

Master thesis

How do we value private companies?

Case example: Sørlandschips AS

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Preface:

Originally the thought was to do a normal theoretical valuation thesis, in which I would pursue to investigate the most pressing matters of public stock valuation. The subject of valuation has been an interest of mine since the first time I had courses in them in business school. However, during the process of finding the right idea for a master thesis, it occurred to me that I had not been subject to almost any degree of private company valuation. This topic caught my interest, if just for the fact that I had no knowledge regarding the differences between common stock valuation, and private company valuation, so I wanted to learn more about this topic. I thank my supervisor Leif Atle Beisland for supporting the idea, giving me the incentive to pursue the matter further.

Abstract:

This thesis has tried to discuss and analyze how an investor should try to value a private company. In addition to special characteristics like the value of control, illiquidity discount and lack of diversification, normal valuation issues and techniques have been discussed as well. The thesis is divided in three parts. The first is a theoretical part in which one considers different valuation models, how to implement these, and the inputs required. The second is a part specifically towards the special characteristics of private company valuation, and the third is the application part of the thesis, which tries to incorporate the two first parts of the thesis. Sørlandschips AS was chosen for application part, but no contact was made with the company, so all information presented is public knowledge. The main reason for not engaging any contact with the company was to illustrate some of the difficulties that occur with private company valuation.

In the application part the company the residual earnings model and the method of comparables were both used. Bold assumptions were made regarding the inputs for valuation, due to the lack of information. The values for the equity ranged from 28,59 million to 43,530 million NOK, depending on which model was used, on assumptions concerning the cost of equity. The elements of illiquidity discount, value of control and lack of diversification were investigated, and found very difficult to apply to the valuation. However, some efforts were made, and the most important lesson learned from this is that private company valuation is far more difficult than standard public stocks. The mindset that valuation indeed is just as much an art as a science will be reflected on this thesis. In addition, I would like to say that what one should do in theory, is not always the best solution in practice, as this thesis has taught me.

Table of contents:

Preface:.....	2
Abstract:	3
Table of contents:.....	4
Introduction:.....	8
Private firms, what make them different?.....	9
Theoretical segment: Valuation models.	9
Valuation models: 1)Discounted Cash flow analysis.....	9
Introduction:.....	9
Disadvantages with the discounted cash flow model:.....	11
Benefits of the discounted cash flow model:.....	14
Implementation: Statement of Cash flows, reformulating, forecasting accruals:	14
Summary discounted cash flow analysis:.....	15
Valuation models: 2) Residual Earnings Model:.....	15
Introduction.....	15
The three cases of valuation:	18
Advantages of the residual earnings model:.....	20
Focus on value drivers:.....	20
Incorporates the financial statements:	21
Uses accrual accounting	22
Shorter forecast horizon.....	22
Protection against accounting created earnings:.....	23
Protection from paying too much for earnings generated by investment:	24
Converting analysts forecast to valuation:.....	25
Capturing value not on the balance sheet—for all accounting methods:	26
Residual earnings model disadvantages:	27
Summary:	27
Valuation models: 3)Method of comparables	27
Introduction:.....	27
Different variations of the model:.....	28
Potential conceptual and implementation issues:.....	28

Conceptual: Lack of fundamental anchoring.....	28
Three steps by Penman:	31
Implementation: Defining and finding comparable firms.....	31
Implementation: Different multiples, different valuations.....	32
Implementation: Negative denominators in the P/E ratio.....	32
Implementation: Consistency issue in the numerator/denominator	33
Summary Method of comparables:.....	34
Valuation Inputs: The Cost of capital	34
The Capital asset pricing model and the cost of capital:.....	35
Assumptions of the capital asset pricing model:	36
Assumption: No transaction cost	37
Assumption: All have same information	37
Assumption: All assets are traded.....	38
Diversification:.....	38
Adjusting for nondiversification:	40
Beta estimation: Private firms.....	41
Accounting betas:.....	41
Fundamental Betas:.....	42
Bottom up betas:.....	43
Valuation Inputs: The cost of debt	44
The cost of debt.....	44
Debt ratio:	45
Private firm essentials: 1)The illiquidity discount:	46
Bid-ask spread:	47
Inventory rationale:.....	47
Processing cost argument:	47
Adverse selection problem:.....	48
The magnitude of the spread:.....	48
Determinants of the spread:	49
The cost of illiquidity:	50
Present value of expected future transaction cost.	50
Illiquidity as an option:	51
Illiquidity and discount rates:	51
Empirical evidence on the size of the discount:.....	52

Bonds:.....	52
Restricted stock and private placements:	53
Private equity:	53
Dealing with illiquidity in valuation:.....	54
Illiquidity discounts on value:.....	54
Fixed discount:.....	55
Firm specific discount:.....	55
Why should there be a liquidity discount?.....	55
Determinants of illiquidity discount:.....	56
Estimating a firm-specific discount:	57
Restricted stock studies:.....	57
Summary: Illiquidity discount.....	58
Private firm essentials:2) Value of Control.....	59
Private firm essentials:3) Accounting standards and discretionary expenses:.....	63
Private firm essentials :4)Valuation Motive:	64
Private firm essentials: 5)Forecast horizon	65
Application: Case Sorlandschips AS.....	66
Sørlandchips AS : Introduction:.....	66
Forecast horizon and valuation motive:.....	66
Beta and the cost of capital:.....	67
Bottom up beta's.....	69
The marked risk premium:	70
The risk free interest:	71
Adjusting for non-diversification:.....	71
Estimating the cost of equity:	71
Estimating the cost of debt:	73
Debt ratio	74
Illiquidity discount, value of control and lack of diversification:.....	76
Adjusting the return for equity and the WACC:	77
Reformulating the balance statement:	78
Reformulation of the Income statement:	80
Tax allocation:	80
Potential problems when reformulating the income statements:	81
The reformulated balance sheet and income statement:.....	81

RE calculation:	85
Value of debt(net financial obligations).....	89
Residual earnings and the value of debt: Can we trust these results?	91
Method of comparables:.....	92
Discounted cash flow calculation and valuation:.....	95
Value of control:.....	97
Conclusion:	99
References:.....	100
Appendix 1: Income statement	103
Appendix 2: Balance statement	104
Appendix 3: Comparables	105

Introduction:

In this thesis the main point of interest was how to value private companies, with special interest to what makes them different. Of course, when valuing private firms one has to consider all the regular concerns which one has with public company valuation, but there are special properties of private firms that have implications on value as well.

The valuation models discussed and analyzed were the residual earnings model, discounted cash flow model and the method of comparables. Of course, there are other models as well, but due to the fact that the thesis covers a potentially very wide topic, some models had to be left out. The dividend discount model, residual operating income or abnormal earnings growth models are not discussed, due to limited time available and the intended size of a master's thesis.

In the same respect, some of the aspects covered in this thesis are of somewhat limited nature, but still included to get the whole perspective. The reformulation of the financial statements is one example of this, where almost just the information and theory needed for the particular case example was included. Growth and sustainable growth discussion is also of limited nature, mainly due to the fact that there is not much information available for private firms, especially the case in question, considering the fact that no contact was made with the company. This was made purposefully to help illustrate some of the implications of private company valuation.'

The thesis's main concern is to discuss what makes private company valuation different, general valuation topics and finally how we try to implement it on a particular case. In essence these are very broad topics, and general valuation theory could stand alone in a thesis. Therefore the reader might get the notion that some elements are lacking, but the main idea was to get a bird's eye view on how we value private firms, so hopefully this was achieved. A special interest is done in the theoretical part of the illiquidity theory, with some empirical results as well. Some of this is not used in the application part, but it is perhaps the main difference between a private company and a public company, so extra efforts were made to uncover and discuss it.

Private firms, what make them different?

There are several properties concerning private firms that make them different as opposed to public companies. This segment will be brief in that respect that most of this information is included and discussed in other parts of the thesis.

Private firms rarely trade, as opposed to public. This implies that there is no market value readily available for the investor to use. In addition to this, private firms rarely give out information, in the respect of announcements of investments plans or deals they make, to name two examples. This is of course because they don't have to, as opposed to public firms for whom there are rules that control the disclosure of information.

In addition to the lack of information made public, there is limited accounting information as well. As an example of this for the case in question, later to be discussed, only three years of accounting data were public. This of course raises the uncertainty concerning a number of aspects on valuation.

Another point of interest is that there might be what is called discretionary expenses in private companies. These are expenses that are unnecessary, causing the accounting numbers to potentially be somewhat suspect. In addition there according to Damodaran(2002) potential accounting differences across private companies and public, making it difficult to compare results.

Theoretical segment: Valuation models.

In this part of the thesis we will look into the three valuation models chosen for theoretical discussion. First out is the discounted cash flow model.

Valuation models: 1) Discounted Cash flow analysis

Introduction:

A very common valuation model often used in financial textbooks is the *discounted cash flow model*. In the following section this model will be outlined, variations of the models will be demonstrated, the benefits and disadvantages will be discussed, and it will briefly

discussed how to implement the model to the best of its use. The notion of the discounted cash flow model is that just as you can value projects from its discounted cash flows, the firm's value is the present value of the cash flow of the entire firm (Penman,2010).

The perhaps simplest version of this model is presented by Penman (2010,pg 123) and looks like: $DCF: 1.1 = V_0^E = \frac{C_{1-I_1}}{P_{E-g}} - Net\ debt.$

Where C_{1-I_1} is cash flow from operations in year 1 subtracted by cash investment in operations in year 1 This is called the free cash flow because it is the part of the cash flows that is free to both equity and debt holders after reinvestment in operations. P_{E-g} is the cost of capital for equity minus the estimated growth in cash flows. Net debt is the value of debt in year 0, at market value.

It is sometimes referred to as the constant growth model, in that it assumes constant growth over the lifespan of the investment. With the model one basically just have to forecast cash flows and investments one year ahead and make estimates about the constant growth rate of free cash flows. The formula itself is an annuity, in the respect that the amount each year is the same, and the fact that it is assumed to continue forever makes it a perpetuity (Penman.2010). However, as this simplified model implies, this version of the discounted cash flow would only work with a constant growth rate. For instance, if we assume that the business in question is in a cycle where it's investment opportunities at present time is expected to generate large returns, and hence large growth in the cash flows, but is considered to decline to a constant rate within 5 years? In that case the smoothed constant growth rate would simply not make a correct estimate. If one can estimate the next few years' growth rates by a degree of certainty, one could expand the model to something like this:

$$DCF: 1.2 = V_0^E = \frac{C_{1-I_1}}{P_f^1} + \frac{(C_{1-I_1})g_2}{P_f^2} + \frac{(C_{1-I_1})g_2 \times g_3}{P_f^3} + \dots + \frac{C_{T-I_T}}{P_f^t} + \frac{CV_T}{P_f^T} - V_0^D .$$

Where V_0^D is the value of net debt at the time for the valuation, P_f^t is the weighted average cost of capital for the firm, and the cash flows are forecasted and discounted till the time of the forecast horizon T. The term $\frac{CV_T}{P_f^T}$ is known as the continuing value. As noted, forecasting to an infinite forecast horizon, which the last version of the model do, is a tedious and complicated procedure. Instead, we could do like in the first version, assume the free cash

flows at the end of the forecast horizon will continue as a constant perpetuity. The continuing value is calculated as this (Penman, 2010, pg 120):

$$CV: 1.1 = CV_{T=\frac{C_{T+1}-I_{T+1}}{P_{f-1}}}$$

This way of calculating the continuing value is used when there is no expected growth after the forecast horizon t . If there is one could use (Penman, 2010, pg 120):

$$CV: 1.2 = CV_{T=\frac{C_{T+1}-I_{T+1}}{P_{f-g}}}$$

As you can see from formula DCF: 1.2, this continuing value at time T is then discounted back to the present value at time 0. This last formula could be preferred if one assumed varying growth rates until a certain point, T , where the growth would either converge towards zero, as with CV:1.1, or continue at a constant rate as in CV:1.2. However, it is unlikely that all firms have positive cash flows at the time of valuation, and in addition, that the cash flows are expected to grow constantly over the entire forecast horizon. One can instead use the formula provided by Penman (2010, pg 120) which looks like this:

$$DCF: 1.3 = V_0^E = \frac{C_1-I_1}{P_f^1} + \frac{(C_2-I_2)}{P_f^2} + \frac{(C_3-I_3)}{P_f^3} + \dots + \frac{C_T-I_T}{P_f^t} + \frac{CV_T}{P_f^T} - V_0^D .$$

Here we manually estimate the cash flows and required investments for each year, instead of assuming a constant growth, or varying growth rate. However, even if the cash flow models are flexible in the respect of varying growth rates and free cash flows, there are some problems that cannot be negated easily if the firm in question has certain properties.

Disadvantages with the discounted cash flow model:

As noted the discounted cash flow model is dependent on having positive cash flows in the numerator of the formula, to achieve a positive value for the equity (the continuing value to be precise). However, this is not always the case with many firms. Start up firms, cyclical firms and firms in financial trouble might not have positive free cash flows for the near foreseeable future and make it difficult to estimate the correct value of the firm using this model.

Whatever the reason for the negative cash flows at the valuation horizon, there are certain issues with using this model. A start up firm for instance invests heavily in the beginning of the firm's lifespan, hoping to acquire market shares and the consumer's interest. Inevitably, there is a high degree of uncertainty regarding when and how much the firm will earn, both profits and cash flows. The situation makes forecasting very difficult, in that one has to estimate when the positive cash flows will occur, and to what rate of return they will earn as well. If one for example calculates that the free cash flow will be positive after 5 years, and that the growth in free cash flow stabilizes five years after this, one is left with an estimation based almost purely on estimates with very high degree of uncertainty. One of the tenets of fundamental analysis are :”Anchor a valuation on what you know, rather than on speculation”(Penman,2010,pg 19). If one is forced to speculate like in the example above, due to the negative cash flows, this principles is clearly broken. One could easily imagine a start up firm having positive earnings before the cash flows, due to the degree of investment in the beginning. This would negate some of the speculation and likely prove a much more sound valuation method in situations with negative cash flows in the first years of a forecasting period. Before the discussion of earnings based and other models are to be discussed, other possible issues regarding the discounted cash flow model will be outlined.

However, even if positive, the free cash flow could easily be manipulated, at least in the short run. Consider a firm with free cash flow of 4 million per present day. In addition assume we are applying $DCF: 1.1 = V_0^E = \frac{C_1 - I_1}{P_{E-g}} - Net\ debt$ to calculate the value of the equity of the firm. For sake of simplicity we assume there is no growth and that the cost of equity is 10% and that the value of net debt is equal to 10 million. These assumptions give a rough estimation of $DCF: 1.1 = V_0^E = \frac{4}{0,1} - 10 = 30\ million$. Further to this, consider we have an identical firm except they have reduced their investments so that the free cash flows are 5 million, instead of 4. The calculation then becomes entirely different and the second firm is then worth 40 million, instead of 30 like the other one. This example shows us that one has to be very careful when estimating value based on cash flows. Naturally if both firms had the same growth opportunities, not investing as much, should cause the price of firm to, too decrease, and not increase. So in essence one has to calculate the potential growth of comparable firms based on how much they invest and what growth opportunities they have.

This example leads us to the description of free cash flow model being partly a liquidation concept(Penman,2010). He says:”Free cash flow is not really a concept about

adding value in operations. It confuses investments (and the value they create) with the payoffs with investments, so it is partly an investment or a liquidation concept”(Penman,2010,pg 122).

What is meant by this is that increased free cash flow is not necessarily a sign of increased value, but rather a decrease in investments. The reason is that if a firm decreases its investments in operations, all else equal, the free cash flow for that particular period increases. One can easily argue that if a firm gives up investment opportunities so that they can pay dividends, or pay down debt, the cash flow from operations in future periods would decrease. If the firm has investment opportunities with positive net present value, this would of course decrease the value of the firm, not increase it. Hence one could on the other hand imagine that if a firm with lots of positive net present value opportunities would invest in the degree that their free cash flows become negative. If one is not careful, this could be interpreted as a loss of value, although one knows that firms that earn returns greater than their cost of capital is increasing in value.

Another disadvantage mentioned by Penman(2010) is that this method does not measure value added in the short run, as value is neither recognized once created. As implied, if the firm invests heavily, and has negative free cash flows as a result, the value added by investments is not recognized. This might result in a forecasting process that is more difficult than it should be and forces too much emphasis of the valuation on speculation, instead of fundamental values.

The last disadvantage mentioned is that continuing value have to high weights in the valuation(Penman,2010). He says this to emphasize that discounted cash flow does not anchor valuation on something that we already know. The short term forecasts of cash flows might be relatively certain, but other than that, there is no real certainty about the valuation. An example of a fundamental anchor is the book value of equity. It is unlikely that the firm is worth less than that, and gives a good start for the valuation. In addition to the lack of anchor, free cash flows might often be negative, forcing the positive part of the valuation(continuing value) to make up for huge amounts of the total value. Relying too much on speculative components like this is not preferable in valuation.

