock in case 4 and 5 on the other hand is “plain vanilla” preferred stock, although the dividend payments are quite high.

I then proceeded to calculate the adjusted valuations based on the methodology presented earlier. Table 2 summarizes the assumptions made for the parameters in the Black-Scholes option pricing formula. PE-funds generally have an investment horizon of 5 years, so this was chosen for T. Risk free interest rate was chosen as the 5-year government bond rate, taken at year-end in the year of the investment. I used the Norwegian bond yield for the companies that have most of their income in NOK (Norges Bank, 2013) and the US government bond yield for the companies that are most exposed to USD (Federal Reserve, 2013) . Volatility is estimated using V. Damodaran’s data on standard deviations in firm value by industry sector (Damodaran, Standard Deviations by Sector, 2013), and adjusting this for capital structure in the portfolio company since the underlying asset priced with in the Black-Scholes formula is the value of the company minus its debt (V-D).

Table 2 - Assumptions for option pricing

	Holding period, T.	Risk-free interest rate, r.	Volatility, σ .
Assumption:	5 years	5-year government bond rate at year-end in the year of the investment	Industry volatility adjusted for capital structure

Table 3 shows how treating an investment as if it was an investment into common stock instead of the correct securities that were used leads to inferring the wrong valuation of the target company. The simple enterprise value is calculated using inferred equity value treating it as common stock (Inferred price divided by share of total capital) plus net interest-bearing debt, while the “real” enterprise value is calculated using the option pricing methodology described earlier. The %-error in the bottom row shows the relative difference between the “real” and simple enterprise value calculation.

Table 3 - Effect of security characteristics on valuation

	Case 1	Case 2	Case 3	Case 4	Case 5
Security characteristics	Participating preferred stock get 50% of proceeds above RV	Preferred stock 8% dividend, further proceeds distributed 95% to preferred stock and 5% to common stock		Preferred stock 12% dividend, further proceeds distributed 100% to common stock	
Total investment invested into:	100% Participating preferred stock	100% Preferred stock	90 % Preferred stock and 10% common stock	90% Preferred stock, 10 % common stock. (90 % of common stock owned by PE-firm)	100% Preferred stock
Ownership share of total equity	50 %	95 %	95 %	99 %	54 %
Volatility	70 %	60 %	60 %	55 %	65 %
% Error between "simple EV" to "Real EV" [(Real EV-Simple EV)/Simple EV]	-15 %	-3 %	-3 %	2 %	39 %

There are several conclusions to be made from table 3. In case 2, 3 and 4, the ownership share of total equity is very large, which makes makes the error small. This is because when the PE-firm holds a large proportion of the total equity, a smaller portion of the value can be distributed

between investors. Remember that the difference in valuation comes from the investors buying different rights to the cash-flows from the company, e.g. a plain vanilla participating preferred stock is always worth more than common equity, since the value distributed to participating preferred stock is always larger than to common stock (see figure 2). But if 100% of equity is participating preferred stock, it will basically function like common stock, since there is no equity class it will rank above.

In case 1 and 5, the ownership of total equity is a lot lower – close to 50% in both cases. This leaves room to distribute value between equity classes. In case 1 the “real” valuation of the company implied by the deal is 15% less than what you would get using the simple enterprise value based treating the investment like it was made with common stock. This is because the value of the participating preferred stock is higher than the amount invested, implying a lower valuation of the company. In case 5 the security is preferred stock with no upside potential after its preferential 12% dividend. The results imply that the “real” valuation implied by the deal is 39% larger than the simple enterprise value, but the results are very sensitive to the volatility parameter. Table 4 shows how the percentage error changes for different volatility inputs. With no upside, the call given to the common stock holders (Value to preferred stock holders = $V - C(RV)$) becomes increasingly more valuable as volatility increases, dragging down the value to the PE-firm. The value of the company (V) must then be larger in order for the zero NPV equation to hold.

Table 4 - Sensitivity of valuation to volatility in case 5

Volatility	% Error (Real EV-Simple EV)/Simple EV
30 %	-26 %
40 %	-16 %
50 %	-1 %
60 %	23 %
70 %	56 %
80 %	94 %

The point of this section is to illustrate that because of the specific equity instruments often used in PE-deals, it is not straight forward to go from transaction prices to enterprise valuations of the target company. From the sample of five deals it seems like the simple enterprise value can be used as long as only common stock is used (and there are no “special” types of equity already in

the firm), and when the PE-firm purchases a very large majority of the shares (approx. >90%). However when the PE-firm buys a smaller share of the firm and when the instrument used is not common stock, the effect should be controlled for. This is not straight-forward, particularly because the method is so sensitive to the volatility and time to maturity parameters.

2.5. Summary of the Method

This section summarizes the method used to infer transaction prices from public accounting information. The first condition for the model to work is that financial statements are publicly available. Financial statements are public information in Norway and many other countries, but not for some important countries like the USA, Jersey, Guernsey and Luxembourg. Thus using the method for PE-investments where the parent company is incorporated in one of these countries is not possible.

PE transactions are typically structured in a way that makes it easy to infer the transaction price from the parent company's balance sheet. A holding company, or Special Purpose Vehicle (SPV), is set up for each investment, with the sole purpose of owning the target company. Thus any financial assets or accounts receivables found on the company's balance sheet should be the book value of its investment in the target company. Even if more complicated structures are used, the NAC requires the disclosure of book values and ownership shares of investments in subsidiaries in the notes of the financial statement.

Exit prices can be found in similar ways. For a secondary exit (the buyer is another PE-firm), the same method used for uncovering the entry price is used. IPO exits are public information, so one would not need to use financial statements for this. A trade sale to an industrial buyer can pose more problems. Since the industrial buyer typically will invest into other companies or in other financial assets, one cannot be sure that the financial asset balance only reflects the investment into the company we are interested in. One will run into the same problem if the method of using consolidated financial statements is used, because one cannot know if the spike in goodwill etc. should be attributed to the company you are looking at. However as earlier information on book values and ownership shares are available in the notes as long as the buyer prepares his financial statements using NGAAP, but not if he uses IFRS.

The case study of 11 investments made by a Norwegian PE-fund proved that the method works well in practice. Yet there are some drawbacks to the method that were uncovered. First, the estimated transaction prices are biased upwards because transaction costs are “baked into” the book value. The bias is not very substantial; Based on the sample I concluded that a reduction of the book value by about one percent is appropriate. However the fraction of the book value that is due to transaction costs could differ from deal to deal, depending on size and complexity of the transaction.

Using the method on older deals is much more difficult than recent deals. Companies may have been deleted, given new names and company structures might have changed since the time of deal. The Brønnøysund Central Register is only required to keep financial statements for the last ten years (NAC §8-2), but Ravn actually has financial statements on all Norwegian companies all the way back to 1998 (e.g. 15 years). For deals done after 1998 the problem however is to find the right organization number, since only the name of the company is presented in the notes when you look for the parent company in the subsidiary’s financial statement. When searching databases like Ravn you tend to get many hits on companies that have very similar names, so it’s not always easy to tell which company is the one you are looking for. But by looking at some of the characteristics of the firms (e.g. date of incorporation, size and address) you are often able to decipher which company is the right one. If you are not able to get any hits the next step could be to contact the PE-firm to see if they have any information. NHH also has a database on ownership changes in Norwegian companies that could be useful.

Recent deals, in particular investments that have not yet been exited, are usually easy to find information on. Searches in Ravn or Proff give the current ownership structure, which usually is the same as at the time of the transaction. The correct parent company’s financial statement can then easily be accessed to infer the price paid for the acquired company.

The source of information should be the full financial statement (including notes), not just the information you get from websites such as www.ravninfo.no. There are several reasons for this. First, shareholder loans are usually found under “other accounts receivables” in the parent company’s financial statement or under “other long-term debt” in the target company’s financial statement, and are only specified in the notes that are not shown on the website. Second, the websites only give the current ownership structure. There might have been more rounds of

financing (to fund add-on investments etc.), so that you cannot use the current ownership share since it will not be the same as at the time of the transaction. Third, the book value of the investment is specified in the notes, information that you don't find on the web site. This is particularly useful if the parent company is a holding company for several investments, since that is the only way to get the book value of each investment and not just the total book value of all investments.