Benefits of the discounted cash flow model:

There are not all negatives about this method. The two main benefits mentioned by Penman(2010) are that it is easy familiar concept and the fact that cash flows are not affected by accounting rules. Most people vaguely familiar with finance and economics know how to calculate the present value of an investment, based on its cash flows. Also, people within a firm might be comfortable with the concept as well, as most project managers calculate cash flows from their projects and discount them to find out if they are worth the while. Free cash flows are basically just the sum of all the business's projects cash flows. Accounting rules does not affect the free cash flows, but accounting might still matter through the adjustment of accruals to get from operating cash flow from the most common financial rapports to the free cash flow input in the valuation model.

Implementation: Statement of Cash flows, reformulating, forecasting accruals:

When using the discounted cash flow method, we need the proper input, free cash flow to get a value. As Penman(2010) states the cash flow from operations from both GAAP and IFRS are not numbers that we can apply directly in the valuation. The reason is that there are potential financial items, in the cash from operations in these rapports.

Operating activities implies only activities that are connected to the business end of things, not financial. So when we talk about excess cash being invested in interest bearing securities for example, this is items that are supposed to be noted as financial items and its impact removed from cash from operations. In addition to this dividends and taxes might be reported in the wrong section. In addition to the reformulation problem, one also needs to forecast the accruals which are the reason why cash flows and earnings don't match up.

Penman(2010) argues that forecasting earnings and sales before free cash flows is better than to try to forecast cash flows directly. In addition to that, one has convert earnings, to cash flows by adjusting for accruals, and then deducts the anticipated investment in operations, to get the free cash flow. This thesis will not go into how to forecast accruals and investment in

operations to get the free cash flow forecasts, and then use DCF valuations. There are two main reasons for this, it is too time consuming, and particularly since the case in question has negative cash flows, which makes this forecasting even more unpredictable.

Summary discounted cash flow analysis:

A reasonable amount of time has been used to illustrate the discounted cash flow in this thesis. This was done due to its popularity and familiarity. The different variations of the model as far as growth is concerned are reasoning one can apply in other models as well. There are as mentioned several potential pitfalls using the discounted cash flow model. Although popular and widely used, it has proven to be potentially flawed, and difficult to apply in certain cases. We will see in the application part of the model, if the model's benefits outweigh its disadvantages, to the case in hand.

Valuation models: 2) Residual Earnings Model:

Introduction

The next valuation model to be discussed is the residual earnings model, presented by Penman(2010). The model will be outlined, variations of the model will be shown, benefits and disadvantages will be discussed, some with examples to illustrate these points, and some of the issues will be referred back to the discounted cash flow model discussed in the previous segment.

Penman(2010) talks about principles of fundamental analysis in his book Financial statement analysis and security valuation. One of those principles is that you should beware of paying too much for growth(Penman,2010). As mentioned, another important principle is that you should anchor a valuation on what you know rather than speculation(Penman,2010). The residual earnings model as presented by Penman(2010,pg 153) does exactly that:

$$V_0^E = B_0 + \frac{RE_1}{P_E} + \frac{RE_2}{P_E^2} + \frac{RE_3}{P_E^3} + \dots$$

Where B_0 is the book value of common equity, year 0, or the year where the valuation is made. RE is the residual earnings for each period, discounted by the cost of equity, P_E . This first version is for a going concern, with an infinite forecast horizon, which is very difficult to use, but serves as an example of the principle, that the value is the sum of the book value of common equity, and all discounted residual earnings. Residual earnings are defined as (Penman, 2010, pg 153):

$$RE_t = Earn_t + (P_E - 1)B_{t-1}$$

Where RE_t is the residual earnings at time t. $Earn_t$ is the forecasted earnings at time t, P_E is the cost of equity and B_{t-1} is the book value of common equity last year. One has residual earnings or excess profits as it's also called, only if the earnings in the period are larger than the required return multiplied with the book value of common equity last year. The point is that cost of equity multiplied with last year's book value of common equity is what the business is supposed to generate, given its risk, and that value is only created if the earnings exceed this required amount.

The principle of not paying too much for growth refers to the fact that growth is uncertain, hence you might end up paying for false promises, or estimations. In addition, growth itself has to be value adding, which is not always the case as will be shown now, in estimating the value of a savings account, using Penman's (2010 example on page 152, in his book of Financial Statement and security analysis;

The example used looks like this:

	Scenario 1(Earnings withdrawn each year (full payout)					
Required return	0,05					
Forecast year	2008	2009	2010	2011	2012	2013
Earnings		5	5	5	5	5
dividends		5	5	5	5	5
Book value	100	100	100	100	100	100
Residual Earnings		0	0	0	0	0
Free cash flows		5	5	5	5	105
Investment	-100					
Discount rate		1,05	1,1025	1,157625	1,21550625	1,27628156
Present value of CF	-100	4,76190476	4,535147392	4,31918799	4,11351237	82,2702475
NPV	0					

Take note that I have calculated the net present value of the “project” of investing in a savings account. This is done to more clearly illustrate the point of the residual earnings(done to illustrate it gives the same result as disc cash flow, given they both run out the same time, and there are no accruals). Here the earnings made up each year from the 5% interest are taken out as dividend each year, instead of reinvesting it in the savings account. As you can see the net present value of this is 0, which means the savings account is worth its book value, or the initial investment. In the next example the payout policy is of the other end of the spectrum, with zero payouts:

	Scenario 2, No withdrawals (zero payout)					
Forecast year	2008	2009	2010	2011	2012	2013
Required return	0,05					
Earnings		5,00	5,25	5,51	5,79	6,08
Dividends		0,00				
Book value	100,00	105,00	110,25	115,76	121,55	127,63
Residual Earnings		0,00	0,00	0,00	0,00	0,00
Free cash flows		0,00	0,00	0,00	0,00	127,63
Investment	-100					
Discount rate		1,05	1,1025	1,157625	1,21550625	1,27628156
Present value of CF	-100	0	0	0	0	100
NPV	0					

Here net present value of the project is again 0, with only one big payout at the end of the projects lifespan. Cash flows are zero until the last year, but still this payout “policy” gives the exact same value. Earnings are growing, as opposed to the example with no reinvesting, yet there are still no residual earnings or value creation. In both situations the residual earnings are zero, which makes the value of the savings account equal its book value, as we know from the residual earnings model where the value is book value plus present value of residual earnings.

There are five important things to take note of, as presented by Penman(2010), which is perhaps even more clearly shown with a discounted cash flow valuation as well as the residual earnings valuation. First is that the savings account is worth the same regardless of whether you extract money out of it or not, this shows that dividends is potentially a non value creating activity. Second, an asset is only worth a premium over its book value if it generates earnings over the required return. Thirdly, growth at the required rate of return, or below, does not add value, as shown in the second example. Fourth, an asset that doesn't pay dividends can still be valued from its book value and expected earnings which is an important principle when considering the vast majority of textbooks putting large emphasis on dividend discount models. Fifth and lastly, the value of the savings account does not rely on the free cash flows, and he points out that you cannot value scenario 2 from its cash flows. I would partly disagree, as I have shown in the additional discounted cash flow valuation. However, this is assuming the savings account is terminated in the last year; I record the accumulated savings as free cash flow the last year, and discount it back to year 0. The conclusion remains the same though, the net present value is still 0.

The three cases of valuation:

As noted, forecasting to an infinite time horizon, is both problematic, and extremely time consuming. If valuing a going concern, the most appropriate would be to do like shown in the discounted cash flow model, to calculate a continuing value at the end of the forecast horizon T. Penman(2010) shows three cases, where we have no residual earnings at the end, positive residual earnings but no growth, and a case with positive residual earnings growing at a constant rate. As he mentions these three cases will cover most of the valuation cases on run into in practice(Penman,2010,pg 161):

$$\text{Case 1 valuation: } V_0^E = B_0 + \frac{RE_1}{P_E} + \frac{RE_2}{P_E^2} + \frac{RE_3}{P_E^3}$$

Here there are no residual earnings after the forecast period, which in this example is 3 years. A situation where the firm would revert to zero residual earnings would be in a market where the competitiveness of the industry drove away earnings over the required return, or for example a firm you'd expect to lose its competitive advantage due to new entries, change of managers etc. There is no continuing premium over book value in this case, since expected residual earnings are zero at the forecast horizon, and hence no continuing value is calculated.

Case 2 valuation however is where we expect there to be residual earnings at the forecast horizon, but without growth (Penman, 2010, pg 163):

$$\text{Case 2 valuation: } V_0^E = B_0 + \frac{RE_1}{P_E} + \frac{RE_2}{P_E^2} + \dots + \frac{RE_T}{P_E^T} + \left(\frac{RE_{T+1}}{P_E - 1}\right) / P_E^T$$

The principle remains the same, forecast residual earnings up to the forecast horizon t , and discounts the residual earnings with the equity cost of capital. In addition, we have a continuing value of residual earnings, or a continuing premium as Penman (2010) calls it, which is discounted back to its present value as well. If one is assuming that the residual earnings are positive, still after the forecast horizon, but not growing, this model is appropriate to use. These two first examples are probably the most common once you'll need when valuing a firm. The reason being that most firms are not in a position where they can outfox their opponents for what analysts almost would call "infinity". However, there are firms that earn and grow residual earnings for the entire lifespan of the business. It is not unlikely that companies like Microsoft, Apple, Coca Cola Company, etc in their prime and perhaps even now, could justify such an assumption of growing continuing residual earnings. This brings us to the case 3 valuation (Penman, 2010, pg 163):

Case 3 valuation:

$$V_0^E = B_0 + \frac{RE_1}{P_E} + \frac{RE_2}{P_E^2} + \dots + \frac{RE_T}{P_E^T} + \left(\frac{RE_{T+1}}{P_E - g}\right) / P_E^T$$

Case 3 is similar to case two, however here we are assuming a constant growth rate at the forecast horizon at time T . If a firm has expected growth in residual earnings until the forecast horizon, one might have to assume a constant rate of growth after the forecast horizon. This assumption has to be treated with caution. If one is assuming growing residual earnings for the lifetime of a business, one is also assuming the company will maintain and strengthen its competitive advantage for "infinity". The interpretation is that constant RE means that the current excess profits and hence position in the market will be maintained whereas the growing excess profit as residual earnings also is called implies a strengthened position for the business for eternity. However, a firm might have growing residual earnings for the foreseeable future, and the analyst might be unable to determine when it stops, or eventually approaches zero. There might be cases where it is warranted, but as pointed out, it

the assumption of a continuing value with growing residual earnings has to be treated with caution.

Which case valuation to choose is as noted dependent on the market the firm is operating in, perhaps the firm's history of keeping the competitive advantage, government involved etc. The factors that influence residual earnings, and in essence, the ability to have earnings over the required amount, are several and if possible, should be taken into account when considering what case of valuation the firm is likely to be closest to. Basically the reasons for residual earnings can perhaps be best explained by microeconomic theory, where it claims that excess profits are only temporary, since new entrants in the market will occur. However that conclusion is based on perfectly efficient markets, which is a theoretically sound ideology, but not true in real life. The growth rate, and residual earnings forecast basically becomes a subjective assessment, but it should be anchored on sound economic theory and the interpretation of the current state of the market. Perhaps even Porter's five forces, which analyze a current business position and opportunities, could be used as an extra tool for analysts to discover a larger part of the picture, instead of just looking at numbers. Finance is not all about numbers; it is also subject to personal opinions and interpretations. The numbers are a good starting point, but perhaps other tools can be used as well. Knowing the business is a part of being an analyst, the Porter-five forces is merely an example of how to put the knowledge of the business into a system. Porter's five forces will not be used in this thesis, it is just an example of a tool that might help in the analysis.

The segment that follows will discuss the advantages, disadvantages and features of the residual earnings model as presented by Penman (2010).

Advantages of the residual earnings model:

Focus on value drivers:

He says that the residual earnings model; "focuses on the profitability of investment and growth in investment, which drive value, directs strategic thinking to these drivers" (Penman, 2010, pg 169). As mentioned and shown in the savings account example, a firm can only add value if it earns a rate of return over its required return. In addition, one can say that a firm can increase its value by increasing investments that earn a rate higher than the required return. The present value of the equity is defined as the book value of equity and the

sum of residual earnings, discounted to its present value. If we look at the formula for residual earnings again:

$$RE_t = Earn_t + (P_E - 1)B_{t-1}$$

Where $Earn_t$ is the earnings given from last year's book value of common equity B_{t-1} , and $(P_E - 1)B_{t-1}$ is the required amount. Earnings this year could be written as; $Earn_T = ROCE_T \times B_{t-1}$, since $ROCE_T$, the return on common equity, is defined as:

$$ROCE_T = \frac{Earn_T}{B_{t-1}}$$

Substituting $ROCE_T \times B_{t-1}$ for $Earn_t$ in the formula gives us:

$$RE_t = (ROCE_T \times B_{t-1}) + (P_E - 1)B_{t-1}$$

Or we could rewrite it as:

$$RE_t = (ROCE_T - (P_E - 1))B_{t-1}$$

Here it is clear to see, that value, or residual earnings, can be increased either be increasing return on common equity $ROCE_T$ or, by increasing book value: B_{t-1} , given that: $ROCE_T > (P_E - 1)$. This was done to show that the residual earnings model focuses on profitable investments, which earn return above the required amount, so that they can increase their value by either increasing that current rate of return, or increase investment if they have an investment opportunity that is expected to earn above the required return.

Incorporates the financial statements:

The second advantage mentioned by Penman(2010) is the fact that this method of valuation incorporates the use of financial statements. The first obvious advantage is that this allows us to account for the value that is already there in the book value, as opposed to discounted cash flow valuation where we don't have this feature. This goes back to the tenet; "anchor a valuation on what you know rather than speculation"(Penman,2010,pg 19). In addition, this allows us to forecast income statements and balance sheets, rather than cash flows. This can be an advantage if the cash flows from the investments are hard to predict.

Uses accrual accounting

Accrual accounting uses the matching principle, which basically means that earnings are reported when they are earned, regardless of when the cash flow effect occurs. For instance, if a firm sells on credit the revenues are reported immediately, even though the payment is yet to be made. Same principle goes for accruals. Different rules applies, but whichever depreciation plan used, an investment in an asset that is supposed to generate value is not deducted the current years financial income statement by its full amount. Rather a somewhat appropriate amount is deducted as an operating expense, to illustrate the amount needed to generate this year's revenue. This hardly works perfect in real life, but at least it's more accurate than a cash flow perspective which treats the investment to its full amount the moment the investment is made. So in essence, as mentioned previously, discounted cash flow method treats the investment as a loss of value, at least that is how it appears, because the cash flow generated from an investment comes later, earnings on the other hand is likely to arrive much sooner, and likely to be easier to anticipate.

Shorter forecast horizon

The fact that value generated is recognized sooner with accounting principles as opposed to cash flows, can make the forecast horizon shorter. For a firm with ongoing investments and negative cash flows, the value from these investments can be hard to recognize, as opposed to the residual earnings. A firm that has lots of investments opportunities and invest in them could have negative free cash flows but positive earnings. The analyst's predicament then, if using discounted cash flow method, is to predict when, and by how much the cash flows will turn positive. Free cash flow is as mentioned the cash available to both equity and debt holders/issuers. Operating income after tax, before interest is the income also available to the same groups. However, accounting principles is as mentioned not the same as cash in and out of the business, due to the accruals. In principle operating income and free cash flows should in the long run accumulate to be the same amount, but since accounting principles tries to account for the value added when it occurs, instead of the

cash flow, the cash flow's might be delayed, and hence harder to predict. This makes valuation models with earnings in focus potentially easier as far as forecast horizon concerns.