Finally, when moving from transaction price to enterprise value the debt of the company can be found in both the subsidiary and the holding company. Enterprise value should be calculated as the book value of the investment from the parent company's financial statement, plus debt in the subsidiary. An error source is that we only get information at year-end that could be substantially different from the situation when the deal was made.

One should also be careful when trying to find the implied valuation of the target company that the deal gives. PE-investments are sometimes made by using securities that have preference in the event of liquidation, which leads to a different implicit valuation of the company than if the investment was made with common stock. However the case study indicates that the problem is not substantial if the PE-firm acquires a very large share of the portfolio company. One should however be aware that deals using complex equity instruments where the PE-firm does not acquire a large share of the company, the impact on valuation of the company implied by the deal could be substantial. It is possible to get information on equity instruments used from the notes in the portfolio company's financial statement, and the company's articles of association.

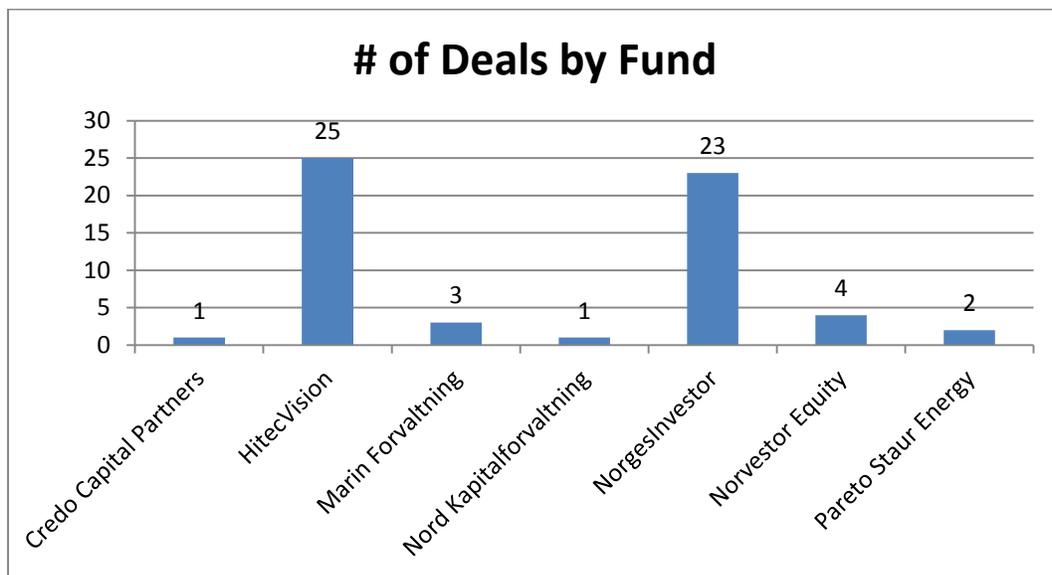
3. Data Collection

This section describes the data collection for the sample used in the analysis in section four. The first part of the section describes how the deals for the dataset were sampled. The second part shows a case example of the data collection, while the third section describes the variables that were recorded in the dataset other than inferred prices.

3.1. Construction of the dataset

This section describes how the data for my dataset of Norwegian PE-deals was constructed. I began with a list of PE-transactions based on a database from the Argentum Centre for Private Equity at NHH. The database mostly contains information from the Argentum database, but there is an ongoing project to improve the database by adding more information. I retrieved a subset of the data in the database where the PE-firm had headquarters in Norway, and for PE-deals that were labeled as buyouts. This gave a list of deals stretching from 1996 to 2013, with a total of 134 observations. However when I sorted the data for the observation where the investment year was known, only 59 observations remained. The 59 observations were distributed as seen in figure 4. The figure shows that the database appears to contain complete information mostly on deals by the Private Equity funds HitecVision and NorgesInvestor. Many of the deals in the database have missing information so that they are sorted away when you retrieve a subset on the deals, which leads a biased selection of deals.

Figure 4 – Initial sample of buyouts



Of the deals in Figure 4, all the deals made by Marin Forvaltning and Pareto Staur Energy removed because I think they should have been labeled as venture capital investments. Also some of the deals made by NorgesInvestor and HitecVision were removed, either because they were too old to get enough information (deals that happened before 1998), or because I thought they were venture capital investments and not buyouts.

To supplement the dataset to make it more representative with respect to Private Equity funds included, year of investment and industry focus, I proceeded to add observations made by the PE-funds Borea Oppurtunity Management, Norvestor Equity and Altor Equity Partners. In total I added 13 deals made by these three Private Equity funds. In the end the dataset contained 44 deals, spanning from 1999-2012.

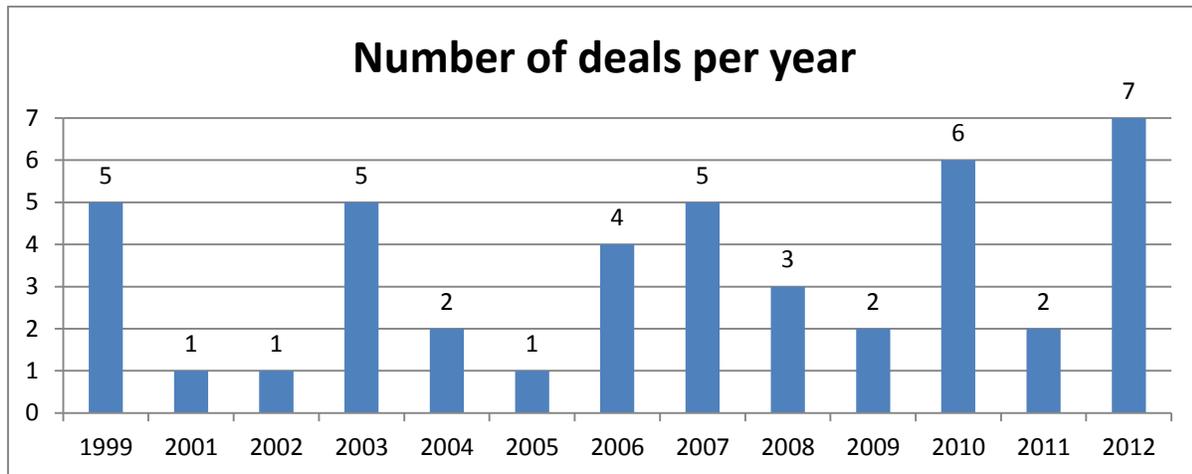
Figure 5 shows the distribution of the deals with respect to the industry the target companies in the sample are in, and the fund behind each deal. From the table you will see that most of the companies in the sample are in the energy sector, these are mostly related to the oil and gas industry. Out of the 13 companies in the energy sector, HitecVision was the fund sponsoring 12 of the deals. HitecVision is also the fund with most deals in the sample with 15 deals, followed by NorgesInvestor with 14 deals.

Figure 5 – Final sample of buyout deals, by fund and industry.

Fund	Industry					# of deals per Fund
	Consumer	Energy	ICT	Industrial	Other	
Altor Equity Partners	1			1	1	3
Borea Oppurtunity Management	1		1	1	1	4
Credo Capital Partners					1	1
HitecVision		12	1	2		15
Nord Kapitalforvaltning				1		1
NorgesInvestor	5		5	2	2	14
Norvestor Equity		1	3		2	6
# of deals per Industry	7	13	10	7	7	44

Figure 6 shows the distribution of deals per year in the dataset. It shows that the dataset contains deals that are pretty evenly spread out in the period, although there are 27 deals in the second half of the period from 1999-2012 vs. 17 in the first half.

Figure 6 – Final sample of buyout deals, by year.



A complete list of all the deals included in the sample is found in the appendix (Table 18).

3.2. Case example of how the data was collected:

This section shows an example of how the transaction price was inferred from accounting information. From the list of deals, three firms were acquired by NorgesInvestor in 2007. These were Music Retail Holding AS (4Sound Music), Visual Conference Holding AB (Videokonferensbolaget Sverige AB) and 07 Invest AS (07 Gruppen). Searching the ravninfo website showed that one of the current owners is NorgesInvestor IV AS, and that it owns 52.30% of Music Retail Holding AS, 72% of Visual Conference Holding AB and 53.72% of 07 Invest AS.