Protection against accounting created earnings:

Another benefit of the residual earnings model, as opposed to regular forecasting and discounted earnings, is that it protects the investor from earnings created by accounting. An example by this, as given by Penman(2010), is if for instance management writes down inventory by a certain amount, in accordance to lower of cost or market rule. If then these goods are sold in the year to follow, consequently, the cost of the goods sold will be lower as well, appearing to have created earnings. However, this will be discovered with the residual earnings model, since the book value cannot stay the same if the inventory is written down. For instance, if you have a firm that has 15 million in earnings, 100 million in book value, and expected growth of 5% of residual earnings, the residual earnings table could look something like this

Example 1 (normal)	0,00	1,00	2,00	3,00	4,00	5,00
Earnings	15,00	16,80	18,82	21,07	23,60	26,44
Book value	100,00	116,80	135,62	156,69	180,29	206,73
RE(10% charge)		6,80	7,14	7,51	7,93	8,41
Re growth rate			0,05	0,05	0,06	0,06

Where all earnings are reinvested, no dividends. The earnings are growing with 12% in this example, which is 2% above the required rate of 10%. The residual earnings growth is increasing but we are assuming a rate of 5% of constant growth is appropriate. Then we can value the firms equity

$$V_0^E = 100 + \frac{6,8}{1,1-1,05} = 236 \text{ million}$$

If we then assumes the write down occurs, at 10 million, the table would look like this:

Example 2(accounting earnings)	0,00	1,00	2,00	3,00	4,00	5,00
Earnings	15,00	26,80	18,82	21,07	23,60	26,44
Book value	90,00	116,80	135,62	156,69	180,29	206,73
RE(10% charge)		17,80	7,14	7,51	7,93	8,41
Re growth rate			-0,60	0,05	0,06	0,06

Here the residual earnings are higher the first year, so it might appear as if there was value created. If one didn't take into account that these temporary earnings does not create

growth one could easily have overvalued the company due to the write down of inventory, and the following lower cost of goods sold. But the inventory has already been paid for and there is no more cash to reinvest at the rate of 12%, so the new valuation would look like this:

$$V_0^E = 90 + \frac{17,80}{1,1} + \left(\frac{7,14}{1,1-1,05} \right) / 1,1 = 236 \text{ million}$$

So no value has been created, as you can see. The increased residual earnings in year 1 is offset by the decreased book value, and as long as we discount the continuing value in year 2, we are in the clear.

Protection from paying too much for earnings generated by investment:

In addition to protecting against earnings growth the residual earnings model perhaps main point is that it protects investors against paying too much for growth generated by investment. We know that ; “Firms can grow earnings simply by investing more”(Penman,2010,pg 170). And he further states:”If those investments fail to earn a return above the required return, they will grow earnings but they will not grow value”(Penman,2010,pg 170). An example of this can be that if you borrow at 7% interest to invest, you only have to earn more than this to increase the earnings. However, if the required return on the investment is above the expected return, your investment is losing value. Once investors realize the return is not matching the risk of the investment, they will sell their shares, dropping the price of the stock, and decreasing the value of the firm. A simple example to demonstrate this would be a firm that currently has book value of 100 million of equity, 10 million in current earnings expected to perpetuate forever, with a current cost of equity of 10%. Assume that book value of equity is equal to the market value of equity with:

$$V_0^E = \frac{10}{0,1} = 100 \text{ million}$$

Let’s say this firm invests in a new project, with the cost of 50 million, which is expected by the managers to generate 2 million in earnings, as a constant perpetuity. The return on common equity is then 4% (2/50). The new value of the equity then is:

$$V_0^E = \frac{12}{0,1} = 120 \text{ million}$$

At the first look of it, it appears that the investment has created value, since the capitalized earnings are higher. However, the investment cost 50 million and only generated 20 million, so the firm is in essence worth 30 million less. The residual earnings model will prevent these potential misleading valuations of occurring as this next example will demonstrate:

$$RE_t = (0,1 - (1,1 - 1))100 = 0$$

Residual earnings in the first scenario are 0, since the firm is only generating its required return. With the new investment it becomes:

$$RE_t = (0,08 - (1,1 - 1))150 = -3 \text{ million}$$

Using the residual earnings model case 2 with no growth in residual earnings.

$$V_0^E = 150 + \frac{-3}{0,1} = 120 \text{ million}$$

By separating the book value and the residual earnings the model shows that value of the equity is lower than its book value, due to unprofitable investments, hence the investment should never been made in the first place.

Converting analysts forecast to valuation:

Another benefit with the residual earnings model is that you don't have to convert analyst's forecasts of earnings to cash flows, to question whether you agree or not with the valuation. As mentioned by Penman(2010), forecasting cash flows without forecasting earnings and revenues are a difficult procedure. Forecasting the accruals can be a difficult procedure, and with this method one does not have to go through that trouble, and instead use the analyst's forecasts of earnings more directly.

Capturing value not on the balance sheet—for all accounting methods:

Another benefit of the residual earnings calculation is that it captures the value added from assets that are not recorded by their full amount, or even noted as an expense, not an asset. An example of this is the research and development expenses, or expenses on advertising that links to the power of the brand name of a product. These are assets that generate value, although not recorded as such in the balance sheet by the rules of GAAP. However, as noted by Penman(2010); “higher residual earnings compensate for the lower book values, to produce a valuation that corrects the low book value”(Penman,2010,pg 172). This can be best shown with a hypothetical example where we first treat an investment in an advertising campaign as an asset, and then just as an expense.

Let’s say we a firm with 90 million in book value, 10% cost of equity, 15 million expected earnings year 1, and this firm invested in a advertising campaign to strengthen their brand name and increase sales and earnings in the future. We also assume this investment was of the magnitude of 10 million dollars, with expected return of 15%. Without considering it as an asset the residual earnings would be:

$$RE_t = 15 - (1,1 - 1)90 = 6 \text{ million.}$$

The value of the equity:

$$V_0^E = 90 + \frac{6}{0,1} = 150 \text{ million.}$$

If we then assume the brand investment was recorded as an asset, the book value would increase to 100 million and the residual earnings would be:

$$RE_t = 15 - (1,1 - 1)100 = 5 \text{ million.}$$

The value of the equity would now be:

$$V_0^E = 100 + \frac{5}{0,1} = 150 \text{ million.}$$

So as you can see whether or not this investment is recorded as an asset or not, is irrelevant as far as residual earnings valuation is concerned. The increased book value again offsets the decreased residual earnings, so in this case the accounting principle is irrelevant.

This example is similar to the example above with the accounting created earnings, but in this case the assumption is no growth in residual earnings.

Residual earnings model disadvantages:

The two disadvantages is that the model ; 1) Requires an understanding of accrual accounting and 2) That it relies on accounting numbers which can be suspect(Penman,2010). Especially with private firms this is the case, where one can have managers not separating dividends and their own salaries, making it hard to estimate a proximate for the earnings, in order to value the firm/equity. These two disadvantages will not be discussed in this segment, but brought up during the valuation to give greater emphasis to what to look for in the specific case of private firm valuation

Summary:

The residual earnings model indeed looks like progress in relation to the discounted cash flow model which has been there for several years. As mentioned there are several benefits, with the most apparent one's being that you don't need positive free cash flows to value a firm or its equity, and that you can separate the what you know(book value) from the more speculative component of growth(continuing value). In addition to that, the model protects the analyst from paying too much for earnings growth, be it growth generated by accounting, or by unprofitable investments. Last but not least, it may serve as an easier method of comparisment, given that analysts forecast earnings and not cash flows, if one understands how the accrual accounting works.

Valuation models: 3)Method of comparables

Introduction:

As mentioned previously, there are several methods to value a firm, and the method of comparables will be discussed in this section. As with any model, the benefits/disadvantages have to be considered, before implementing the model. In this segment we will look into some

of the variations of the multiples, conceptual issues and reverse engineering, the three steps of implementation by Penman(2010) along with some implementation problems.

The method of comparables is perhaps the simplest of methods to use, as it does not require any specific accounting knowledge, or spending lots of time and effort on forecasting. Comparables is simply a ratio, for which a stock/asset currently trades at. Price to earnings, price to book and price to sales are common ratios or multiples if you'd like, to estimate a company's value. Multiple analysis uses minimum amounts of information, so of course, one cannot rely its result completely, but as various authors say, it serves as a benchmark.

Different variations of the model:

In addition to variations regarding the whether the denominator is earnings, book value or sales, there are also variations within these. Damodaran(2002) mentions that the earnings can be from the recent financial year(that yields the current PE ratio), expected earnings per share for the next financial year(yielding the forward PE) or the last four quarters earnings, which gives what he calls the trailing PE. If the current price is used in the numerator, one can argue that the expectations for the next year earnings are included in this price. So if the earnings are expected to increase(so the denominator is larger), the P/E ratio will decrease, since the current price then is divided by a larger number than if one uses current price divided by last year's earnings. In a matter of consistency, the most appropriate seems to be to use the expected earnings, since the price in the numerator includes the market's expectations for the firm growth in earnings. By the same rationale, one would assume that the trailing P/E ratio also is more accurate, and then the one with the earnings used is those from the last financial year. As we will see however, later in this thesis, the quarterly numbers, expectations of earnings or even the last financial years statement might not be available, which can be the case with private firms.

Potential conceptual and implementation issues:

Conceptual: Lack of fundamental anchoring

As mentioned previously, the use of comparables is by far easier than most other valuation methods. However, this advantage comes with a cost. There are both conceptual and implementation issues that needs to be discussed. First off are the conceptual issues, which

will be highlighted, and solutions to these issues will be proposed. The first conceptual issue to be discussed, as mentioned by Penman (2010), is the fact that the method is not anchored on anything fundamental, and that if not careful, it can be circular. When one uses other companies' prices and earnings ratios, to find the value of another company, one is basically assuming that the average (if one uses such metrics) reflects the true value of the firm in question. That implicitly means that one is assuming the value creating factors like growth, cost of capital and cash flow/earnings potential are similar. So if this is not the case, even if the market is efficient, the value might not be correct due to differences in the hidden fundamentals, which can somewhat be revealed with reverse engineering, as shown later in this segment.

As Penman(2010) says, one of the tenets of fundamental valuation is that you should not use price to challenge value, and that is basically what happens with the use of comparables. When valuing public stocks and assuming that price equals value for the comparable firms, one could just assume the market price for the company in question was efficient in the first place. However, for companies that are rarely traded, such as private companies, it can, as discussed later, be more legitimate to use the method of comparables. One can then relax the assumption of prices being efficient and at least get a benchmark for what the private firm in question should trade at, if not what it's actually worth. This view is supported by the fact the investment bankers floating initial public offerings use the methods of comparables to get an estimate of the markets valuation of the issue (Penman,2010). This is also noted by Damodaran(2002), who uses the phrase; "mood of the market" to describe what the relative valuation captures. Still, one cannot ignore the fact that the mood of the market might be far of the theoretical intrinsic or fundamental value. Intrinsic value is known as the value a stock should trade at, given a certain valuation model, which is based on fundamentals.

Penman(2010) for instance mentions the use of price multiples for valuation during the initial public offering boom for teleservicing firms, as a main reason for the prices to fall dramatically after that period. Basically, if all market participants are overvaluing the companies at which you use as comparables, your estimation will be too high as well. However, if one studies the multiples, especially the price/earnings multiple, one can as noted use what Penman(2010) refers to as reverse engineering to find out what the market expects from growth rate in earnings and the cost of equity. There are some circumstances where the use of reverse engineering should be applied; when you're uncertain whether risk, growth

potential or earnings/cash flows are the same, or if you believe the market is over/undervaluing the sector/market as a whole. Below follows an example on how to do this with the P/E ratio.

Let's say we have found an almost perfectly comparable firm, to the one in question, but we are reluctant about using the P/E multiple directly to the valuation of our firm. Firm A is the comparable firm, with 2 million in expected earnings next year, cost of equity of 10%, and a market price of 40 million. This gives a forward P/E ratio of 20 (40 million market value of equity/2 million earnings). As noted, Firm A, and the company in question, Firm B, are similar, and Firm B is expected to generate 2 million of earnings as well next year. Both firms are of similar risk and 10% cost of equity is assumed for B as well. However, we are a little concerned about the growth rate of earnings, and have to use reverse engineering to find out what the market projects for the comparable firm, to find out if we agree, and then use the multiple to value Firm B. To illustrate this the simplest way, capitalized earnings is used:

$$P_E^0 = \frac{E_1}{R_E - g}$$

Where P_E^0 is the price of equity, year zero, E_1 is expected earnings next year, R_E is the cost of equity and g is the expected growth. Given the numbers we have for Firm A:

$$40 = \frac{2}{0,1 - g}$$

We solve this for g and get that g equals 5%. If one for instance assumes this estimate is too high for the firm in question, or too low, one will receive a different valuation, and a different P/E multiple. For instance, if firm A's expected growth, by our estimations is 2,5%, approximately the expected inflation in Norway, we would get this price:

$$P_E^0 = \frac{2}{0,1 - 0,025} = 26,67$$

Which give a P/E ratio of approximately 13,33. Take note that the valuation method used to illustrate how one can infer the P/E ratio is simple, and lacking. One could easily argue for instance that a firm does not normally grow constantly, like this model assumes, but

it was only used to illustrate how one can double check what the P/E multiple implicitly is claiming. The P/E ratio and other multiples could be a result of different combinations of earnings, growth and cost of capital, but through different inverse engineering one at least gets a feel for the assumptions made by the market, and whether or not you trust them to apply to the company whose value is in question.

The valuation can as mentioned become circular if one does not pay attention. If you use the comparables of three firms to value the firm in question, you will ultimately get a value for this firm. The danger of circularity is if you use that value again, when valuing some of the firms you used as comparables. That is the problem with circularity, since the firm you used as a comparable basically is an input in its own valuation. This is not a problem in the private firm valuation since we don't have a market price to begin with.

Three steps by Penman:

Penman (2010) talks about three steps on how to use the *method of comparables*. “1) Identifying comparable firms that have operations similar to those of the target firm whose value is in question, 2) Identify measures for comparable firms in their financial statements- earnings, book value, sales, cash flow- and calculate multiples of these measures at which the firms trade and 3) Apply and average or median of these multiples to the corresponding measures for the target firm to get that firm's value”(Penman,2010,pg 76). Although limited, there are ways to make the use of multiples more reliable than just using them blindly. First of let's look at how to find and define firms of similar operations.

Implementation: Defining and finding comparable firms

So the question is; what is a comparable firm? Damodaran(2002) defines it as one with cash flows, growth potential and risk similar to the firm being valued. In his definition there is nothing that forces the analyst to use only firms within the same sector or industry. This makes sense because the value of any given firm, is assumed to be dependent on cash flows (or earnings), growth and its risk. However the common implicit assumptions are that firms in the same industry share these characteristics, and hence the common practice is to use the firms from the same industry as comparables.

This of course is not necessarily true since businesses within the same industry might not even compete for the same customers, due to differences in products, and hence might not be equally affected by the changes in the market (systematic risk). An example could be an IT firm that produces only high end business equipment versus a firm that produces low cost equipment for the private market. It is likely that the high end company will struggle more during a recession than the low cost company, and hence they would not have the same beta, or risk attached to the investment. In addition growth opportunities would likely also be different, so comparing their multiples would probably make the low end company seem reasonably priced, although that might be because of lower risk and lower growth and cash flow potential.

There is basically no such thing as a two equal firms, and the comparables can only be as precise as the quality of input (the degree to which the firm's are alike). This could be, according to Penman (2010) be negated by increasing the number of comps to average out the errors. In theory it will work but it is likely that the firms become less and less comparable, so the error will not be averaged out.

Implementation: Different multiples, different valuations

The second problem with implementation is that different multiples give different valuations. With other valuation techniques, such as dividend discount model and discounted cash flow model, theory tells us that in principle, the price/value output of each model should be the same, given that one makes assumptions that are consistent across the board (Penman, 2010). Given that the different comparables, like Price/earnings, Price/Book and Price/Sales give different answers, the problem becomes how to estimate the average of these, which one to choose. Arithmetic average, weighted average based on subjective assessment or other logical reasoning might be applied to find the "correct" output. Whatever the method used, it has to be logically chosen, so perhaps the more random arithmetic average is not suitable in most cases, unless the companies are equally similar to the firm's whose value is in question.

Implementation: Negative denominators in the P/E ratio

The third implementation problem is that negative denominators can occur. This applies mostly to the price/earnings ratio. If there is a loss (negative earnings), the value itself would become negative, which makes little to no sense. This, as Damodaran(2002) says lead to bias in the selection process of the firms used to compute the multiples. The firms with negative earnings are dropped out of the sample, and therefore, the firms left are likely to produce higher values of the price/earnings ratio than what is the “true” value for the sector of the firms chosen as comparable. This will, if not accounted for, likely produce a price that is too high for the firm whose value is in question. One solution to this, as presented by Damodaran(2002) is to aggregate all the net income’s and market value’s of equity, including those who had negative earnings, and compute an industry aggregate P/E ratio. Another multiple that might be better suited for sectors with firms having negative earnings is the price to revenue multiple. Having negative revenues is impossible, so the price/revenue multiple would ensure that at least there will be no upwardly biased estimate due to the negative earnings firms being dropped out of the sample. Earnings can, as mentioned, be affected by accounting rules and principles, and if comparing firms from different sectors, or perhaps even comparing public stocks with private stocks, the comparables might be flawed by this due to the differences in accounting rules and practices between public and private firms. In addition, to be discussed later, owners of private firms might intermix personal and business expenses, or charge higher/lower salaries, which will affect the earnings measure to be incorrect.

Implementation: Consistency issue in the numerator/denominator

The fourth potential implementation problem is the lack of consistency in the numerator and denominator in the multiples being used. Earnings per share, net income and book value of equity are examples of equity measures which should not be mixed with firm measures according to Damodaran(2002). Firm measures like operating income, EBITDA(Earnings before interest depreciation and amortization), mixed with the equity measures can potentially cause firms with different amounts of debt to seem cheaper/more expensive than they really are. An example of this could be shown through the price to earnings before interest depreciation and amortization multiple. Consider two completely equal firms, and the only difference being their difference in debt financing. Firm A and B both have 1 million dollars in EBITDA, however one has a debt/equity ratio of 1, meaning its

operations are just as much financed by debt as equity. Given the fact that debt usually has a lower interest, and cost of capital, then equity, one could assume that financing with debt instead of equity would increase the earnings yield for equity, and hence generate a higher value, all else equal. However the well known theorem of Miller and Modigliani states that financing should not affect firm value, because the increased debt financing is exactly offset by increased risk for equity holders, and hence a higher cost of equity, causing the value to remain constant. Given that the theorem is correct, or/and that increased demand for debt forces the cost of interest to increase (as with any good that has limited supply when demand increases) the firm with more debt should not be valued differently, or misjudged to be cheap due to its debt financing.

Summary Method of comparables:

The method of comparables is as discussed a potential trap, in lack of a better word. If not used without caution, one might end up with a very wrong valuation. The previous section might have indicated that the method is almost all bad, but that is not the case. Different ratio's give different results, negative earnings cause the ratio to make no sense and the lack of fundamental anchoring are some of the issues that have been discussed. While this remains true, there is always a cost/benefit dilemma from the analyst's point of view when choosing a valuation method. It serves a benchmark, to the very least, if one assures that the firms are comparable and that one uses the multiples correctly. In addition, when it comes to the valuation of private firms, it might be a valid method, considering the options. There are issues with illiquidity, the fact that it almost never trades, the value of control, difficult estimating a cost of capital and estimating the growth prospects, to mention a few potential issues, to be discussed later. The cost of taking all these into account might be so high that a relative valuation might serve its purpose greater than in the valuation of public firms.

Valuation Inputs: The Cost of capital

In this segment the different inputs of the cost of capital and the cost of equity will be discussed. First out is the tool itself, the capital asset pricing model.

The Capital asset pricing model and the cost of capital:

Regardless of which valuation method one chooses to value a firm, with the exception of comparables, each method requires the computation or estimation of the cost of capital, or the required return. This could be the cost of equity if one chooses to value that, or the cost of operations (or firm) if one looks at the business as a whole. “The required return is the amount that an investors requires to compensate her for the time value of money tied up in the investment and for taking on risk in the investment”(Penman,2010,pg 110). A well known model in estimating the cost of capital for equity is the capital asset pricing model as presented by William Sharpe in 1964, for which he later won the Nobel Prize in economics in 1990. The empirical evidence, the different ways to use it and the complexity of the model could be a master’s thesis on it’s own. This assignment will not go in depth, but rather scratch the surface and get a general idea of what the model consists of, how to use it normally and in addition, a discussion on how to use it on private firms.

The model looks like this:

$$E(R_i) = R_f + \beta_i [E(R_m) - R_f]$$

Where $E(R_i)$ is the expected return on the asset I, R_f is the risk-free rate of return, β_i is the beta of the asset i, $E(R_m)$ is the expect return on the market portfolio and the parenthesis $[E(R_m) - R_f]$ is referred to as the risk premium for investing in the market.

The expected return, can as Penman(2010) states, be seen upon as the amount of return the investor demands to compensate for the time value of money and for talking the risk of the investment. The risk of the investment, is dependent on the risk premium for the market as a whole $[E(R_m) - R_f]$ and the riskiness of the investment i, β_i . The beta is a measure of systematic risk, which indicates to what degree the security moves with the market. As Penman(2010) says that CAPM assumes one can diversify away a considerable amount of risk away, and that the only risk left, that one is rewarded for taking on, is the systematic risk. Systematic risk is sometimes referred to as market risk, and in essence are risk factors that influences the market as a whole, and cannot be diversified away(Penman,2010). Factors like recession, interest rate changes, war etc has been named as potential systematic risk factors but CAPM is silent to what these systematic risk factors actually are(Penman,2010). If an investment has a beta of 1, it means that the investment is expected to move 1% in return, as

the market moves 1%. If it were 2, the investment moves in the same direction as the market, but with twice the magnitude. The beta formula looks like this(Penman,2010,pg 112):

$$Beta(i) = \frac{Covariance(return\ on\ i, return\ on\ market)}{Variance(return\ on\ market)}$$

Were beta of investment (i) is defined as the covariance between return on the investment I, and the market, divided by the variance in the return of the market. So in essence the beta of a security is a standardized measure on the variance on the return of the market. The beta is normally found by using a regression approach where one regress the changes in stock returns on the market returns.

The risk premium $[E(R_m) - R_f]$, can be found in a different way. The market index, the proxy for the market, is assumed to have a beta of 1. So one can find the risk premium by looking on the returns on the market index through a number of years. But Penman(2010) claims that research papers and texts have found this to be around 3 to 9,2 percent, so its perhaps not as reliable as one might think. The risk free interest on the other hand is easy to find, as it usually is found by looking at the yields of government bonds, which are assumed to be as close to risk free as possible.

The notion Penman(2010) provides, that the CAPM is not accurate, is also taken on in this thesis. Instead of reviewing large amounts of empirical evidence regarding the accuracy of the model, let's look into the assumptions of the model, explaining why we can't trust its results.

Assumptions of the capital asset pricing model:

Since the capital asset pricing model is implying that the expected return of an investment is only dependent on the risk free rate of return, the systematic risk of the specific investment (beta) and the risk premium for investing in the market portfolio, there has to be some underlying assumptions supporting this. The assumptions mentioned by Damodaran(2002) are; there are no transaction cost, all assets are traded, investments are infinitely divisible, all market participants have the same information, there exists a true riskless asset and that investors can lend and borrow at the riskless rate to achieve optimal allocations of their wealth according to their risk adversity.

Assumption: No transaction cost

The assumptions of no transaction cost, all have same information, all assets are traded, and that the investments are infinitely divisible relates to the fact that one can diversify away all firm-specific risk away without cost and that there is no expected excess returns over what the model dictates. For instance, if all investors have the same information and there is no cost in constructing a fully diversified portfolio, each investor can enjoy the full benefits of diversifying. In addition, the full information part means that no investor will be able to find assets that earn excess profits, above what the model stipulates. You gain return in relation to what systematic risk you are willing to undertake.

However, how realistic are these assumptions? First, the no transaction cost assumption does not hold, as we'll see later on in the discussion of the bid-ask spread, which relates to transaction cost. Even in the most liquid stock markets, there is some transaction cost, even though technology has decreased it through time. If one looks in the real estate market instead, there are huge transaction costs which include broker commissions, and the time one spends selling the asset. With private firms, this assumption is especially weak. Like to be discussed, there is a significant liquidity discount that relates back to the transaction costs.

Assumption: All have same information

The assumption that all have same information an assumption that probably doesn't hold either. Public firms are obliged to give out information often, but there are probably still players in the market that has inside information and trades on it, although illegal. If one looks in other markets, like the real estate market, the assumption is probably weaker. A simple but dull example of this is to assume investors who live in an area probably has more knowledge of the potential growth than outside real estate investors. This assumption is especially weak when it comes to valuing private firms. A private firm, unlike public, does not have to disclose much information at all. This leaves a selected few individuals with more information than others.

Using real estate again, as an example, it is of course not possible to infinitely divide a share of real estate. This doesn't hold perfectly for stocks either, even though one usually can acquire pretty small amounts. If one takes the eyes of a private firm investors, who considers

acquiring a company, than the divisible argument collapses. One buys the entire business (Or at least a number of shares), so the one is not able to purchase as small an amount as one perhaps could in a public stock company through mutual funds etc.

Assumption: All assets are traded

The last assumption, all assets are traded, are also a bold one. One could perhaps argue that all assets to trade, at least in the very long run. Nevertheless, the fact that private firms, art, and real estate rarely trades, compared what the model suggests, has implications. When an asset rarely trades, how can one know that the current market price ensures that one only receives earnings according to systematic risk and the market premium? In addition, if the market proxy used to regress, one would expect there be a variation of returns unexplained due to the fact that the market proxy(usually the big stock exchanges) not to be the real market index, which is supposed to cover all assets.

To sum up, the assumptions are weak, at best, especially when considering private firm valuation. The CAPM has been discussed to not be accurate enough when it comes to public stocks, so it is therefore reason to believe it will be even worse when applied to private firms. As Penman(2010) says, there has been lots of efforts trying to build an asset pricing model that is accurate, but it has failed providing us evidence to what the cost of capital really is.

Diversification:

To illustrate how diversification works best, with regards to independent risk, or unsystematic risk, is perhaps by using the insurance example provided by Berk and DeMarzo(2007). Consider you have an insurance company, which covers insurance for theft and earthquakes. Again assume both events have equal probability of occurring(1%), and if they occur, the claims for each individual household will be by the same amount. Let's say there are 100 000 households, which all buy one insurance policy for both theft and earthquake. Assume in addition that the distribution of thefts is to fall within 857 to 1125 claims per year, leaving the insurance company forced to hold reserves worth of 11 25 claims. The expected claims for each incident is equal, due to the probability of both occurring being 1% and the number of households being 100 000 (1000 claims expected). However, it is not unreasonable to assume that theft's in one household is unrelated to (independent) to the

likelihood of theft in another home. On the other hand, an earthquake is likely to affect far more homes if it occurs. For simplicity's sake, let's assume the earthquake affects all households if it occurs.

These two incidents have what Berk and DeMarzo(2007) refers to as different sources of risk. An earthquake is a common risk, or systematic risk as called in elsewhere, as it affects all households. Theft on the other hand is independent risk, or unsystematic risk, since its likelihood of occurring is unrelated across households. Although not likely, the insurance company has to be prepared for the worst case scenario, when it comes to the risk of an earthquake, and has to have reserves covering all 100 000 claims, which it did not when it came to the thefts.

To relate this back to stocks and other portfolios of securities, think of the 100 000 thefts and earthquake insurances as a portfolio of insurances. One portfolio (theft) has 100 000 households where the risk of theft is completely independent, the portfolio regarding earthquake insurances however is a portfolio where each insurance shares the same risk exposure (systematic risk). In order to illustrate the difference in risk, I will calculate the standard deviation of the events occurring for both cases:

$$\begin{aligned}
 STD(CLAIM) &= \sqrt{Var(Claim)} \\
 &= \sqrt{0,99(0 - 0,01)^2 + 0,01(1 - 0,01)^2} = 0,09949 = 9,95\%
 \end{aligned}$$

Where variance is calculated by the difference between the expected outcome of claims (0,01), and the claims in each outcome (0 and 1), squared, multiplied by their probability of occurring. For both cases, the standard deviation of an individual claim will as Berk and DeMarzo(2008) says be equal, however, the portfolio's standard deviation, or risk for the insurance company will be different. They say:"When risks are independent and identical, the standard deviation of the average is known as the standard error, which declines with the square root of number of observations"(Berk and DeMarzo,2008,pg 301). Hence we get:

$$SD(Percentage Theft Claims) = \frac{SD(Individual Claims)}{\sqrt{Number\ of\ observations}}$$

$$= \frac{9,95\%}{\sqrt{100000}} = 0,03\%$$

This example is a good way of showing what happens when the risks are completely independent, versus where they are not. In stocks or securities, usually there is no such thing as a security with only systematic or only unsystematic risk, like this example demonstrates. Under the assumptions of the example they are assuming thefts are completely independent whereas earthquake occurrence in a city is completely common, meaning they all will be affected by the same proportions. These are simplified assumptions to demonstrate the power of diversification. This example shows us the power of diversification which translates to normal valuation of stocks and securities, when you can buy funds or construct own portfolios, of companies with very different sources of independent risk. The only risk factor supposedly left, is the systematic one, the one that affects all companies. However in private firm valuation we don't always have this luxury as we will discuss in the next segment.

Adjusting for nondiversification:

Normally when applying beta technology, one is assuming the marginal investor is fully diversified. This however, might not be the case for a private firm investor. It is not unlikely that the investor has either his entire wealth, or a large degree of it invested in the private company. Damodaran(2002) argues that this might mean that the betas measured will understate the market risk exposure of such firms.

This can according to him be accounted for by estimating the total beta based on the market beta and correlation coefficient between the market index and the company(Damodaran,2002,pg 668):

$$\text{Market beta} = p_{jm} \times \sigma_j / \sigma_m$$

Where p_{jm} is the correlation between the stock and the index, σ_j is the standard deviation of the stock and σ_m is the standard deviation of the market index(Damodaran,2002,pg 668):

$$\text{Market beta}/\rho_{jm} = \sigma_j/\sigma_m$$

When you scale it like this, you get a relative standard deviation measure, since one is dividing the total(the stocks) deviation on the markets. Damodaran(2002,pg 668) refers to this as the total beta:

$$\text{Total beta} = \text{Market beta}/\rho_{jm}$$

The market beta is then first found by comparing public firms in the same industries beta, and the estimate a correlation coefficient looking at the same sample. Damodaran(2002) argued that the market risk might be underexposed, but according to the formula, it seems more like some of the firm-specific risk inherent in the σ_j is included. Regardless of whether this approach is correct, there will be discussion later on if the inability to diversify should have expected returns to it. The method will not be used, due to the tedious nature of estimating a correlation coefficient based for the public firm or firms whom we choose as comparable.

Beta estimation: Private firms

If one chooses to trust the capital asset model, as a reliable tool for finding the cost of equity, one has to estimate the beta of the investment. As Damodaran says:” The standard process of estimating the beta in the capital asset pricing model involves running a regression of stock returns against market returns”(Damodaran,2002,pg 664). This however, is somewhat difficult to do when dealing with private firms as the lack past information in both quality and quantity, as an outside analyst. There are three other ways of estimating beta’s for private firms, presented by Damodaran(2002). These are accounting beta’s, fundamental beta’s and bottom up beta’s.

Accounting betas:

Instead of regressing past returns for a security against the market index, one could use the accounting earnings as a substitute. The regression equation could then look like this(Damodaran,2002,pg 664):

$$\Delta Earnings_{Private\ firm} = a + b\Delta Earnings_{S\&P500}$$

Where the slope of the regression would measure the sensitivity of changes in earnings with respect to systematic risk beta(b). As noted by Damodaran(2002) there are two severe limitations to this approach. The first limitation is that private firms usually don't measure earnings on a quarterly basis, at least it's not published as often as public firms, and the second is that earnings can be smoothed out to accounting judgments. In addition to not being measured on a quarterly basis, there are perhaps not many private firms with sufficient number of accounting years. The lack of quarterly measures and the number of accounting years affect the quantity of input and statistical power of the model whereas the second affects the reliability of the inputs (precision). Earnings could be a good measure if the rules of accounting were equal for private as well as public firms. Another problem with the measure is that it's not a standardized measure. Should one use EBIDTA (Earnings before interest, depreciation, taxes and amortization) or Operating income or net income? It's important to be aware of this, especially if one finds to challenge a private firm's estimated beta with beta estimates provided by analysts who might have used a different method. Operating income or EBITDA would yield an unlevered beta, whereas net income would yield a levered beta, or equity beta.

A possible solution if there is not enough accounting data or important accounting differences between the public and private firms, one could perhaps use fundamental betas instead.

Fundamental Betas:

Fundamental beta's is a method of trying to relate the beta to observable variables like earnings growth, debt ratios, variance in earnings, asset growth, etc. This was done by Beaver, Kettler and Scholes(1970), when they examined this relationship and used seven variables- dividend payout, asset growth, leverage, liquidity, asset size, earnings variability and accounting beta. Damodaran(2002) mentions that Rosenberg and Guy(1976) also did a similar

analysis. Damodaran(2002) himself ran a regression in 1996 relating the betas of NYSE and AMEX stocks, with four variables; coefficient of variation in operating income, book debt/equity historical growth in earnings and the book value of total assets. The significance of each variable was not available in the book, but the regressions explanatory power was 18%, and the outputs where(Damodaran,2002,pg 665):

$$Beta = 0,65027 + 0,25CV_{OI} + \frac{0,09D}{E} + 0,54g - 0,000009TA$$

Where CV_{OI} was the coefficient of variation in operating income, D/E the debt to book ratio, g the growth in earnings and TA the book value of total assets. Needless to say, the R-squared of 18% suggests not a strong model, but likely to have large standard errors. As Penman(2010) says no one really knows the true beta, as shown by empirical trials and errors, and if we in addition use a model that only has 18% explanatory power to predict this beta, there might be good reasons not to trust the result. Another way of estimating the beta of a private firm is the bottom up beta, also presented by Damodaran(2002).