Since NorgesInvestor IV AS seems to have been used as the investment vehicle for all of the three buyouts, it is necessary to go to the notes of the financial statement of the company to find the book value of each investment. Below I show the relevant note from the 2007 financial statement:

Note 5 - Aksjer i andre foretak m.v.

	Eierandel	Anskaffelses kost	Bokført verdi
<i>Aksjeinvesteringer</i>			
Music Retail Holding AS	57%	80 000 000	80 000 000
Visual Conference Holding AB	60%	17 559 669	17 559 669
07 Gruppen AS	57%	<u>43 000 000</u>	<u>43 000 000</u>
Sum		<u>140 559 669</u>	<u>140 559 669</u>

“Note 5 – Aksjer I andre foretak m.v.” means note 5 – shareholdings in other companies.

“Eierandel” is ownership share, “Anskaffelseskost” is acquisition cost and “Bokført Verdi” is book value. We see that NorgesInvestor paid 80 MNOK for its 57% share of Music Retail Holding, 17.6 MNOK for the 60% share of Visual Conference Holding AB, and 43 MNOK for a 57% share of 07 Gruppen AS. The round figures we see (Visual Conference is converted from SEK, therefore not as round) indicates that no transaction costs have been baked into the book value, so I will not adjust for this.

Since NorgesInvestor did not buy a very large share of either of these companies, it is prudent to check whether any special equity instruments were used that could lead to the implicit valuations of these companies to be different. In the case of the Visual Conference group, there was set up a holding company at the time of the deal that owned 100% of the shares in the target company - Videokonferensbolaget Sverige AB. Looking at the financial statement of the holding company (Visual Conference Holding AB), note 4 indicate that common stock was used:

Not 4 Förändring av eget kapital

Antal aktier: 100 000

	Aktiekapital	Balanserat resultat	Årets resultat
Bolagsbildning	100 000		
Erhållna aktieägartillskott		34 340 600	
Årets resultat			-812 501
Belopp vid årets utgång	100 000	34 340 600	-812 501

Where “Förändring av eget kapital” means change in owners’ equity, “antal aktier” is the number of shares, “bolagsbildning” means at the time the company was founded, “erhållna aktieegärtilskott” is the shareholder’s contribution or share premium. We see from the note information that the company has 100 000 shares, with no specification of any different equity classes apart from common stock. Swedish accounting law has the same disclosure requirements as Norwegian law on this subject, which requires the company to disclose their share capital by equity class (see NAC §7-26 and the Swedish Accounting Act §5-14). I will therefore assume common stock was used in the acquisition, and use the simple EV calculation to compute firm value implied by the deal. Common stock was also used in the investments into 07 Gruppen AS and Music Retail Holding AS.

The 07 group deal happened around November 2007, I therefore use the 2007 consolidated financial statement of 07 Invest to get the debt that was assumed in the deal. The group had 176 MNOK of interest-bearing debt and 26.5 MNOK in cash at year-end. Using the simple EV calculation the firm value implied by the deal becomes $(E+D-Cash = 43''/57\% + 176'' - 26.5'')$ 225 MNOK.

The Music Retail group had 124 MNOK in interest bearing debt and 23 MNOK in cash at year-end. Firm value thus becomes $(80''/57\% + 124'' - 23'')$ 241 MNOK.

As mentioned earlier, the Visual Conference group is structured with a holding company between NorgesInvestor IV AS and Videokonferensbolaget Sverige AB called Visual Conference Holding AB. The holding company’s financial statement is not consolidated with reference to §7-3 of the Swedish Accounting Act that exempts small companies from preparing consolidated statements (Sveriges Riksdag (Swedish Parliament), 1995), but the financial statement still contains information on any transactions within the group (there were not any) so it is possible to find the group’s consolidated debts. The holding company had 29 MSEK in debts, which at the time equaled 24.5 MNOK (Norges Bank, 2013). The daughter company did not have interest-bearing debt, while the sum of cash in the two companies was approx. 0.25 MNOK. This gives an EV of $(17.6''/60\% + 24.5'' - 0.25'')$ 53.5 MNOK.

3.3. The variables in the dataset

In addition to inferring prices for the companies in the dataset, firm characteristics information was gathered, as well as some macro-level data.

For each company, sales and earnings before interest, taxes and depreciation (EBITDA) were collected from their financial statements. These figures are meant to reflect the last known sales and EBITDA before the company was acquired. Since a Private Equity buyer will be able to access internal information before acquiring a company, I decided to use sales and EBITDA from the same year as the acquisition if the target company was acquired more than half-way into the year. Some of the companies in the sample were formed as a legal entity at the time of the deal, usually with the fund acquiring several companies in an industry and then merging them into a new company. In these cases I only have information on sales and EBITDA from the time of the deal and until year-end, which I have then interpolated to generate yearly figures. E.g. if a company had 100 MNOK in sales and 10 MNOK in EBITDA after a buyout that was effective from July 1st, I recorded sales of 200 MNOK and EBITDA of 20 MNOK.

Each company was assigned into five broad industries (Energy, Industrials, Consumer, ICT (Information- and Communications Technology) and Other), based on information on their websites and annual reports. Ownership was recorded in three categories, ownership of the main Private Equity fund sponsoring the deal, ownership of co-investors and ownership of the company's management/entrepreneur, all measured as their fraction of total equity. The name of the Private Equity fund was also recorded.

Leverage ratio before and after the buyout were collected from information in the financial statements of the companies, measured as net interest bearing debt divided by the enterprise value implied by the deal. This measure includes debt found in the parent company which was used to finance the purchase of equity. If the deal was executed using a security that could cause the inferred enterprise valuation to be biased, this was recorded.

As a measure of assets that can be used as collateral for loans, the book value of tangible fixed assets were collected for each company.

The general inflation index for Norway was collected from Statistics Norway (2013), in order to compare figures from different time periods. The general price level was 31% higher in 2012 than in 1998 according to this statistic.

To account for risk, unlevered industry betas from the year each company was acquired was recorded using V. Damodaran's calculations (Damodaran, Standard Deviations by Sector, 2013), which are based on a model using publicly traded U.S. companies. This might not be ideal to measure the industry beta for the companies in the sample, but I was unable to find a better source of data. Damodaran operates with approximately 100 different industries, so some effort was made to assign each company into a more precise industry category in order to use the right beta than was done to assign each company into the five broad industry categories.

Indices for the performance of stocks listed on the Oslo Stock Exchange were collected from the Exchange's web site. The value of the index was then matched to the year and the industry of each company in the sample, to give an estimate of the equivalent public company pricing at the time.

Indicative credit spreads based on interest paid on a sample of Norwegian companies over the swap interest rate were supplied by DNB Markets (2013). The companies the spread is based on are rated as investment grade, with most of them around a A/BBB-rating. The spread is based on yield to maturity of bonds with 5 years to maturity, and the interest rate on a swap-agreement to swap the interest rate of three-month NIBOR for a five year fixed rate. The spread between these two rates should then show the risk premium added for lending to A/BBB rated companies over inter-bank lending, since the time to maturity for each interest rate is the same. The credit spread data is available from 2001.

Data showing the amount of fund's raised by Private Equity funds in Norway were supplied by Argentum. The data is split between buyout and venture capital funds, where the amount raised for buyout-funds were used in the analysis.

Table 19 in the appendix shows a detailed description of the relevant variables that are found in the dataset.

4. Results

The following section summarizes the analysis made on the dataset of Norwegian buyout transactions. The first section shows descriptive statistics with tables of average Enterprise Valuations, average valuation multiples, use of special equity instruments and use of leverage. The second section shows regression analyses that try to explain the pricing of PE deals in Norway, and test two findings from the literature in a Norwegian setting.

All the data presented in this section has been gathered from public information, such as public financial statements, except for the data on credit spreads which is proprietary data from DNB Markets. Most of variables presented are my estimates, such as enterprise value, sales and EBITDA. Even though I have tried to be as thorough as possible I cannot guarantee the accuracy of the data. Errors can come from mistakes I have made in the data collection, or from the limitations of the model that was discussed in section 2.

4.1. Descriptive Statistics

Table 5 shows average enterprise value by funds, where deals where special equity instruments have been used have been excluded because the enterprise values based on the standard formula cannot be used. Throughout this section all figures using enterprise values are based on deals where special equity instruments have not been used. I have not tried to make adjusted valuations for the deals, since this approach is very sensitive to the input parameters as discussed in section 2.4.

Table 5 - Average EV for deals where special equity instruments were not used by fund (NOK '000s, adjusted for inflation)

	N	Average EV
Altor Equity Partners	2	1 578 653
Borea Opportunity Management	4	172 651
Credo Capital Partners	1	229 162
HitecVision	10	438 453
NorgesInvestor	13	374 757
Norvestor Equity	6	289 960
Total	36	418 700

Table 5 shows that the average enterprise valuation measured in 2012-kroner has been approximately 419 MNOK. Altor Equity Partners has the deal with the highest enterprise value,

which was the buyout of Norsk Gjenvinning in 2011 with an enterprise value of MNOK 2287. The lowest enterprise value in the sample was HitecVision’s investment into Ocean Installer in 2012, a subsea company that was basically founded in collaboration with the fund. The enterprise value of this deal was MNOK 43.5.

Table 6 shows the average ownership share each PE-fund has had of total equity in the companies they have invested in. The overall average has been 58%, indicating that the funds prefer to have coinvestors but to be a majority shareholder. Most of the funds tend to secure more than two-thirds of equity, giving them supermajority which is often needed in Norway to make important decisions such as making changes to the articles of association or in order to sell the company through a trade sale or an IPO. However NorgesInvestor has averaged an ownership of only 33%, preferring to be a minority investor in most of their deals.

Table 6 - Average ownership share of PE-fund by fund

	N	Ownership share of PE-fund (%)
Altor Equity Partners	3	82
Borea Opportunity Management	4	68
Credo Capital Partners	1	51
HitecVision	15	69
Nord Kapitalforvaltning	1	80
NorgesInvestor	14	33
Norvestor Equity	6	68
Total	44	58

Table 7 shows average EV/EBITDA multiples, where I have excluded deals where the target company had negative EBITDA. We see that the average multiple was 10.3. This can be compared with the findings of Axelsson, Jenkinson, Strömberg and Weisbach in their paper “Borrow Cheap, Buy High – The Determinants of Leverage and Pricing in Buyouts” which is forthcoming in the Journal of Finance. From their sample of leveraged buyouts from 1980-2008 they find an average EV/EBITDA multiple of 8.2, and 7.8 for the deals in Western Europe (p. 43). The reason why the EV/EBITDA multiple is larger in my sample could be that my sample contains less mature companies with higher value stemming from growth opportunities, and because companies with negative EBITDA have been excluded. If the companies with negative EBITDA in the sample are included the average multiple becomes 5.0, which is significantly

lower than Axelson et al.'s findings. The notion that the average EV/EBITDA multiple should be higher in my sample is supported by the fact that the average enterprise value in Axelsson et al.'s paper is 1514 MUSD, which is about 20 times larger than the average enterprise valuation found in my sample. Particularly HitecVision, who account for nearly one-third of the sample, tend to invest in young companies in the oil and gas industry with high growth potential. Table 8 shows the EV/EBITDA multiple by industry, which shows that the highest multiples were paid for Information and Communications Technology (ICT) companies, who often have high growth potential.

Table 7 - Average EV/EBITDA Multiple by Fund (excluding target companies with negative EBITDA and deals where special equity instruments were used)

	N	Average EV/EBITDA
Altor Equity Partners	1	12.3
Borea Opportunity Management	3	8.5
Credo Capital Partners	1	5.8
HitecVision	9	10.6
NorgesInvestor	11	10.2
Norvestor Equity	6	11.2
Total	31	10.3

Table 8 - EV/EBITDA Multiple by Industry (excluding target companies with negative EBITDA and deals where special equity instruments were used)

	N	Average EV/EBITDA
Consumer	6	11.1
Energy	9	10.3
ICT	7	13.7
Industrial	4	5.9
Other	5	7.9
Total	31	10.3

Table 9 and Table 10 shows the EV/Sales multiples paid, by fund and industry. We see that the highest multiples were paid in the deals sponsored by HitecVision and the deals in the energy sector, which is basically the same thing since HitecVision sponsored 12 out of 13 deals in the energy sector. The reason why we see the highest multiples for the energy sector is probably because these companies have high profit margins and growth potential, because of the booming oil industry in Norway the last decade. The industrial sector has the lowest multiples, and is in

particular weighted down Norvestor Equity's investment into Nordic Paper, a paper products producer. The average multiple paid is 1.1 times sales.

Table 9 - Average EV/Sales Multiple by Fund (Excluding target companies with less than 1 MNOK in sales and deals where special equity instruments where used)

	N	Average EV/Sales
Altor Equity Partners	2	0.6
Borea Opportunity Management	4	0.6
Credo Capital Partners	1	0.9
HitecVision	9	2.3
NorgesInvestor	12	0.6
Norvestor Equity	6	1.2
Total	34	1.1

Table 10 - Average EV/Sales Multiple by Industry (Excluding target companies with less than 1 MNOK in sales and deals where special equity instruments where used)

	N	Average EV/Sales
Consumer	7	0.7
Energy	9	1.7
ICT	9	1.4
Industrial	4	0.4
Other	5	0.9
Total	34	1.1

In Table 11 and Table 12 the average leverage ratio of the companies before and after the buyouts is shown, by fund and by industry. The leverage ratios are calculated as net interest bearing debt before/after the buyout, divided by the enterprise value implied by the transaction. In this part I have chosen to include the deals where special equity instruments were used, even though the leverage ratios are calculated in terms of EV. This is because the enterprise values are somewhere close to the real enterprise values, and because my key interest is to look at the *change* in leverage ratio. Since the leverage ratio before and after the buyout is based on the same enterprise value, the change in leverage ratio should not be wrong even if the enterprise value is wrong. I was only able to calculate the leverage ratio before the buyouts for 29 of the 44 companies. The cases where I could not calculate the leverage ratio were in deals that were divisional buyouts,

deals were I could not find the debt of the previous parent company to see its leverage and deals where multiple companies were bought and consolidated into one group of companies.

The tables show that the average leverage ratio for the companies before being acquired was 15%, while it was 30% after being acquired. This shows that Private Equity funds tend to use more leverage in the companies they invest in than the companies used before being acquired, which could be to increase value from tax shields or through the disciplinary effect on management by leverage as suggested by Jensen (1986). The companies in the sample does not seem to be aggressively leveraged, compared to the average leverage ratio for LBOs reported by Axelsson et al. of 69% (p. 43). These results are as expected, given that the companies in the sample are smaller and probably should retain more financial flexibility to be able to fund growth opportunities. Of the funds in the sample, Altor Equity Partners is the fund that engages in large LBO-deals and has an average leverage ratio post buyout of 72% which is very close to the mean leverage ratio found in LBO deals. I was however not able to compute the leverage ratio before the buyout for any of the Altor-deals, so this is not part of the two tables. Looking at the leverage ratio across industries, the consumer sector had the highest leverage both before and after the deals, and was the sector which had the largest growth in leverage. This pattern is likely observed due to the firms in the consumer sector being more mature companies with higher debt capacity due to stable cashflows.

Table 11 - Use of leverage by fund. Calculated as net interest bearing debt divided by EV

	N	Average Leverage Ratio Pre-Buyout (%)	N	Average Leverage Ratio Post-Buyout (%)
Borea Opportunity Management	3	01	3	29
Credo Capital Partners	1	0	1	27
HitecVision	8	10	8	29
Nord Kapitalforvaltning	1	13	1	34
NorgesInvestor	10	29	10	33
Norvestor Equity	6	7	6	28
Total	29	15	29	30

Table 12 - Use of leverage by industry. Calculated as net interest bearing debt divided by EV

	N	Average Leverage Ratio Pre-Buyout (%)	N	Average Leverage Ratio Post-Buyout (%)
Consumer	3	27	3	50
Energy	6	10	6	30
ICT	9	2	9	23
Industrial	6	31	6	32
Other	5	15	5	27
Total	29	15	29	30

The 8 deals where special equity instruments were used are listed in table 13, along with sales to indicate the size of the company, as well as the ownership share of management/entrepreneur and the ownership share of other investors. Some kind of equity instrument other than common stock was used in many of the deals, but these 8 are the deals where I have judged that the use of these instruments has had a significant impact on the implied valuation of the company from the deal. I was interested in seeing what motivated the use of these instruments, where two explanations could be plausible. The first is that the instruments are used to mitigate agency conflicts between the Private Equity fund and the other investors. If this is the case we should see a high ownership share to the management or entrepreneurs of the company. We should also see special equity instruments being used more frequently for small, less mature companies – thus these should have lower sales. The other explanation is that PE-funds use these instruments to make better deals at the expense of less sophisticated co-investors that don't recognize the impact these instruments have on the value of their investments. If this is the case then we should see higher ownership shares of co-investors in these deals.