Bottom up betas:

Bottom up betas is the method of using industry average beta's for public firms, and uses that beta as representative for the private firm in question. Damodaran(2002) says the first obvious advantage of this method is that if one use the average of an industry, with a sufficient amount of firms in it, the averaging across large numbers of firms will decrease the standard error of the estimate. This benefit is transferred to private firms, and in that case one would use the average beta of an industry for publicly traded firms, and apply this to the private firm. As with the method of comparables, one has to make an assessment to which firms within an industry (if large) is most representable for the firms in question. This assessment will be looked into when applying the method for the case. To find the levered beta of the private firm one might run into a problem since there is no market value of the debt to equity ratio to be found. Damodaran(2002,pg 666) suggests the following solutions:

1. Assume that the private firm's market leverage will resemble the average for the industry.

$$\beta_{private\ firm} = \beta_{unlevered}[1 + (1 - Tax\ rate)(Industry\ average\ debt/Equity)]$$

Or

2) Use the private firm's target debt-to-equity ratio (if management is willing to specify such a target) or its optimal debt ratio (if one can be estimated) to estimate the beta:

$$\beta_{private\ firm} = \beta_{unlevered}[1 + (1 - Tax\ rate)(Optimal\ debt/Equity)]$$

In the first solution one is assuming the private firms leverage will resemble the average of the industry, and in example two one is assuming one could acquire a target or optimal debt ratio from the management and then calculate the beta of the private firm.

These three possible solutions to estimating a beta for a private firm will all be reviewed in the application part of the thesis. In addition to the special conundrum of calculating beta's for private firms, the cost of debt might also be a challenge.

Valuation Inputs: The cost of debt

The cost of debt

In order to get from the cost of equity to the cost of capital, we need two other inputs; The cost of debt and the debt ratio. The cost of capital is also called the weighted average cost of capital, and is simply the market weights of both equity and debt, multiplied with the cost attached to them. This segment will review how we can estimate both the cost of debt and the debt ratio for private firms. The cost of debt is defined as; "the rate at which a firm can borrow money"(Damodaran,2002,pg 669). According to Damodaran(2002) this is normally done with looking at the yields of bonds issued of public firms, or the ratings of these bonds to get a spread. With private firms usually don't have this information, and they normally don't issue bonds. This represents a challenge at which Damodaran(2002) notes three possible solutions. One is to use the interest rate of the most recent loan, number two is to assume industry average interest(given the firm is up for an initial public offering) and the third option is to use interest coverage ratios to estimate a synthetic rating and then estimate the interest rate from this rating.

To use the most recent loan interest as the input for the estimation of debt value definitely seems like the easiest one. However, it has to be current, since market value of debt by definition is current. Even if one could argue that a for example one year interest is not representative, it might still be used in this thesis due to the cost/benefit dilemma, given that that the case is just an example, not a precise valuation.

If one is not satisfied with the degree to which the last debt was current, one could perhaps use the industry average interest rates. This is of course if the firm is being valued for an initial public offering. In addition if the firm was valued for transfer to a public company, this assumption wouldn't seem so farfetched either. Then perhaps the most appropriate would be to use the current firms both debt ratio and interest rates as inputs. This is true because one can imagine that the firm would have little problems refinancing the loan if desirable.

The third solution presented is to use interest coverage ratio's to estimate a synthetic bond rating and achieve an interest from this. The interest coverage ratio will provide a spread to which the interest deviates from the risk free interest. That way one can estimate the current cost of debt. This method will not be used in the assignment, because it is too time consuming to 1) Estimate the interest coverage ratio and then 2) Find the interest coverage ratios and spreads of other firms.

Debt ratio:

In addition to this, the debt-ratio is defined as the market value of debt, compared to the market value of equity. These are inputs which are not available for private firms, so we need to consider other options here as well. Damodaran(2002) mentions four options; 1) Use industry average debt ratios 2) Use target debt ratios(if one is acquired) 3) Use optimal debt ratios or 4) Use the estimated values of equity and debt to estimate the debt ratio.

The industry average debt ratio is used if these were used to estimate the beta, to achieve consistency in the estimation. If the management of the firm provides a target debt ratio to the analyst, that is of course preferable, since one does not have to guess at what it is going to be/should be. The optimal debt ratio on the other hand is a theoretical estimate, at which one assumes there is debt ratio at which all of the EBIT are used to cover interest. This conundrum refers back to the question about whether or not there is such a thing as creating value with financing. This will not be discussed in this thesis, but it will be assumed for simplicity that Miller and Modigliani were right and that there is no optimal debt ratio in relation to value, and hence no effort will be used on estimating this measure.

If using estimated values of the equity and debt to achieve the debt ratio one has to be aware that this estimation is circular. Because as he says;"You need the cost of capital(and the debt ratio) to estimate firm and equity value, and you need the equity value to estimate the

cost of capital”(Damodaran,2002,pg 671). Although flawed, one has to consider the consequences of effort/benefit, because there are undoubtedly larger efforts in estimating these estimates for private firms, than there are for public ones. Simple might be better even if inaccurate.

When the time of analysis comes, perhaps the easiest route will be taken on the cost of debt perspective. The reason being that some of these methods might not be especially more accurate than just estimating the cost of debt as the weighted average of all components of net financial obligations, as a method Penman(2010) described. The company in question is not in an industry that is directly relatable to the company's on the OB stock market; hence their industry average might not provide much better estimate than their current book values of debt and recent interest payments. In addition the interest coverage ratio calculation is too tedious for this assignment. There will however be some sort of effort to find out what the firm can borrow at, currently. But due to its limited affect on the cost of capital, it will not be extensive.

Private firm essentials: 1)The illiquidity discount:

A key difference between valuing private and highly traded public firms is the ability for the investor to change his portfolio/investments quickly, if desired. This lack of ability with private firm investment is related to a term called the liquidity discount. This is referred to by Damodaran(2005) as the cost of remorse, meaning that if one regrets an investment, one has to pay a percentage amount of the investment cost, to revert the decision. One can easily imagine that this “cost of remorse” varies with different assets. A highly traded public company for instance should be easier to sell quickly and with less cost, than an asset like for instance real estate. In this section it will be discussed how to measure the illiquidity discount, studies on its magnitude, different ways of finding it, how to apply it to valuation, and finally, how to apply it to private companies. Damodaran(2005) argues that liquidity is not a question of liquid or not, it is a continuum, meaning that all assets have varying degrees of liquidity attached to them. If one imagines two completely equal assets, where the only difference is the degree of liquidity, one would expect the most liquid asset to sell at the highest price. However, there is rarely such a thing as two equal assets in the market of stocks and companies, so one has to consider other ways of measuring illiquidity.

Damodaran(2005) proposes transaction cost as a way of measuring illiquidity, and that higher transaction costs represents less liquid assets. He proposes three determinants of transaction costs which are; 1) Bid-ask spread 2) Price impact and 3) The opportunity cost of waiting. First to be discussed is the bid-ask spread:

Bid-ask spread:

If we accept the reasoning that transaction cost is a function of liquidity, the first component to look into is the bid-ask spread. The bid-ask spread is the first component of the transaction costs to be discussed. It refers to the fact that there almost always is a difference between what a buyer will pay and what the seller receives, at the same point in time for the same asset, in almost every traded asset market(Damodaran,2005). There are three main arguments why there is such a difference, and these costs are called inventory rationale, processing cost argument and adverse selection by (Damodaran,2005). These all affect the market maker and incurring cost on the market maker. The market maker is the brokerage or bank that takes on the job of buying and selling securities at publicly quoted prices.

Inventory rationale:

The market maker holds inventory for a specific stock or security in any point of time, hence needs to be rewarded for this. The risk as Damodaran(2005) mentions occurs if the market makers sets the price too high, or too low. For instance, if the price is too high it is likely that they won't sell, accumulating inventory. On the other end, if the price is too low, it will result in a large short position in the stock(Damodaran,2005). In addition to this Damodaran(2005) mentions external (exchanges and regulatory agencies) and internal restraints(limited capital and risk) that in total makes up for the cost of inventory.

Processing cost argument:

The second component of the bid-ask spread mentioned by Damodaran(2005) is the processing cost argument. This refers to the costs of processing orders such as the paperwork and fees connected to these. This of course is the minimum the spread has to cover, for the market maker to have profits.

Adverse selection problem:

The third component is the adverse selection problem. Since the market maker is obliged to hold sell at his/hers quoted prices, there is a risk that he/she is trading with more informed investors than themselves (Damodaran,2005). As Damodaran(2005) says, this is a negative profit activity, and the spread needs to be large enough to on average cover these losses.

The magnitude of the spread:

The studies reviewed in Damodaran(2005)'s paper, regarding the magnitude of the bid-ask spread will not be discussed in depth here. However there are some findings of interest(Damodaran,2005,pg 7);

- 1) The spread in % of stock price is much higher for small capitalization companies compared to the large ones.
- 2) The spreads on secure U.S. government securities are lower than on stocks in the U.S. market.
- 3) Spreads on corporate bonds also tend to be larger than government bonds, and the safer more liquid bonds have less spreads than the riskier ones.
- 4) There are also differences across markets, where non-us equity markets present higher spreads than the U.S.

According to the theory, volatility should increase the spread; The cost of remorse will be larger if it is likely that the assets price is volatile. This can be partly attributed to the fact that it's more difficult to find the right price (inventory rationale) with a more volatile security. This coincides with point 2 and 3, where stocks are apparently more risky than government bonds, and so are the corporate bonds.

The difference in spreads across U.S. and non-U.S. equity market is attributed by Damodaran(2005) to the fact that these markets are less liquid and the firms traded have smaller market capitalization.

The fact that lower market capitalization stocks have larger spreads in terms of % of price can be attributed to the fact that there will always processing costs of some magnitude, regardless of the size of the order/purchase.

A study made by Heflin, Shaw and Wild(2001) looked at the relationship between information disclosure quality and the size of the bid-ask spread. They found that the spread decreased as the information increased. This relates directly back to the adverse selection problem of the market maker, where less information is assumed to make them more vulnerable to informed traders. If most of the information is disclosed there will of course not be much room for more informed traders and the price will be easier to set.

Determinants of the spread:

There have been several studies on what the determinants of the bid-ask spread is, or at least which factors they correlate with. If possible, these should be consistent about the theory of why there exists such a spread in the first place, with the inventory rationale, adverse selection and the processing costs.

Damodaran(2005) mentions studies that have found the spread to be correlated negatively with price level, volume, number of market makers but positively with volatility. The price level as mentioned relates to the processing cost argument as not all of these do not disappear though the stock doesn't cost much, so a highly priced stock is assumed to have lower processing cost and hence transaction cost as a percentage of price.

Volatility is likely to affect the adverse selection problem, since the more volatile a stock, the more potential benefit an informed investor will gain.

The number of market makers will affect the competition between them. Like other markets, increased competition reduces profits. The bid-ask spread is there to ensure the market maker indeed has profits, so it's not surprising that increasing number of market makers decreases the spread.

Volume has a decreasing effect since it according to Damodaran(2005) reduces the need for the market makers to maintain inventory and increases the turnover of the inventory.

According to the theory, the bid-ask spread increases with increased degree of adverse selection, meaning the risk the market maker have of trading with a more informed investor. This should then lead securities with more disclosed information to have smaller spreads,

since then the more informed investors would lose their advantage. As mentioned the study by Heflin, Shaw and Wild(2001) found that the spreads decrease as the information quality increases. Frost, Gordon and Hayes(2002) supports this view by looking across different equity markets and found that the markets the best disclosure systems had the highest liquidity.

So to sum up, the bid-ask spread seems affected by volatility, information quality, number of market makers, and the price of the security. If the bid-ask spreads is a part of transaction cost, which we assume represents illiquidity cost, we could then assume to find consistent results when measuring the illiquidity discount later in this paper.

The cost of illiquidity:

As mentioned, the notion that an investor would pay less for an illiquid asset compared to another is neither unreasonable, nor unproven, given the empirical evidence presented earlier. Damodaran(2005) mentions three ways of examining the effect of illiquidity on the price of assets. First is by reducing the present value by the expected future transaction cost, the second by increasing the required rate of return, to reflect the cost of illiquidity and the third is to value illiquidity as an option. The option method refers to the fact that with an illiquid asset you lose the opportunity to sell at whichever time you want, for instance when the asset is at its highest value, or in the profit zone for the investor. First let's look into the future expected transaction cost.

Present value of expected future transaction cost.

The view of looking at the effect of illiquidity can be found by looking into the present value of all future transaction costs will not be reviewed in this thesis. The notion was, that in addition to calculating an intrinsic value based on future cash flows, one also has to consider the future transaction cost with the sale of the unit.

According to Amihud and Mendelson(1986), this and the fact that all future investors will consider these transaction costs, was the argument they proposed, and that the sum of these was illustrating differences in the illiquidity discount. The theory might be correct, if one accepts that transaction costs are strongly correlated with the illiquidity

discount. Nevertheless, to estimate and/or use it in valuation seems too tedious to elaborate further.

Illiquidity as an option:

The value of liquidity can be looked upon in several ways. One way is to look at it as the profits neglected from the fact that you were unable to sell at maximum profits. Longstaff(1995) used an approach where he considered an investor with perfect market timing, and estimated what the inability to sell at the top would result in terms of profits. He viewed it as a look-back option, where the maximum price was the upper bound for liquidity. The notion that the cost of illiquidity is greater for more volatile assets and increases with time is supported. However, one could argue this approach is partly theoretical, since it is difficult to assess the skills of the investor and if the look-back price movements are representative for the future. In addition to this, one could easily imagine more volatile assets having a greater discount, making the option more valuable, as what other option theories suggest. His results were dependent on volatility and the longer time period, the bigger the discount.

Illiquidity and discount rates:

If one agrees that less liquid assets cost less than otherwise similar assets, the question then becomes, that one perhaps could view the cost of illiquidity similar to how risk is viewed in the capital asset pricing model. Risk is known to affect the price of assets. Two assets with equal expected returns but different risk are known to not be priced equally. Why would one pay the same for a more volatile asset if both had the same expected returns?

Following this notion Acharya and Pedersen (2003) established that illiquidity risk is related to expected returns. They found that illiquid stocks have higher risk premiums than liquid ones, and that 80% of this can be explained by the covariance of the stock's illiquidity and the overall market liquidity. This method sounds a lot like the beta approach from asset pricing models, where the covariance of returns of a security to the market returns, explain differences in return across securities(beta). Pastor and Stambaugh (2002) found similar results where they claimed that returns sensitive to the market liquidity had higher annual returns (7,5%) than those with low sensitivity. In addition to this Amihud and Mendelson

(1989) examined adding bid-ask spreads to betas, to better explain the difference in returns across stocks in the US. They found that increase in bid-ask spread of 1% increased the annual expected return of 0,24-0,26%.

Without going into depth into these studies, they nevertheless seem to imply that liquidity, similar like risk, is something that affects expected returns and hence the price for what one pays for an asset. In addition the study by Acharya and Pedersen(2003) suggests that the beta of illiquidity risk matters, meaning that firms that are illiquid when the market is, should have higher expected returns.

Empirical evidence on the size of the discount:

If comfortable with the notion that less liquid assets trades at a discount, the next question becomes how big it is, on how it varies with asset classes. In this segment we will look into the studies from bonds, restricted stock and private placements and private equity.

Bonds:

In this segment we will briefly look into studies done on different types of bonds, with presumably different liquidity, and see whether or not they trade with discounts or not. The first study was done by Amihud and Mendelson (1991) that compared yields on treasury bills and treasury bonds with six months to maturity. They found that the less liquid treasury bond had an annualized yield 0,43% higher than the comparable treasury bills. A similar study was done by Kamara(1994), but according to Damodaran(2005), Strebulaev(2002) claimed that the tax treatment differences was the reason for the difference in yields. However, Chen, Lesmond and Wei(2005) compared the yields on more speculative corporate bonds and found the yield to vary with bond ratings(which is a measure of how risky it is) and with maturity. They found that liquidity decreases from higher to lower bond ratings and from short to long maturities. In regards to the riskiness of the bonds, a study made by Bianchi, C.,D.Hancock and L. Kawano (2004), concluded according to Damodaran(2005) that more illiquid bonds have higher default spreads than otherwise similar liquid bonds.

Although the liquidity issue was debated by Strebulaev(2002) in regards to t-bills and treasury bills, there seem to be enough studies supporting the fact that liquidity matters for the yield of the bonds. This is especially the case if one looks on to the study of corporate

bonds, which is more risky. According to the theory, the discount should be dependent on volatility, if one looks at the bid-ask spread. More volatile securities make the market maker more susceptible to adverse selection and the risk of trading with more informed investors.