Table 13 - List of deals where special equity instruments were used. Ownership share calculated as share of total (book) equity.

Company	Sales in 2012-kroner	Ownership share of PE-fund (%)	Ownership share of management /entrepreneur (%)	Ownership share of co-investors (%)
Lindorff Group	1 899 974	65	5	30
Reef Subsea	425 369	60	0	40
APL	647 567	83	17	0
Momek Group	176 165	50	50	0
SPT Group	150 721	61	39	0
Spike Exploration	n/a	79	21	0
Rapp Marine Group	549 007	80	20	0
Consorte Group (Intelecom)	243	18	39	43
Average of sample	668 414	58	20	18

We see that nearly all the companies where special equity instruments have been used have lower sales than the sample average, with the exception of the Lindorff Group. Most of the deals also have higher management ownership than the sample average. This supports the theory that these instruments have been used to mitigate agency conflicts between the PE-fund and the management/entrepreneur.

The theory that the special equity instruments are used to exploit less sophisticated co-investors is not supported by the data, since five of eight deals did not have co-investors. In the three deals where there were co-investors, the use of special equity instruments did not seem to have been used to exploit co-investors. In the Lindorff deal, the instrument used was a convertible bond that could be converted to common stock, as well as the use of series A and B stock where the stock characteristics were not specified. The convertible debt seems to have been a “deal sweetener”, knowing that this was a highly leveraged transaction with a leverage ratio of 82%, making the bond quite risky. The Lindorff deal is also one of the largest deals in the sample, with very sophisticated investors involved that should be able to see the impact on value from different securities. In the Consorte Group deal there was a lot of stock options to employees at the time that could affect firm value. These stock options do not shift value from the other co-investors to

the PE-fund, but serves as a way of motivating employees. Finally the Reef Subsea deal was a joint venture between HitecVision and GC Rieber Shipping ASA, where GC Rieber contributed with their ownership interest in three subsea companies while HitecVision brought in fresh capital. The common stock in the company was split 50/50 between the two partners, after each party invested 105 MNOK – HitecVision in cash, GC Rieber with 35 MNOK in cash and the remainder as contribution in kind with their ownership interests in the three subsea companies. HitecVision also contributed with an additional 55 MNOK in preferred stock, which was the special equity instrument used in this case. The use of preferred stock in this case seems to have been to fund the company's capital needs, while preserving the 50/50 joint venture set-up since the preferred stock did not have voting rights.

To conclude, the use of special equity instruments in the sample seems to have been done in order to mitigate agency conflicts between the PE-fund and the other owners, not to exploit less sophisticated co-investors. However the evidence has mostly anecdotal value due to the small sample size; more research is needed to make conclusion about the buyout market in Norway in general.

4.2. Regression Results

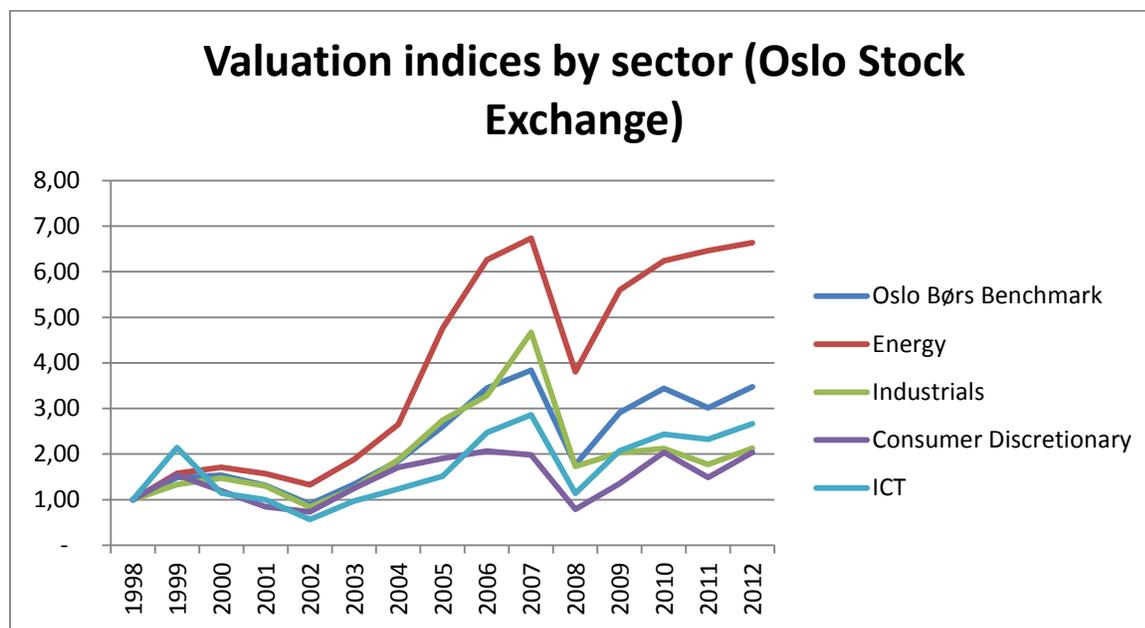
In this section I describe the regression analyses on what drives prices for companies acquired by Private Equity funds in Norway. After controlling for factors that commonly affects company valuations, I test whether the availability of credit and competition between Private Equity funds affect the enterprise valuations of the target companies.

Finance theory tells us that a firm's value is determined by its discounted expected future cashflows. Thus a firm's value should increase if its expected future profitability is higher, or if its riskiness is reduced. According to the Capital Asset Pricing Model (CAPM), only a firm's systematic risk should be relevant when discounting future cashflows, since unsystematic risk can be diversified away.

In the analyses I regress enterprise values on firm characteristics. The control variables included are EBITDA, sales, unlevered industry beta, an index of similar public company valuations and dummy variables for industry. EBITDA and sales can be seen as proxies for profitability, where

EBITDA is a measure of current profitability, while both sales and EBITDA can capture future profitability. Future profitability is also captured by the Oslo Stock Exchange indices, since a rise in public company valuations indicate macro-level changes that affect all companies. The industry-index used in the regression is specific to the five industry categories I employ: Energy, Industrials, Consumer, ICT and “Other”, to account for industry-specific changes to future profitability. For the companies in the category “Other” the general Oslo Børs Benchmark index is used. Figure 7 shows the development of these indices in the period 1998 to 2012 (Oslo Stock Exchange, 2012). Oslo Stock exchange has two separate categories for telecom and information technology companies, while I combine the two into the ICT sector. ICT in the figure has therefore been calculated as the simple average between the two series. From the figure it is evident that the energy sector has outperformed the other sectors.

Figure 7 – Valuation indices by sector on the Oslo Stock Exchange



Systematic risk is captured by using V. Damodaran’s estimates of unlevered beta by industry, where the beta used is matched to the year and industry the target company is in.

Specifying the model was a challenge. To incorporate the different firm sizes in the sample I would prefer to use a log-log specification, where both EV and independent variables are log-transformed. With this specification a percentage increase in for example EBITDA leads to a percentage change in EV. However, since nine out of the 44 companies have negative EBITDAs

this specification would lead to these observations being dropped if the log of EBITDA is used, because the log of a negative number is not defined. This would make the sample biased. Using the log of EV as the dependent variable and using EBITDA on the levels as an independent variable would lead to a model that assumes that an absolute change in EBITDA leads to a percentage change in EV, i.e. if EBITDA increases by 10 MNOK, EV increases by some percentage. This does maybe not make sense, since the relationship between EBITDA and EV should be proportionate, either by using a level-level specification or a log-log specification. In order to include EBITDA as an independent variable, I have chosen to use EV on the levels as the independent variable. I have also chosen to use sales and the public valuations index on the levels, following the same reasoning that there should be a proportionate relationship between these variables. The unlevered industry betas are log-transformed since increasing cost of capital should not have a one-to-one effect on EV, i.e. a change in the cost of capital from 1% to 2% should have a much higher impact on EV than a change from 19% to 20%. I also included dummy variables for industries in the second specification of the model to allow for potential differences across industries.