Restricted stock and private placements:

Restricted stock studies are probably the most appropriate way of finding what is referred to as the illiquidity discount. The reason being is that restricted stocks are as Damodaran(2005) explains, stocks issued by public companies without the option of reselling for a period of time. In addition to this, only limited amounts can be sold after this holding period. This limitation reduces the price of the stock, and the reduction is viewed as discount for lack of liquidity.

A study by Maher(1976) examined restricted stock purchases made by four mutual funds in the period 1969-73. He found a discount in the magnitude of 35,43%. Another one conducted by Silber(1991) in the time span of 1981 to 1989 found a discount of 33,75%. These discounts seems rather large at first eyesight but a recent study from Johnson(1999) found a discount of 20%.

Given these magnitudes, should one assume that the proper discount for restricted stocks is in this range? According to Damodaran(2005) one should be skeptical about these results, due to three reasons.

The first refers to the fact that the sample sizes of the studies were small and spread over long time periods. The second is that the typical firms issuing restricted stocks are smaller, riskier and less healthy than the typical firm. The third and last reason mentioned by him is that investors involved may be providing services to the firm as well, justifying part of the discount.

Private equity:

In this thesis we are interested mainly in the illiquidity discount associated with the valuation of private firms. In that respect, looking into studies of private equity and venture

capital investors makes sense. A venture capitalist or private equity investor will of course know that their investment will not be as liquid as an investment in a public company. In that respect, they should implicitly discount the value they are willing to pay, to get “paid” for not having as liquid an asset. As discussed risk is something one gets compensation for in the capital asset pricing model, and if one gets compensated for less liquid assets, one would expect these to earn “excess” returns. What is meant here by excess returns is that it’s not really excess returns, but if not illiquidity is factored into valuation; it will appear as excess, even though you paid for it.

Ljungquist and Richardson(2003) did a study in that respect, estimating excess returns of 5 to 8% , compared to the public equity market. They attributed this excess return to compensation for illiquidity. However, as we know, there are more factors than just illiquidity that separate public from private firms. The fact that most investors probably are not diversified might count for some of the excess returns. In addition, if the private equity investors have some degree of control they might be able to influence the operations in a positive effect, earning an excess return. In summary, it is very difficult, if not impossible; to know what of this excess returns attributes to illiquidity and what is attributed to some degree of control or compensation for lack of diversification.

Dealing with illiquidity in valuation:

From the previous suggestion and empirical evidence, we can safely assume that liquidity matters for the value of an asset. The question is, how do we best apply this to valuation? One can according to Damodaran(2005) either value the business as liquid, and then apply the discount, adjust the discount rate to account for the illiquidity premium, or use relative valuation by using similar degree of liquid asset as comparables.

Illiquidity discounts on value:

In the capital asset pricing model, and other models to estimate the cost of capital, there is nothing that considers the cost of liquidity. One of the assumptions in many of these asset pricing models is that markets are efficient, there is no transaction cost and that there is full information and else well functioning markets. As previously discussed, this is not always

the case, especially with private firm valuation. So in order to value a private business one has to try to take this into account the fact that the asset is more difficult to trade, and hence apply a discount on the value. Damodaran(2005) describes four ways of estimating this discount. The first is to apply a fixed discount, second is a firm-specific discount based upon a firm's characteristics, third a synthetic bid-ask spread and the fourth is an option based liquidity discount. Only the fixed discount and firm specific discount will be discussed in this thesis.

Fixed discount:

The simplest way of estimating the liquidity discount is to use a fixed discount based on the restricted stock studies noted earlier. However, as discussed, there is reason to believe, and empirical evidence supporting that the discount estimated from the restricted stock studies is perhaps inaccurate and too high. Nevertheless, as noted by Damodaran(2005) this has been the standard practice for many analysts and in court cases regarding private company valuation. The range of this discount found by the restricted stock studies noted previously has been between 20-35%. However as noted, there were researchers who believed this discount was too large due to a sampling bias. In addition the studies suggest that the discount varies with information quality, volatility and time horizon of the investor.

Firm specific discount:

Knowing that the discount should vary across assets and business we need to consider the determinants of the discount, and how to implement them into deciding a firm specific discount.

Why should there be a liquidity discount?

There are several reasons why a less liquid asset, all else equal, should trade at a lower value than the liquid asset. One has the opportunity cost of waiting to sell, neglecting alternative investments, general need for liquidity and regretting once decision to purchase as a few examples.

The opportunity cost of waiting refers to the fact that if the investment has risen in value, but due to the lack of a liquid market, one bears a cost of not being able to make the

maximum profits. In the same ally, if the investors lays all or almost all his wealth into the investment, alternative investment opportunities might not be available. So in essence the cost of illiquidity can be traced back to the alternative cost of not investing in the best investment opportunities. This is of course related back to the “cost of remorse” term, since apparently, the decision to purchase the illiquid asset has to be viewed as the best opportunity for the investor, at the time of the investment.

On a general level though, one has the need for liquidity that varies with time and often unexpectedly. There might be personal reasons for the need for “cash”, or business reasons within the firm one has purchased, if it were a private business. Investment opportunities might arise, suppliers might tighten in the deals of trade, and if forced to sell shares of the business to cover these, there would definitely be a cost of illiquidity. There are different degrees of illiquidity within firms, and next we’ll discuss what factors affect the size of discount.

Determinants of illiquidity discount:

Damodaran(2005) sums up six determinants of the discounts which are; liquidity of assets owned by the firm, financial health and cash flows of the firm, possibility of going public in the future, size of the firm, the control component and the type of investor/buyer.

Liquidity of assets owned by the firm refers to the fact that a private firm that is difficult to sell should have lower discount attached to it if it consists of highly liquid assets. This is connected to the component that if liquidity needs arises, the investor could sell of the firms asset to cover these, even he/she cannot cover these by for instance selling shares of the company.

Financial health and cash flows of the firm is a factor too, but with slightly different implications. First off, normally a financial healthy company is a company that has matured somewhat, meaning that it is in cycle where it is not as volatile as for instance start-up companies with high growth potential. Hence a financial healthy company reduces the risk severe losses for the investor forced to hold on to an asset longer than he might prefer. In the public stock market, the shares could be for instance sold quickly if the stock price declines too much for the investors liking.

Thirdly we have the possibility of the firm going public in the future. Regardless of what the need for liquidity is, if the firm is likely to go public, or in other words, easy to go public with, the investor is somewhat assured that if liquidity needs arises, this can be resolved by going public.

The size of the firm matters as well. If we, as Damodaran(2005) says, view the liquidity discount as a percent measure of the firms value, it is likely that the liquidity discount should be lower in that respect, with larger firms. This is tied to the fact that the transaction costs as a percentage of value, is less for these firms, as discussed previously.

The fifth determinant, the control component of the purchase is important too. If an investor gets the control of the company, he/she could easier liquidate the assets in the firm, if the need for liquidity arises. In addition, projects or investments with expected cash flows to arrive sooner rather than later would provide some insurance against the well “running dry”.

In addition to these, the type of investor that purchases the firm will also affect the illiquidity discount he/she attaches to the transaction. It is likely that different investors have different time aspects and different financial wealth, affecting the need for liquidity. One can easily imagine a very wealthy investor with long time horizon not being affected much by the fact that he/she is unable to sell the firm for a period of time.

Estimating a firm-specific discount:

Given that the research on the subject suggests that the liquidity discount varies across companies and types of securities, the question still remains, how do we estimate it for a specific company? If perhaps not completely accurate, the studies of the restricted stocks provided by Silber (1991) might give clues to what factors influence the size of the discount.

Restricted stock studies:

One of the most recent studies presented by Damodaran(2005) was the study made by Silber(1991). In addition to establish a median discount of 33,75%, Silber also examined factors that are supposed to explain the differences in discounts across the different restricted stocks. The regression model presented looked like this:

$$\ln(RPRS) = 4,33 + 0,036\ln(REV) - 0,142\ln(RBRT) + 0,174DERN + 0,332DCUST$$

With: $R^2 = 0,29$

Where;

RPRS= Restricted stock price/unrestricted stock price-illiquidity

REV= Revenues of the private firm (in millions of dollars)

RBRT= Restricted block relative to total common stock in %

DERN=1 if earnings are positive; 0 if earnings are negative.

DCUST=1 if there is a customer relationship with the investors;0 otherwise.

According to Silber(1991) each of the explanatory variables are statistically significant and the f-test indicates the overall relationship is that as well, even though it is only 0,29%. To sum up positive earnings, revenues, and customer relationship with the investors reduce the illiquidity discount. However, the bigger the block sizes of the restricted stock in relation to total common stock, the lower the discount. The results are significant, meaning that one can safely assume that the discount is not static, across different variables, like the use of a fixed discount would imply. A study on restricted stock in 1991 is not valid for a private firm valuation in 2010, but at least we are neglecting the hypothesis that it is equal for all assets.

Summary: Illiquidity discount

There are several ways of viewing the illiquidity discount. This segment has tried to mostly illustrate the different approaches and magnitudes across assets. The bid-ask spread was a good place to start, in that it illustrates that even with so called liquid assets like stocks, there seems to be a discount attached to illiquidity there as well, if one views transaction cost as a part of illiquidity.

The cost of illiquidity was then viewed three different ways. The value of an option, that one cannot sell the security, a function of future transaction cost or its affect to the discount rates, in the respect that one has to be compensated for the lack of selling options.

In addition we noticed that this discount varies with asset classes, which apparently can be attributed to the factors assumed to affect this discount. With regards to valuation, there seems to be a consensus that it varies with asset classes, in it varies within firm characteristics as shown by Silber(1991). Establishing that the discount is not fixed, does not necessarily mean that Silber's approach will be used. The first reasons are that the study is somewhat old; the study is based on restricted stock, not private firms. The private equity study made by Ljungquist and Richardson(2003) were the most interesting one, in that respect that the difference in excess returns that in addition to illiquidity, partly can be attributed to lack of diversification. This part of the thesis has proven a complicated matter, and the point of this segment was to get an understanding of what the discount is how it varies with asset classes, and the factors/determinants it seems to vary with, and in theory should vary with.

There are several reasons why attaching a specific discount for illiquidity to a private firm is basically impossible. Strictly hypothetically, we would need two completely equal companies, whereas one was on the public stock market whereas the other where not. In addition to this, we would have to have data of private firm transactions, that could be measured up against the current market price of the public company at the exact same time. Even if such data were available, the differences in prices would not only be subject of the illiquidity discount. Part of it would be due to lack of diversification and part of it due to the value of control as to be discussed in the next segment. We could perhaps than try to adjust these results for coefficients like Silbers(1991) regression, but as noted that regression was not particularly strong and one would either way end up with potentially large standard errors. At the sight of it, it seems virtually impossible to get any good measure of this discount, at least as far as accuracy is concerned. This segment has proven it exists and is dependent on different factors, but due to the limited trust we can have in the output, and the fact that private firms are likely affected by other factors, a simpler solution will be applied. The next part, value of control, will also prove to be a somewhat cumbersome matter.

Private firm essentials:2) Value of Control

When purchasing stocks or a significant share in a public company, it is normal that you don't receive any significant control over the company. However, if one purchases a

private business, one receives full control over the company, given that you acquire enough shares. The question is, should full control over an asset yield a higher price to an otherwise similar asset? Houlihan Lokey Howard and Zukin did a control premium study, where they looked into the additional payment for controlling interest in relationship to minority interest. They came with the following statement:(Feldman,2005,pg 105)

A controlling interest is considered to have a greater value than a minority interest because of the purchaser's ability to effect changes in the overall business structure and to influence business policies.

This value of control will depend on why the valuation is made, like the illiquidity discount, cost of capital and cost of debt. If you value the business to purchase the entire firm, you would gain the right to control the firm's assets and operations. If the company is poorly run at the moment, and that you believe you could run it better and make larger profits, there is reason to believe you would value the business higher than what it's current earnings and growth potential stipulates. In addition, the ability to control the assets might also reduce the illiquidity discount, as discussed previously. If one controls the assets, and there are sufficient amount of liquid assets and financial health in the company, any immediate liquidity needs can be covered, thus reducing the illiquidity discount attached to the investment. Zukin and Howard mentioned five factors that will affect the magnitude of the value of control(Feldman,2005,pg 105):

1. The nature and the magnitude of the non-operating assets.
2. The nature and the magnitude of discretionary expenses.
3. The perceived quality of existing management
4. The nature and magnitude of business opportunities which are not currently being exploited.
5. The ability to integrate the acquire into the acquirer's buiness or distribution channels.

The first point, the nature and magnitude of the non-operating assets refers to assets are relevant to the cost of illiquidity. If a company has a high degree of financial assets that are highly liquid, one could imagine, that the acquirer of the firm has the ability to liquidate these if the need for liquidity arises. Hence these will be needed to be looked into if one tries to get a notion of how big the illiquidity discount is.

The discretionary expenses might have an impact on the value of control as well. Discretionary expenses are expenses that are either non-essential for the operations or expenses that are of redundant magnitude. Examples of these could be very expensive business parties, the CEO buying gifts for the family members on the firms account etc. If there a lot of these, replacing the management and controlling these would undoubtedly raise the earnings of the company and generating a higher value. This point however is related to the quality of the existing management.

When talking about the quality of existing management there are a lot of factors that could be discussed. The ability to motive your workers, hiring skills, ability to find and evaluate profitable business opportunities, etc. This will of course be a subjective assessment, in which the analyst will need to know the business the company is in well, and the ability to evaluate how the business is run currently. The quality of management and unexploited business opportunities is integrated in Damodaran(2002) notion of the value of control.

Damodaran(2002) stipulates an example of the value of control by considering what the firms is worth with optimal management, the value of the current management and the value of the controlling interest. The optimal management value is ultimately dependent on the opportunities that are not being exploited. It is also related to the expense controlled, an example being the discretionary expenses mentioned by Zukin and Howard. The following example is from Damodaran(2002,pg 685).

Let's imagine we have a firm that is worth 100 million with the current management, and 150 million with optimal management. You can either buy 51% of the company or achieve full control or 49% of the company, leaving the other 51% to a single individual, which then leaves you with no control basically over the company. He computes the value like this:

Value of controlling interest= 51% of optimal value= $0,51*150= 76,5$ million

Value of noncontrolling int= 49% of status quo value= $0,49*100= 49$ million

At status quo the company is worth 100 million, and each % is hence worth 1 million. However if able to change it with 51% of the shares, each % of the shares increases its value of 1,5 million, meaning that 51% of the shares is worth $51*1,5=76,5$ million. The difference

between the two percent is massive, and this is because the value when run optimally is 50% higher. This is perhaps an overstatement if how it normally is, but illustrates the potential value of control. Damodaran(2002) states that if a firm is run optimally there will be close to zero value of control. However, as mentioned, perhaps there is reason to believe that the ability to liquidate assets when there is a need for liquidity, reduces the illiquidity discount, and hence increases the value, even if the firm is run optimally.

As Zukin and Howard claims, the magnitude of the control premium is dependent on the nature of the business opportunities. This is logically as one can imagine that the value of control in a stable industry with low growth prospects is low. There simply is not much to gain from running the business optimally in terms of the right investments. Hence, studies that might indicate how much companies rise in value after being acquired, and replaced with new management, will not be precise.

The value of control ultimately is difficult, if not impossible to measure. To do so correctly, one would have to have the current value of company, and the value once acquired and run optimally. For a company to be run optimally is a theoretical matter, since there will always be opportunities that most people cannot see. In addition the discretionary expenses and non operating assets might also be difficult to measure. Private firms are known for not disclosing much information, so for the outside investor these might be difficult to estimate. So even to begin to asses a situation of a firm, to get a proxy of how much the firm is worth, run optimally, is a task that cannot be done with accuracy.

The original idea was to investigate the matter thoroughly, but it appears to be as noted, a process that has higher costs than it has benefits. Instead, the recommendation is to look into each business individually, when trying to estimate the value of control. Theoretically the value of the control will be dependent on the factors mentioned above. The effect these have on the perceived value is uncertain, but logically it still makes a difference. If there is sufficient information, ideally one would consider each factor, but to get anything other than a guess on the value of control is unlikely.

A final note, the theory regarding Howard and Zukin were found in the book Principles of Private firm valuation, by Stanley J.Feldman(2005,pg 105). However, his method of citation was poor and the study and the original work has not been found. This is of course a flaw, but the theory itself makes sense, and since no empirical evidence was presented, but mere theory, it was kept in the assignment.

Private firm essentials:3) Accounting standards and discretionary expenses:

Among the potential differences between private and public firms, we have the accounting standards that might affect the valuation process. In addition to this, there are possibly discretionary and intermixing of personal and business expenses that are sometimes common in private firms.