As an alternative to the above specifications, I dropped EBITDA as an independent variable and used the log of EV as an explanatory variable. In this model sales, beta and the industry index variables are also specified in logs. Since one of the companies had zero sales, this drops one observation from this regression compared to the first regression. I also ran the model with industry dummies in a fourth specification.

The four specifications are presented in Table 14, where t-statistics are calculated using heteroscedastic-robust standard errors. The regression is only run on the companies where value-distorting special equity instruments have not been used. In the specification which includes EBITDA, only sales is significant on the 5% level. In the other model specification where EBITDA is not included, both sales and beta are significant. Surprisingly, the industry valuation index is not significant in either specification, and has the opposite sign of what I expected in the log-specification. EBITDA is not significant on the 10% level in the first specification, while it is marginally significant in the second specification, probably due to the combination of small sample size and since many of the target companies in the sample are young companies who are yet to reach profitability. The stage the companies are in could to some degree be captured by the

industry dummies. Running tests for the joint significance of the industry dummies reveals that they are not significant on the 10% level in either model.

Table 14 - Initial model specifications

	(1) Level EV	(2) Level EV with industry dummies	(3) Log EV	(4) Log EV with industry dummies
Sales	0.357*** (0.0836)	0.384*** (0.0920)		
EBITDA	1.843 (1.095)	2.019* (1.084)		
Log of unlevered industry beta	-250409.8 (171809.9)	-401813.2** (180390.9)	-1.067** (0.481)	-0.945 (0.620)
Industry valuation index	4123.0 (19018.6)	-8995.4 (25790.8)		
ICT		120330.2 (109739.0)		-0.378 (0.551)
Industrial		-174141.6 (132051.0)		-0.147 (0.642)
Consumer		6383.9 (88679.9)		-0.131 (0.374)
Energy		84530.6 (122205.2)		0.517 (0.445)
Log of sales			0.254** (0.116)	0.259** (0.111)
Log of industry valuation index			-0.0216 (0.212)	-0.375 (0.323)
Constant	85531.3 (66153.6)	68884.9 (98725.3)	9.336*** (1.547)	9.649*** (1.500)
Observations	35	35	34	34
R ²	0.817	0.844	0.392	0.453

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

From the results of the initial specification I conclude that the third specification seems to match the data best. EBITDA is only marginally significant on the 10%-level in the model with industry dummies, while it is not significant without the dummies. The way beta risk is specified in the first model, it predicts that EV should decrease by approximately 2.5 MNOK from a 1 percent increase in beta, regardless of the size of the firm, which does not make sense. Although the models with EBITDA included have a much higher R-squared, I prefer the specification in model 3 as it yields coefficients that are both significant at the 5%-level and has a specification that makes more sense given that the companies in the sample have different sizes. Since neither the industry valuation index nor the industry dummies are significant they are dropped from the model.

Hypothesis 1: Availability of credit

The first hypothesis I wanted to test was if easy access to credit leads to higher transaction prices for Private Equity deals in Norway. The hypothesis is inspired by the paper by Axelsson et al. where they find that EV/EBITDA multiples paid in large LBOs are significantly correlated with the high-yield credit spread, while the high-yield credit spread has no effect on public company pricing. They postulate that the credit spread is a proxy for debt market conditions, where high spreads indicate increased risk margins and more difficulties in obtaining debt. Moreover they argue that the credit spread could also be a proxy for the economy-wide market risk premium, so that when credit spreads are low, the market risk premium is lower – leading to higher prices. To control for this fact they use a matched public company research design so that each LBO-company is matched to a similar public company. Thus price differences that are not reflected in the price of the matching company, as well as other control variables, should be the independent effect of the credit spread. Using these and other control variables, Axelson et al. find that LBO pricing is negatively related to the credit spread. They find evidence to support their theory that buyout firms overpay because fund managers have incentives to take larger risk due to their option-like compensation.

Since the sample do not contain very many transaction that are leveraged as aggressively as the LBOs in Axelson et al.'s study, I wanted to use a more representative credit spread than the high-yield spread. Finding this data for Norwegian companies was a challenge, since the Norwegian bond market traditionally has been quite illiquid compared to the U.S., and since most companies have been financed by bank loans. However I was able to obtain the credit spread between the

interest rate paid by a sample of Norwegian companies on bonds with five years to maturity who was rated around A/BBB and the fixed rate in an interest swap agreement to swap three month NIBOR for a fixed rate, both interest rates based on the same time to maturity (DNB Markets, 2013). This spread should match my sample well since the companies in the sample have an average leverage ratio of 30%.

Table 15 shows the result of my analysis. For the three specifications tested, we see that the indicative credit spread is pretty close to being significant (p-value of .12), but the coefficient is actually positive, which is the opposite of what Axelson et al. find in their work. The result is also the same if the alternative model specification with EBITDA is used, or if the regression is run using the U.S. high-yield spread. I therefore conclude that the credit spread does not seem to have the effect on pricing for the companies in my sample that Axelson et al. find in their work.

The reason why the credit spread does not seem to affect pricing in the sample could be because it is different from the sample of LBOs used in Axelson et al.'s paper, with respect to the amount of leverage used. Arguably, LBO transactions are motivated by the aggressive use of leverage to create value, illustrated by the following quote from a practitioner (from Axelson et al.'s paper, p. 1):

“We buy stuff with cheap debt and arbitrage on the difference with equity markets.” (Guy Hands, founding partner of the private equity firm Terra Firma, Financial Times, Nov. 15, 2007) “

Therefore, LBO transactions are perhaps more sensitive to credit market conditions than the transactions in the sample, who seems to be motivated by other factors than to create value through the use of leverage.

Table 15 - Regression results credit spread's effect on pricing

	(1)	(2)	(3)
	Log EV	Log EV with Index	Log EV Industry Dummies
Log of sales	0.196* (0.0952)	0.192* (0.101)	0.162 (0.0973)
Log of unlevered industry beta	-0.894* (0.459)	-0.840 (0.532)	-0.715 (0.580)
Indicative credit spread	0.00383 (0.00239)	0.00375 (0.00248)	0.00449 (0.00287)
Log of industry valuation index		0.0700 (0.263)	
ICT			-0.0810 (0.480)
Industrial			0.168 (0.761)
Consumer			0.517 (0.310)
Energy			0.401 (0.362)
Constant	9.701*** (1.209)	9.681*** (1.242)	9.867*** (1.191)
Observations	29	29	29
R^2	0.362	0.364	0.430

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I also examined whether another measure of the ease of obtaining credit that could explain pricing – the target companies' ability to secure debts with collateral. The hypothesis is that for companies with access to more assets that can be used as collateral should be able to be more highly leveraged at a lower cost of debt than otherwise, making them more attractive for buyouts. The ratio of tangible fixed assets to enterprise value was calculated as a measure of the target company's ability to secure loans with collateral. Since many of the companies had very low ratios, particularly the ICT companies in the sample, while others had very high ratios, two models were specified. In the first model the ratio of tangible fixed assets to EV was used on the

levels, while in the second model the square of the ratio was added to allow for nonlinearities in the relationship. The results are shown in table 16, which shows that the effect is not significant in the first specification, while the joint significance of the two collateral terms in the second specification has a p-value of 9.0%. The results indicate that EV grows with the ratio of tangible fixed assets to EV, but is marginally decreasing and eventually decreasing. The effect of collateral at the mean of the sample is that a change in collateral by 1 percentage point increases EV by 14 NOK¹, which doesn't have any practical significance. The model implication that companies with a high ratio of tangible fixed assets to EV have lower EV is probably a result of the model does not control for adequately that these companies to have lower growth prospects than the other companies. If the industry dummy variables are added to the regression for instance, the effect of tangible fixed assets to EV is not significant. I therefore conclude that collateral does not seem to have an effect on pricing.