The reason for this potential accounting standard problem, is that public firms are governed under strict accounting standards, whereas private firms, especially if not incorporated, might operate under far looser standards(Damodaran,2002). The implication of this in valuation is that one might not get the correct earnings numbers out of the private firm reported statements. This again will make it difficult to compare private firm's earnings across each other, or for instance use comparables based on public companies, to value private firms. This thesis will not go into depth at all; just mention that there might be a potential problem, which one has to be aware of. So when one goes through the financial statements one has to keep an open eye for items that might have been tampered with.

Another potential issue that might affect the reported earnings is the intermixing of personal and business expense. Often in private firms, the owner is also the manager or CEO. This can potential create problems. The reason being according to Damodaran(2002) is that the owner might intermix personal and business expenses. An example might be a car bought on the company's account, which is used privately. Another might be computer equipment bought for personal use, but written off as a business expense in the financial statements, lowering the reported earnings. If that happens, it might be difficult to get an idea what the true earnings and growth potential of the firm really is. Needless to say, this can be difficult for an outside analyst to discover, but before an eventual takeover one should perhaps demand an elaborate description of the reported income statement to accommodate this.

The thirds potential issue mentioned by Damodaran(2002) is the failure to separate management salary and dividends. In a private firm, the management salary might be overstated, due to the fact that he/she might be indifferent to in which form the compensation comes in.

These issues are hard to investigate for the outside analyst, considering the lack of information provided by private firms, and will not be pursued in this thesis. They were only presented to illustrate a potential problem, and make aware of the extra caution needed when viewing the financial statements.

Private firm essentials :4)Valuation Motive:

What is the reason for which the valuation is made? Initial public offering, value for transfer to employees, sale to private entity might or sale to a public company might all have different implications on the valuation. The illiquidity discount, adjusted beta, tax rate, firm life and illiquidity discount are all factors that separate private company valuation from regular valuation. However, to the degree they should be factored in will vary with the reason for which the valuation is made. In this thesis we will briefly look into the consequences if the valuation is made for an initial public offering, sale to a private entity or to a publicly traded firm.

If valued for an initial public offering, the company should of course be valued as if it were a public company, and not a private one, since that is the purpose of the initial public offering. The illiquidity discount should be approximately zero if the company is entering a highly traded market, however there might still be exceptions. Even though public, if the company in question is a small company, compared to the others on the index, one might, as proved by studies, argue that there still will be a liquidity discount. This is perhaps nitpicking, but as discussed before, the question is not liquidity or no liquidity; it is a matter of a continuum. If valued for sale to a private investor or entity, Damodaran(2002) argues that the degree of illiquidity discount should be estimated taking the investor in question into hand. If the investor is wealthy, has a long time horizon for his horizon and has no immediate needs of liquidity, one could argue that the illiquidity discount should be lower. On the other hand, an investor who puts almost all his wealth into a private company, and is financially very dependent on the success of this firm, is likely to attach a higher illiquidity discount, making the price he is willing to pay, decrease.

In addition to the liquidity needs, the amount of diversification the investor has will according to Damodaran(2002) affect the discount rate attached to the investment. In CAPM

assumptions, one is as mentioned assuming that due to the ability to diversify away unsystematic (firm specific risk), one does not get a return premium for holding such risks. However, Damodaran(2002) argues that since one is unable to diversify as an investor of a private company, one should be rewarded with additional return, increasing the beta. This beta adjustment will according to him rely on the degree of diversification of the investor in question. If the purchaser of the company on the other hand is public company, the added risk to the public company will depend upon the company's degree of diversification and the correlation of risk to the private company in which they will purchase, like normal portfolio theory. In addition, Damodaran(2002) mentions possible synergy effect with costs and revenues, if sold to a public company. If the combined units function better than separate, there might actually be a value increase, relating to selling to going public.

The cost of debt is also as discussed likely to be affected by the reason for which the company is valued. For a private firm the interest payment is normally not current and hence not accurate as the cost of debt. Interest coverage ratio's, industry average interests and most recent loan interest was discussed as possibilities to negate this. If the firm is valued for an initial public offering the most appropriate seems to use the industry average (public) as representative for the firm in question. On the other hand, if valued for private sale, perhaps the interest coverage ratio or the most recent loan interest is more suitable.

Private firm essentials: 5)Forecast horizon

When valuing private firms, with the models shown previously in this paper, one usually assumes infinite lives and time horizons. This however, might be different with private firms. Many private firms have family owners and managers, what happens when these pass on? The company might then be liquidated, if one cannot find a successor. As Damodaran(2002), the transition to a new CEO through family is sometimes difficult and the owner might not want to pass over the control to an outsider. This implication might affect both the growth prospects and the assumption of infinite time horizon on valuation. For instance, is it likely to assume a constant growth rate in residual earnings over an infinite horizon if 1) The owner/CEO is old and has few successors, and 2) That the company in general is assumed to last forever? In mathematical terms, forever is not a very long time. For instance, 1000 dollars today, expected to grow at 2,5% for 30 years, discounted with a 10% cost of capital is only worth approximately 120 dollars. In that respect, the error of infinite

lifespan grows smaller the further one goes past for instance 30 years. Nevertheless, this has a potential impact on valuation, if one expects is uncertain of the firm's ability to replace the CEO in the near future. However, as Damodaran(2002) mentions, there are plenty of private firms, often the larger ones, that are run like public firms, with a professional CEO, that the assumption of infinite growth and lifespan can be retained.

Application: Case Sorlandschips AS

Sørlandchips AS : Introduction:

Sørlandschips AS is a private company located south in Norway in Kristiansand. The company is somewhat special in that it markets itself as Norway's smallest chips factory. It was founded somewhere around 1990 and have grown substantially since then, with currently distributing in most cities of Norway. The chips itself is produced by a special technique, keeping the potato shell on when frying it in peanut oil. In addition the potato flakes are thicker than normal potato chips. As you can see from the financial statements the company has enjoyed substantial revenue growth from the limited amount of accounting data available online. The company enjoys somewhat of a recognized brand with national television commercials contributing to that. Not much relevant information was drawn out from the somewhat uninformative web-site the companies have, with loading times for each segment, and the outlay of the website being more art than informational. So the following valuation attempt is basically based upon the financial statements and some simplified assumptions.

Forecast horizon and valuation motive:

Before we proceed to the calculation of beta and the cost of capital, lets remind ourselves the theoretical part on forecast horizon and valuation motive.

As discussed the forecast horizon might be different with private firms, given that one is not sure if the company can have CEO's to succeed after the current retires. Although a potential private company issue, in this case we will for simplicity sake assume we can calculate continuing value like with public firms.

Diversification, value of control, cost of debt, cost of equity and illiquidity discount are all measures affected by the reason for which the valuation is made, as discussed previously. In theory the assumption of this thesis will be that the investor is a private investor trying to evaluate what he/she finds Sørlandchips AS value to be, from an outside point of view. This investors approach, will be of one that gives a hunch for the value, not a precise estimate, since this seems almost impossible, as part of the discussion before has shown, and as the case illustration might further elaborate. In all cases the benefit/cost dilemma will decide which approach is chosen.

Beta and the cost of capital:

The models intended for use in this thesis is the residual earnings model and the method of comparables. For the residual earnings model we will need the cost of equity first, based on beta technology. As previously discussed we don't have the input needed to estimate the beta in a normal way, where we would regress the returns on the market on the returns on the security. For private firms we discussed three other options which where; Accounting beta's, fundamental beta's and bottom-up beta estimation.

Accounting beta's relies on regressing the earnings against the market index, instead of the returns. However, as with any regression approach this demands a significant amount of data. For the case at hand, there were only 3 years of accounting data available, from 2006-2008. The first problem is of course that this is by no means of the imagination sufficient data to run a regression with any significant results. The second is that we might not, as discussed, be 100% certain about the earnings number in a private firm, vs a public, as the rules might differ, and the potential discretionary expenses discussed previously.

Another way of estimating the beta of a private firm is the fundamental beta solution. This refers to estimating the beta coefficient by looking at regressional models that tie the beta into fundamental observable factors, which we also can find in private firms. As mentioned Damodaran(2002) ran a regression trying to deal with this and get the following model;

$$Beta = 0,65027 + 0,25CV_{OI} + \frac{0,09D}{E} + 0,54g - 0,000009TA$$

Where CV_{OI} was the coefficient of variation in operating income, D/E the debt to book ratio, g the growth in earnings and TA the book value of total assets? The model's R-square was 18% which suggests a very weak model, with little explanatory power and potential large standard errors. Normally this would be a model to weak to use, but since there is such limited information with regards to private firms, let's at least illustrate how its computed. To use this method, the factors involved where calculated and looked like this:

CV_OI	0,14
D/E(book)	3,23
g (earn)	0,00
TA(total assets)	8987333,33

The coefficient of the variation in operating income (0,14) is as mentioned previously in this thesis the standard deviation of operating income divided by the mean operating income. This is done on only three years, and is likely not a reliable output. The debt/equity book ratio was 3,23, total assets in dollar values was approximately 8,9 million, and the growth rate 0%. In reality the growth rate was not 0%. It was negative 35,48% in 2007 and positive 4,7% in 2008. However, based on only two years of growth, it is impossible to say anything about this growth rate in earnings. For simplicity sake, just assume it is 0%.

Based on the outputs we get this beta:

$$Beta = 0,65027 + 0,25 * 0,14 + 0,09 * 3,23 + 0,54 * 0 - 0,000009 * 8,987333,33 \\ \approx 0,98$$

As mentioned this estimate is not to be trusted by far, first off due to the low R-squared. Second, this regression is based on stocks in the United States, and might therefore not be correct for a company in Norway. Beta is found by regressing returns on stocks, and what causes returns in U.S to vary might not be the same macro factors that cause returns to vary in Norway, although there are of course some sources that have much of the same effect. A recent example is the worldwide recession, affecting both countries stock indexes. Given that the regression is so weak, and based on another country, it will probably not be used in this thesis. If one perhaps could do the same in Norway with better explanatory power, it might be more appropriate. Perhaps the Bottom-up beta's are more appropriate.

Bottom up beta's

The method of using bottom-up beta's refers to using an industry unlevered betas as an estimation for a private firm. To do this properly one needs to define what a comparable firm is first, in order to get beta's that are comparable. Sørlandschips AS is a company that mainly gets their revenues from selling snacks. On the OBSE(Oslo Børs Stock Exchange) there are no companies within the exact same business, unfortunately. If we define the snacks as a food industry, we get a different picture. Below is the beta's collected from www.dn.no for the following companies:

Betas	
Aker Seafoods	0,4726
Ekornes	0,1759
Cermaq	0,4823
Codfarmers	0,7624
Copeinca	0,4848
Domstein	0,2794
Lerøy seafood	0,2302
Rieber and Son	0,1745
Average Beta	0,3827625

Apart from Rieber and Son and Ekornes, all these companies are companies which mainly produce/develop some sort of fish products, which is a very big industry in Norway. The question then becomes, are these beta's valid for a company who gets their revenues from selling snacks? In essence we don't really know exactly what affects the betas, so the task of determining whether or not these firms are affected by the same systematic risk factors is a difficult one. Norway is known for their lumber, oil/energy companies and fish companies. In that respect one would believe the marked index to move due to systematic risk factors affecting these companies. This is the reason why it's chosen not use their betas as an estimate for Sørlandschips, because the comparable firms are not really comparable. Rieber and Son at least is a company at which gains most of its revenues from food products, sold in the same grocery stores as Sørlandschips, and is the closest we got to a comparable firm. Only one comparable firm for the beta estimation is extremely uncertain, but rather than trusting this estimate, we will use sensitivity analysis later, to see how critical this uncertainty has on value.

For 2009 Rieber and Son's D/E ratio was 0,4915, and assuming a marginal tax rate of 28% we can calculate the unlevered beta for this company:

$$\text{Unlevered } \beta_{\text{business}} = \beta_{\text{comparable firms}} / [1 + (1-t) \left(\frac{D}{E} \text{ratio}_{\text{comparable firms}} \right)]$$

$$\text{Unlevered } \beta_{\text{business}} = \frac{0,1745}{[1 + (1-0,28)(0,4915)]} = 0,1289$$

This beta estimation seems very low at first sight. However, as discussed, perhaps the systematic risk factors affecting the index have very little effect on a business that sells a variety of food products, as opposed to fish which is a main export source. The unlevered beta of 0,1289 will be a starting point for the further estimation of the cost of capital, although it is an highly uncertain measure. The beta estimated by the fundamental beta approach will not be used because it is too far off the beta's collected for the industry, and it was based on a very weak regression based on other stock markets.

The main question then is; Can we justify that Sørlandschips AS is not affected by interest changes, recession, booms, currency fluctuations etc as much as for instance Statoil or Hydro? It is not unjustifiable that a snack company, with regards to factors affecting the national economy, is relatively protected. Hence there is reason to believe that the beta in that case is in the low region. But is it a certain measure? Not by any stretch of the imagination. This is one of the many problems with private firm valuation, when you have no real comparable firms and in addition lack of information, forcing the analyst to basically make a wild guess. The bottom up beta is definitely not an ideal solution with only one company to compare with, but due to the lack of information and the poor regression model for accounting betas, it's the best we got.

The marked risk premium:

In the section where the Capital Asset Pricing model where discussed, it was found that the market risk premium had been found between ranges of 3 to 9,2 percent. This is a wide margin and based on foreign stock exchanges. From the governments website www.regjeringen.no, segment 9.7 the market risk price on the OBSE was found to be approximately 6% during the last 28 years by Johnsen(1996). He argued that the modernizing of the stock exchange from 1985 and the increase of foreign investor should make the risk

premium lower, and he concludes with a risk premium of 5 percent. Whether or not he is right, is not that important, it is probably a better estimate than those based on foreign exchanges.

The risk free interest:

On the web-page www.norges-bank.no, the yields on government bonds from 7th of may was found to be 2,06% for 3 years to maturity, 2,40% 5 years and 4,19% for those with 10 years to maturity. Since we are valuing a private firm, with an investor who is likely to have a much longer time horizon than your common stock investor, it seems reasonable to use to yield of the 10 year government bond as the input for the risk free interest.

Adjusting for non-diversification:

There was previously a discussion that argued that since most private investors are not diversified, as one assumes when using beta technology, that the beta and risk should be adjusted accordingly. The solution presented earlier was to estimate the correlation coefficient between the market index and the market beta for the security at which one has chosen as comparable. Since we don't have certainty in the company chosen even being comparable, and the fact that one has to compute the correlation coefficient, this seems like a solution not worth pursuing. Although sound in theory, rather than doing this, a premium will be added for this lack of diversification, based on excess returns observed in studies discussed previously in this paper.

Estimating the cost of equity:

With the unlevered Beta of 0,1289 from Rieber and Son, the next question is what debt/equity ratio Sørlandschips will attain. One could use the book values of debt and equity to calculate them, however Damodaran(2002) suggests other options as discussed previously. We discussed four other options to get from the levered beta to the unlevered, which where optimal debt ratio, target debt ratio, industry average or use the estimated values of equity and debt to estimate the ratio. Since the industry is not comparable the industry average solution is not preferable, a target debt ratio is not acquired and the estimation of debt and equity values will become circular. The optimal debt ratio will not be estimated because it is beyond the

scope of the thesis. We could perhaps use the debt/ratio of Rieber and Son, or use the book values, let's look at the differences in betas, ranging from 0,4915 to 3,23(the book value ratio)

Unlevered beta	D/E	Beta(levered)
0,1289	0,4915	0,17
	1	0,22
	1,5	0,27
	2	0,31
	2,5	0,36
	3,23	0,43

These beta values will be the range of which we will estimate a range for cost of equity's a little later on. It's definitely not perfect, but with private firm valuation puts serious limitations on the analyst, as far as the cost/benefit of doing estimations that in theory are more accurate. In this case the unlevered beta is assumed correct, or appropriate, and flexed with various degrees of D/E ratios. In reality the book D/E ratio is probably way too high, and there could probably be a range for the unlevered beta as well, but even though the potential method seems flawed, the range from 0,17 to 0,43 doesn't seem to farfetched concerning the nature of operations.

Now that we have the inputs needed for the cost of equity, lets recall the equation CAPM provides:

$$E(R_i) = R_f + \beta_i[E(R_m) - R_f]$$

With risk free interest of 4,19%, market risk premium of 5% and a levered beta of 0,17 we get the following cost of equity for Sørlandschips:

$$E(R_i) = 4,19\% + 0,17[5\%] = 4,8345\%$$

At first eyesight this seems way too low. Let see what happens to the cost of equity if we do a short sensitivity analysis on the beta's size.