¹ Taking the derivative of the expression with respect to the tangible fixed assets ratio yields $\frac{\partial \ln(EV)}{\partial x} = 0.858 - 2 * 0.991x$, the change in EV is then $\frac{\partial EV}{\partial x} = e^{0.858-2*0.991x}$, which at the mean of 0.261 is 1.41. A one unit change in x gives a change in EV of 1.41, i.e. a one percentage point increase in x gives a change in EV of 0.014

Table 16 - Regression of availability of credit from collateral

	(1)	(2)
	Log EV	Log EV
Log of sales	0.267** (0.124)	0.247* (0.126)
Log of unlevered industry beta	-1.175*** (0.375)	-1.372*** (0.429)
Fixed tangible assets ratio of EV	-0.414 (0.456)	0.858 (1.135)
Fixed tangible assets ratio of EV, squared		-0.991 (0.770)
Constant	9.248*** (1.582)	9.335*** (1.599)
Observations	34	34
R^2	0.410	0.434

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

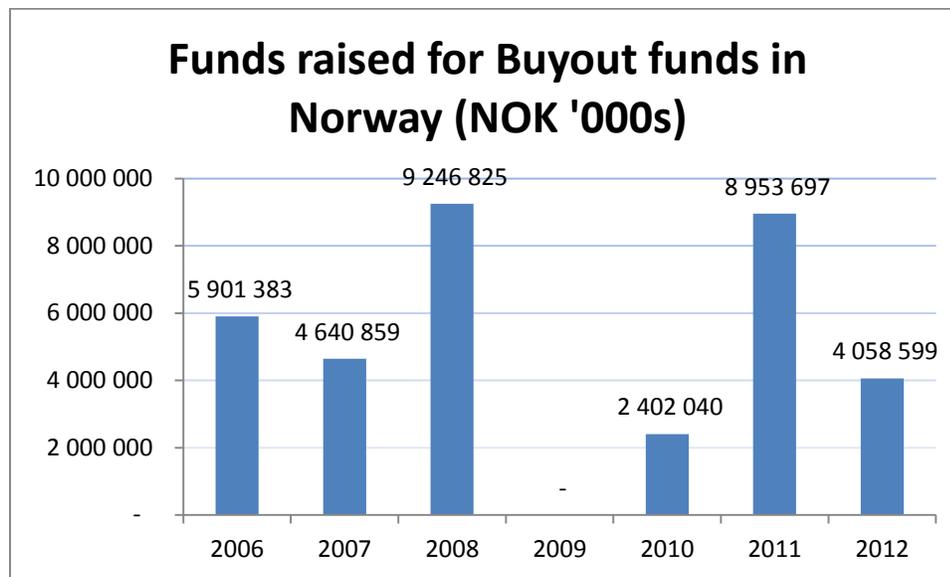
Hypothesis 2: Competition between PE-funds

The second hypothesis I wanted to test is whether competition between PE funds to acquire potential target companies leads to higher transaction prices. This hypothesis is inspired by the paper by Gompers and Lerner (2000) “*Money chasing deals? The impact of fund inflows on private equity valuations*”, where they investigate the effect of capital inflows to venture capital funds in the U.S. on firm valuations. They find that the inflow of more money to venture capital funds were associated with higher valuations, indicating that with only a fixed number of attractive investment opportunities, competition drives up prices. If prospects for the future improve, i.e. the companies’ future cashflows becomes larger, this should increase firm values. At the same time this will make private equity more desirable as an asset class, leading to more funds being raised. Gompers and Lerner therefore control for changing valuations as a result of improved future prospects by adding matching public company valuation indices. They also control for a possible omitted variable bias that could be present because the “quality” of investment opportunities is not observable and therefore not in the regression by using inflows to

buyout funds as an instrumental variable. They also control for a range of other factors for robustness, but the result that higher fundraising increases price is valid for each case. Furthermore they find that fundraising's effect on pricing is most pronounced in geographical areas with the highest venture capital activity.

Figure 8 shows the funds raised for buyout funds headquartered in Norway (Argentum, 2006-2012). The data is only available from 2006, and does not include funds raised for funds that are not headquartered in Norway, but can invest in Norway. This means that funds raised for Altor Equity Partners and EQT are not included, since they are headquartered in Sweden. We see that fundraising has been very volatile in the period. In the aftermath of the financial crisis, no money was raised for buyout funds in 2009, and fundraising continued to be low in the first part of 2010.

Figure 8 - Fundraising for Norwegian buyout funds



Using the model developed earlier, fundraising is now added to the regression, as well as fundraising the previous year. The regression results are presented in table 17, where the first specification uses only funds raised the same year of the deal while the second specification also uses funds raised the previous year to allow some time from the capital is committed to the fund until it is put to work. The results do not show the pattern found by Gompers and Lerner, where higher inflows of capital to Private Equity funds lead to higher valuations of target companies. If anything the second specification points towards an *opposite* relationship, i.e. more funds lead to

lower valuations. The result is actually significant on the 5%-level, but it is likely to be a spurious relationship influenced by outliers. We see that because of the low number of observations, 24 in the first specification and 20 in the second, the coefficients change greatly when running different models. In order to make firm conclusions on this subject it is necessary to increase the sample size.

Table 17 - Regression of effect of fundraising

	(1) Log of EV	(2) Log of EV
Log of sales	0.476 ^{***} (0.148)	0.623 ^{***} (0.120)
Log of unlevered industry beta	-0.717 (0.745)	-1.357 ^{**} (0.563)
Log of fundraising	0.0169 (0.0210)	0.00333 (0.0180)
Log of fundraising previous year		-0.0400 ^{**} (0.0179)
Constant	6.260 ^{***} (2.002)	5.044 ^{***} (1.507)
Observations	24	20
R^2	0.407	0.646

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Since some of the buyout funds who invest in Norway are located in Sweden, I also wanted to try to use fundraising for Swedish funds in the regressions. Unfortunately Argentum could not supply the data in time to be part of the analysis.

5. Conclusions

The aim of this paper was to infer prices from public information about Private Equity transactions in Norway, and to provide an analysis of the Norwegian buyout market based on data gathered from public sources. The paper has shown that prices can be predicted accurately, with the inferred price being 0.7% above the true price on average. The theory presented in the paper shows that there are several error sources that can make the inferred enterprise valuation wrong, but data was not available to test the magnitude of such errors. In future research this should be tested to examine the robustness of the method described in this paper to infer enterprise valuations.

A novel dataset of 44 Norwegian buyouts in the period 1999-2012 was constructed using the method presented in this paper. An average EV/EBITDA ratio of 10.3 is reported for the companies who did not have negative EBITDA before being acquired, and 5.0 for the whole sample. The average EV/Sales ratio is reported at 1.1.

Most of the Private Equity funds acquired more than two-thirds of the equity in the companies they invested in, and the acquired companies show a marked increase in leverage ratios post-buyout. Special equity instruments that affect the inferred enterprise valuation of the deal were used in eight of the 44 deals. The use of these securities seems to have been motivated by a desire to mitigate agency conflicts, and not to exploit less sophisticated co-investors.

The regression analysis showed that sales and beta-risk were most significant for explaining prices, while EBITDA surprisingly was not significant at the 10% level. Other factors that were controlled for but did not have a significant effect were the valuations of similar publicly traded companies, and industry dummy variables.

Two findings from the literature were tested to see if they also hold for Norwegian data. First the hypothesis that easy credit leads to higher valuations of companies acquired by Private Equity funds was tested. The analysis was not able to reproduce the findings of Axelson et al. that lower credit spreads lead to higher valuations, the effect actually seems to be the opposite for the sample, although the coefficient is marginally insignificant. The analysis using fixed tangible asset as a proxy for assets that the company can use as collateral to get access to credit showed no significant effect on company valuation.

The second hypothesis tested was whether increased competition between Private Equity funds leads to higher firm valuations. As a proxy for competition, the fund's raised for buyout funds in Norway was used, with the idea that with more money in each fund but only a limited number of attractive investment opportunities, company valuations should increase. The analysis showed no significant effect, but because the data on fundraising only covers the period 2006-2012, the sample size was small. Another problem was that the data did not include funds raised by Swedish buyout funds who invest in Norway. Because of the data problems identified, it was not possible to conclude on the effect of fundraising. Future research should try to increase the sample size and amend the data-problems identified in this paper.

A topic for future research related to competition between Private Equity funds could be to examine the relationship between the Private Equity fund and the target company prior to the buyout. It could be the case that funds who establish long-term relationships with their target companies prior to acquiring them are able to avoid competition from other buyers, thus lowering the price they have to pay. On the other side of the scale there are companies that are auctioned off to the highest bidder, which could increase the price the Private Equity fund has to pay.

How the selling process affects how much the Private Equity fund has to pay can be examined in various ways. One metric could be to see how many potential buyers who were involved in each deal, information that could be obtained from the investment bank that brokered the transaction or from the Private Equity funds themselves. It could also be interesting to interview the management and previous owners of the acquired company to get their view on the selling process, and what made them decide to accept the Private Equity firm's offer.

Appendix

Table 18 - List of companies included in the dataset, sorted by fund and investment year. All figures in 2012-kroner

Disclaimer: The data listed below are my estimates of enterprise value, sales and EBITDA, gathered using public information only. Although I have tried to be as thorough as possible, I cannot guarantee the accuracy of the estimates. In particular, enterprise value for the firms where the variable “Equity_Instrument” is 1 is not accurate, since an adjusted valuation to account for the security’s characteristics has not been made. See table 19 for definition of variables.

Company_Name	GP_Name	Investment_Year	EV	Equity_Instrument	Sales	EBITDA
Lindorff Group AB	Altor Equity Partners	2003	2 392 963	1	1 623 166	428 056
Helly Hansen Group	Altor Equity Partners	2006	781 000	0	1 409 000	-29 000
Veolia Miljø AS	Altor Equity Partners	2011	2 276 921	0	4 110 000	184 592
Scandinavian Electric Systems	Borea Opportunity Management	2007	91 862	0	405 373	44 184
Ocea (PKA Mercatus)	Borea Opportunity Management	2008	209 741	0	304 583	14 120
Dekk-1 kjeden (Jæren Dekk AS)	Borea Opportunity Management	2008	217 010	0	194 255	25 105
Software Innovation	Borea Opportunity Management	2009	126 191	0	456 753	-6 891
Optimare AS	Credo Capital Partners	2012	229 162	0	254 080	39 515
SPT Group	HitecVision	2003	75 428	1	128 762	7 630
APL	HitecVision	2004	262 904	1	560 138	56 778
ProSep Inc (PKA Pure Group)	HitecVision	2004	74 655	0	0	-935
Aarbakke Group	HitecVision	2006	651 418	0	314 412	47 288
SPG (PKA Vector International)	HitecVision	2006	253 827	0	320 232	51 582
Subsea Technology Group (Technor, Bennex, Ross Offshore and Poseidon)	HitecVision	2008	441 203	0	772 406	36 002
Agility Group (PKA Grenland Group)	HitecVision	2009	444 961	0	1 499 700	53 100

Company_Name	GP_Name	Investment_Year	EV	Equity_Instrument	Sales	EBITDA
Reef Subsea	HitecVision	2010	363 415	1	417 906	-40 082
Bjørge ASA (Align, Stream & Naxys)	HitecVision	2010	577 248	0	1 460 190	60 378
Troms Offshore	HitecVision	2010	777 928	0	110 074	51 360
Tampnet AS	HitecVision	2010	667 440	0	112 809	52 716
Ocean Installer Holding AS	HitecVision	2011	43 381	0	n/a	n/a
Global Maritime	HitecVision	2012	252 760	0	150 494	30 448
Momek Group	HitecVision	2012	180 362	1	176 165	8 134
Spike Exploration Holding AS	HitecVision	2012	66 375	1	n/a	n/a
Rapp Marine Group	Nord Kapitalforvaltning	2012	429 489	1	549 007	45 510
Consorte Group (now Intelecom)	NorgesInvestor	1999	55 525	1	190	-5 687
Cermaq (PKA Statkorn Holding)	NorgesInvestor	1999	1 022 794	0	1 886 775	196 813
Egroup (PKA E Group ASA)	NorgesInvestor	1999	42 569	0	122 275	-58 862
Gulvex	NorgesInvestor	1999	63 717	0	123 216	14 856
Johan G. Olsen	NorgesInvestor	1999	997 392	0	1 382 694	121 353
Jernia	NorgesInvestor	2001	528 281	0	1 680 139	39 489
Software Innovation	NorgesInvestor	2002	148 914	0	512 281	10 713
BLUECOM ASA	NorgesInvestor	2003	46 085	0	94 415	4 178
Algeta	NorgesInvestor	2003	77 915	0	35	-11 140
VIA Travel Group	NorgesInvestor	2003	380 621	0	345 537	20 288
Nordic Paper	NorgesInvestor	2006	153 163	0	833 740	37 954
Music Retail Holding	NorgesInvestor	2007	241 572	0	234 467	15 850
07 Gruppen (07 Invest AS)	NorgesInvestor	2007	224 939	0	436 976	34 728

Company_Name	GP_Name	Investment_Year	EV	Equity_Instrument	Sales	EBITDA
Visual Conference Group AB	NorgesInvestor	2007	53 517	0	88 106	4 795
Panorama AS	Norvestor Equity	2005	210 184	0	245 840	43 454
Nordic Vision Clinics (Argus Øyeklinikker)	Norvestor Equity	2007	108 574	0	90 566	19 321
Advantec	Norvestor Equity	2010	143 260	0	155 210	14 356
Cegal	Norvestor Equity	2010	143 249	0	92 739	23 462
Abax	Norvestor Equity	2012	362 217	0	157 435	10 910
Inmeta Crayon	Norvestor Equity	2012	726 507	0	1 660 492	93 712

Table 19 – Definitions of variables in the dataset

Variable	Explanation:
Company_Name	The name of the target company
GP_Name	The name of the PE-firm (e.g Norvestor Equity)
Investment_Date	The date of the initial investment
Investment_Year	The year of the investment
Price	Price paid in NOK '000s. (The book value of the investment into the target company found in the SPV's financial statement)
Ownership share	Ownership share of the special purpose vehicle (holding company) from which the price is inferred from
Net Debt	Net assumed debt in the target company
EV	Enterprise value (E+D-Cash) implied from the deal in NOK '000s
Equity_Instrument	Dummy variable that is 1 if special equity instruments that could affect implied valuation from the deal, 0 otherwise
Sales	Revenues of the target company before the acquisition. If the acquisition happened later than 30.06 the revenues at year-end is used. For companies that were formed during the year the revenues for the part of the year they were in business is extrapolated to yearly figures.
EV/Sales	Enterprise value divided by revenues
EBITDA	Earnings before Interest, Taxes, Depreciation & Amortization (EBITDA) measured in the same way as Sales
EV/EBITDA	Enterprise value divided by EBITDA
Industry	The type of industry the target firm is operating in: Consumer, ICT (Information & Communications Technology), Industrial, Energy, and Other
Ownership_Share	The ownership share of the PE-fund (often different from the ownership share of the investment vehicle)
Lev_prebuy	Leverage ratio of the target company before the buyout, calculated as net debt before the buyout divided by the enterprise value implied by the buyout
Lev_postbuy	Leverage ratio after the buyout, calculated as net debt after the buyout divided by EV. Debt used to finance the purchase of equity that is found in the parent company is included in this figure
Ownership_management	The ownership share of total equity of management or entrepreneur.
Ownership Co-Investors	The ownership share of total equity of other owners than the PE-fund and management.
CPI	General inflation index. Source: Statistics Norway, 2013
Tangible_F_Assets	Tangible Fixed Assets in target company, used as a proxy for collateral that can be put up for loans. Source: Company financial statements
Beta	Industry Beta in the year of investment for the target company. Source: A. Damodaran's industry beta's by sector (2013).
Industry_index	Index of development in share price adjusted for dividends for the following sectors on the Oslo Stock Exchange: Energy, Industrials, Consumer Discretionary, ICT (the average of the index for telecom and IT) and the general OSEBX index for other companies. 1998=1. The value of

	the index is linked to the investment year and industry of the target company. Source: Oslo Stock Exchange, 2012.
Credit_spread	Difference in interest paid by a sample of Norwegian companies with A/BBB rating with 5 years to maturity, and the interest rate for the fixed part of an interest swap that swaps 3M NIBOR for a 5-year fixed interest rate. Available from 2001-2013. Source: DNB Markets, 2013.
Fundraising	Funds raised for Norwegian and Swedish buyout-funds in the same year as the buyout of the target company. Source: Argentum, 2006-2012

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