Beta sørlandschips	Risk free interest	Risk premium	Cost of equity
0,17	4,19	5	5,04
0,235	4,19	5	5,365
0,3	4,19	5	5,69
0,365	4,19	5	6,015
0,43	4,19	5	6,34

With beta's ranging from 0,17 to 0,43 (assuming we believe it is in the low end, due to the nature of operations), we get cost of equity's ranging from 5,04% to 6,34%. Later on we will use these estimates to see how sensitive the valuation is on the cost of equity estimates here. Now before we proceed, recall that Ljungqvist and Richardson(2003) did a study on private equity that found excess returns of 5 to 8%, which they attributed to a compensation for illiquidity. However, lack of diversification and a potential value of control are also factors that might affect these excess returns. Therefore, let's leave the cost of equity as it is for now, and return to it when we try to implement the cost of illiquidity and the value of control.

Estimating the cost of debt:

Now that we have the cost of equity, the next step is to calculate the cost of debt, before applying the weighted average cost of capital equation to get to the cost of capital. As previously discussed we could either 1) Use the most recent loan interest, 2) Calculate interest coverage ratios or 3) Use industry average interest rates. Since there is very little information available, but the financial statements, it is not possible to find the most recent loan's interest. The industry average is neither preferable since as discussed, the industry on the stock market exchange really isn't the same industry as Sørlandschips AS is in. The interest coverage ratio's will neither be used, because as discussed it is too time consuming. There is no guarantee that those would apply for private firms. From a banks perspective, two firms of similar financial health and size should not be rated the same. The reason is that a public firm can easier raise new cash if needed, opposed to a private firm. The last potential solution then is to estimate the current interest expense based on the financial statements.

Given that the cost of debt is the interest at which the company can borrow, the most reasonable thing seems to calculate the financial expense in relationship financial obligations, instead of net financial expense compared to net financial obligations. Below are the calculated numbers.

Financial expense	2008	2007	2006
Sum annen rentekostnad	0	14 000	0
Sum annen finanskostnad	1 227 000	964 000	134 000
Total financial expense	1 227 000	978 000	134 000
Financial liabilities			
Other long term debt	15 516 000	0	0
Other short term debt	7 632 000	9 391 000	1 401 000
Total financial liabilities	23 148 000	9 391 000	1 401 000
Net financial obligations (NFO)	-22 264 000	-8 890 000	4 804 000
Financial cost/Financial obligations:	5,30 %	10,41 %	9,56 %

Here we have taken total financial expense and divided it by total financial liabilities, to get an estimation for the cost of debt. The years 2007 and 2006 seems at first eyesight to be an exception. In those years there were mainly short term debt financing, which naturally leads to higher financial expense, then with long term debt. We will take the 5,3% as an estimation for the cost of debt, as it does not seem like an unreasonable number.

Given the 28% corporate tax rate the cost of debt after tax is $5,3\%(1-0,28)=3,816\%$.

With the cost of debt at hand, we need the debt ratio before proceeding to the calculation of the weighted average cost of capital.

Debt ratio

As with the calculation of leveraged beta, we need to make the same assumptions here. For discussion on how to find the debt ratio, please look back to that segment. The debt ratio's discussed ranged from 0,4195 to 3,23, which was the comparable firm Rieber and Son vs the book value ratio. As an example, let's see what happens to the weighted average cost of capital with both outer limits.

The weighted average cost of capital formula looks like this:

$$R_c = R_E \left(\frac{E}{E + D} \right) + (1 - T_C) \left(\frac{D}{E + D} \right) R_D$$

Where $\left(\frac{E}{E+D} \right)$ is the weighted amount of equity, $\left(\frac{D}{E+D} \right)$ the weighted amount of debt, R_E the cost of equity, $(1 - T_C)$ the reduction of the cost of debt due to taxes and R_D is the cost of debt, before taxes. If you recall the cost of equity with the beta based on Rieber and Son's beta where 5,04% with a D/E ratio of 0,4915. And the estimation of the cost of debt of 5,3% calculated from the financial statements. When the D/E ratio is 0,4915, that is the same as

writing that $D(0,4915)/E(1)$, hence the $\left(\frac{D}{E+D}\right) = \left(\frac{0,4915}{1+0,4915}\right) \approx 0,33$, and similar, the $E/(E+D)$ ratio becomes $\frac{1}{1+0,4915} = 0,67$. So that gives us:

$$R_c = 5,04(0,67) + (1 - 0,28)(0,33)5,3 = 4,636$$

So with debt/equity of 0,4915 and the following leveraged beta we get 4,636% as the cost of capital. What if we go to the other spectrum? With 3,23 D/E ratio we get a $D/(E+D)$ of 0,7635 and a $E/(E+D)$ of 0,2364. And the cost of equity was 6,34%. This gives us;

$$R_c = 6,34(0,2364) + (1 - 0,28)(0,7635)5,3 \approx 4,412$$

So basically, in the two ends of the spectrum we get a cost of capital in the range of 4,636% to 4,412%. This is a tight range, but it does not have to be correct. As discussed in the theoretical part, illiquidity, value of control and lack of diversification are all factors that might affect the expected returns and hence the cost of capital for investing in a private company. In addition the beta is not found like one normally does either, by regressing stock returns on market returns, instead it's found by taking a single company's beta as given for the company in question.

There is an important point to take note of during this calculation of the weighted average cost of capital. The formula requires market value weights. In the first example, we take for granted that the market value weights of Riber and Son's equity and debt is equal to Sørlandschips, in the other, we take the assumption that the market values of debt and equity is scaled towards the book values. Both approaches seems farfetched, and when we finally calculate the values we will most likely get different weights again, thus changing the weighted average cost of capital. This is definitely a problem, a problem also recognized in estimating public firms weighted average cost of capital and value. In that case you would have market values available, but the reason for the analysis is that you are questioning the market values, or else the valuation itself would be pointless. A possible solution to this conundrum is like Damodaran(2002) says, to iterate towards a value. What this means is that you back and forth, starting with the book value ratios, then estimating a value, and use these

value for new weights in the WACC formula. You would continue doing this until the estimated values match the value weights in the WACC formula.

Later on, we will see that the WACC will not be used, instead it will be a direct approach to value the equity, and a discussion of what potentially could be wrong in assuming the debt, or the net financial obligations, are at market value. The solutions presented by Damodaran(2002) in regards of beta and the cost of debt are sound approaches, compared to what is done here, however in this particular case there is either not enough information, or the effort in calculating an unsure estimate is not worth undertaking.

Illiquidity discount, value of control and lack of diversification:

In the case of a private firm valuation, we know that we have to consider the illiquidity discount, the value of control and the lack of diversification. The previous studies have shown poor results with large potential standard errors, when thinking about the illiquidity discount. The study by Silber(1991) however showed us that a fixed discount seemed unreasonable. Even if unreasonable, his study only showed 29% explanatory power. As discussed in the theoretical part of the illiquidity discount, there are several factors that determine the magnitude of the discount; Liquidity of assets, financial health, size, control component and volatility to mention a few. Some of the studies show us how to try to incorporate these differences, as for instance the one factor in Silber's regression was the amount of revenues. The question however remains, are the results trustworthy? Damodaran(2002) chose an arbitrary liquidity discount, as a base discount, and used Silber's regression to adjust for variations in his factors, when estimating the discount.

This is theoretically sound because Silber's regression denied the hypothesis of a fixed discount. However, three important critiques come to mind if doing so. First is that the regression from 1991, and might be a little outdated, and the second is the low explanatory power of 29%. Thirdly, the study was based on restricted stock studies, not private equity. Since private equity trades so rarely, it is not possible to get a good regression there either, but there have been studies on their returns when compared to public equity. The factors that affect the illiquidity discount are sound in theory, but given the poor studies and complexity of factors, this is a task that has less return than it should according to the cost put into it. You might not end up with more than a guess even if you try to implement all the factors.

This brings us to the second possible solution. The study of private equity returns by Ljungqvist and Richardson(2003) found excess returns of 5-8%. Their study will be used as a basis for computing an adjusted cost of equity, which implements both the notion of illiquidity and some compensation for the lack of diversification. Their study was based on private equity funds, and not a single private entity, but nevertheless, it's the best we got. This study does not give us the direct opportunity to adjust for the factors mentioned above, but it has others benefits. The first is that it is fairly new, and might therefore be more relevant. The second is that its based on private equity, which is what we are trying to value. The third benefit is that it most likely contains some of the expected compensation for investing in assets with lack of diversification. However, private equity investors and investors who purchase an entire private company have a different degree of control. As Damodaran(2005) mentions, there might be some excess returns related to the fact that private equity investors has a certain amount of control, but in this scenario we are assuming full control. This value of control will be shown later, but for now let's assume that the premium for both illiquidity and lack of diversification is somewhere around 5 to 8% in regards to excess returns. Since the study was based on private equity funds, it is difficult to relate the spread of 5 to 8% in excess returns to the determinants of the discount, like Silber tried in 1991. However, a possible shortcut could be to look at the sample mean of his regression, and link it up towards the range of 5-8% excess returns. The sample mean earnings were 5,472 million, the revenues mean was 240 million and the mean discount was 33,75%. Sørlandschips AS revenues were approximately 113,8 million and their revenues 3,75 million. Although below the mean of the study by Silber their profit margins were better ($3,75/113,8=3,3\%$, Sørlandschips) versus ($5,472/240=2,28\%$, Silber study). To try to link up the restricted stock studies towards the excess returns studies for private equity funds is by no means an accurate way of knowing in which end of the spectrum Sørlandschips AS illiquidity discount is. However, there are not many alternatives, so in essence the best thing to do is to take both outer bounds of 5% to 8%, and calculate the values with each.

Adjusting the return for equity and the WACC:

Based on the two outer points of leveraged beta, dependent on a D/E ratio 0,4915 or a D/E ratio of 3,23(Riber and Son or Book value) we will calculate the implications on both the

cost of equity, and the weighted average cost of capital, from the range of 5% to 8% excess returns due to factors like lack of liquidity and the compensation for lack of diversification:

Calculation of the WACC						
1)	Levered beta		0,17			
Re	E(E+D)	(1-Tc)	D(E+D)	Rd	Rc	
5,04	0,67	0,72	0,33		5,3	4,64
10,04	0,67	0,72	0,33		5,3	7,99
11,04	0,67	0,72	0,33		5,3	8,66
12,04	0,67	0,72	0,33		5,3	9,33
13,04	0,67	0,72	0,33		5,3	10,00
2)	Levered beta		0,43			
6,34	0,2364	0,72	0,7635		5,3	4,41
11,34	0,2364	0,72	0,7635		5,3	5,59
12,34	0,2364	0,72	0,7635		5,3	5,83
13,34	0,2364	0,72	0,7635		5,3	6,07
14,34	0,2364	0,72	0,7635		5,3	6,30

Where Re is the cost of equity, $E(E+D)$ is the weighted value of equity, $(1-T_c)$ is the tax multiplier to determine the cost of debt, $D(E+D)$ is the weighted value of debt, R_d is the pre tax cost of debt and R_c is the weighted average cost of capital.

As you can see, the cost of equity ranges here from 10,04% to the maximum of 14,34%. In addition the WACC ranges from 5,59% to 10%. This is assuming that the basic cost of equity numbers without any consideration (5,04 and 6,34%) of illiquidity and diversification are unreasonable. This calculation of the WACC was done to illustrate the potential fluctuation based on uncertain parameters. As mentioned it will not be used, which the reason will be somewhat revealed in the next segment. However, it suits its purpose to illustrate the potential effect the uncertainty of private firm valuation might have on discount rates. Before we jump into the valuation part of this thesis, let's review the reformulation of the financial statements of Sørlandschips AS.

Reformulating the balance statement:

In order to reformulate the balance statement, one has know the business (Penman,2010). What is meant by this is the knowledge on how the business in question makes its money. What is perceived to be a financial asset might be an operating asset, depending on what business we are referring to. For example a bank makes its money from the interest spreads between borrowing and lending, and hence these accounts are operating assets, not financial assets and liabilities, as it would be described in many other businesses. The firm in question is as noted an industrial firm, which produces and distributes potato

chips in Norway. This makes it somewhat easy to define what is operating or financial assets, at least in theory.

Lot building and property, this was 0 before 2008. Other long term debt increased with 15 million same period. They had corporation contributions in both years before, approximately 6 million. Once they bought the lot they lost this. Could they have had a holding company that owned the building? I think it's safe to say the lot, property and building is an operating asset, as its countermeasure, rent would classify as an operating expense since it's the structural part of the business. Matters would be handled differently if the company invested excess cash in property, as an alternative to deposits. Machines and plant is another category which is quite simple to define as an operating asset, since it's crucial for an industrial company. Moveable property, tools and equipment fall under the same classification. The same goes for inventory which is needed to ensure that the company can deliver its merchandise in short notice from when the demand occurs. Accounts receivable is perhaps a bit trickier to classify, depending on whether it bears interest or not. According to Penman (2010) a trade note can be classified as a financial asset if it bears the market interest. However if it's used to attract customers its interest claim should be classified as an operating asset. In this case there is limited information, due to the fact that it's a private firm and there were no notes to elaborate whether or not these notes bears interest, so it's classified as an operating asset. When it comes to the post other receivables we run into to the same problem of lack of information so it's classified as an operating asset. On the other hand we also have to classify the operating liabilities.

Deferred tax liabilities are an example of an operating liability. The reason is that deferred taxes almost always is a result from accounting differences when calculating the operating income component of taxable income and reported book income (Penman,2010). Income taxes payable fall under the same description, since it is a product of the income generated by operations. Accounts payable is treated similar to accounts receivable in the respect of market interest and purpose of writing them. Since we have no such information the safe bet is to classify them as operating liabilities. Deferred government expenditures is classified as operating liabilities, as it is safe to assume these include value added tax and other taxes demanded to run the business. Short term corporation debt is in this case defined as an operating liability since it is likely due to exchange of services and products between divisions. The post cash and cash equivalents is a post that in many cases could profit from further investigation. The reason being is that this post can include cash with different

purposes. As Penman (2010) states it depends on whether the cash is working cash or cash invested in short term interest bearing securities and financial assets. Again, since this information is not available Penman (2010) recommends classifying this as operating assets. The two last post, other short term and other long term debt is safe to classify as financial liabilities, since no other information is available.

In order to arrive at the free cash flow statement we also have to reformulate the income statement.

Reformulation of the Income statement:

Now that we have reformulated the balance sheet, the next on the agenda is to reformulate the income statement, before valuation. The reason to do this, is as Penman(2010) mentions to recognize what parts of the financial statements that are income generated from trading with customers, and the daily business, from financial activities. The first point to look into is the fact that the earnings number in regular income statements are affected by tax reduction/increase due to financing activities. This has to be adjusted, so we can see the true amount generated from operations.

Tax allocation:

In order to know what exact amount of income that comes from operating activities, we need to separate the tax benefit(normally) from financing activities. Interest paid acts like a tax shield as it is tax deductible. To do this the first thing is as mentioned by Penman(2010) to estimate the tax shield/benefit from financing activities(Penman,2010,pg 303):

$$\text{Tax benefit} = \text{Net interest expense} * \text{Tax rate}$$

In order to get to what the operating should be, if there were no financial activities, we use this formula(Penman,2010,pg 304):

$$\text{Tax on operating income} = \text{Tax expense as reported} + (\text{Net interest expense} * \text{Tax rate})$$

Again, the reason we're doing this is as Penman(2010) says, to view the profitability from operating activities by themselves. This again gives us the opportunity to use the residual operating income model, not previously discussed, but neglected due to reason to later to be revealed. The tax allocation and the reformulated income statement will be shown later in this segment.

Potential problems when reformulating the income statements:

The main point of doing a reformulation is to match the assets/liabilities on the balance sheet to the income/expenses reported in the income statement. Lack of disclosure can as Penman(2010) says cause problems in this separation process. This is especially true when it comes to the private business in the case demonstration. From the outside analyst point of view, it is basically impossible to separate some of the items, and this will be shown in the application part. Much more could have been said about the reformulation, of both income and balance sheet. However, there are constraints in the thesis, and the fact that reformulation is virtually impossible to do correct (as will be demonstrated), gives little incentive to elaborate further.

The reformulated balance sheet and income statement:

Below you will see the reformulated income statement and balance sheet, and a discussion on which issues that arise when trying to separate the activities.

Reformulated Balance sheet	31.12.2008	31.12.2007	31.12.2006
Operating assets			
Lot, buildings and property	7 159 000	0	0
Machines and plant	17 173 000	18 815 000	11 679 000
Mov prop, equipment and tools	0	73 000	117 000
Total inventory	4 105 000	2 835 000	2 512 000
Accounts receivables	21 703 000	1 962 000	8 412 000
Other receivables	2 900 000	803 000	116 000
Total operating assets	53 040 000	24 488 000	22 836 000
Operating Liabilities			
Deferred tax liability	580 000	412 000	323 000
Accounts payable	16 130 000	4 414 000	13 351 000
Tax payable	795 000	21 000	819 000
Deferred government expenditures	532 000	485 000	-526 000
Short term corporation debt	0	0	3 671 000
Total operating liabilities	18 037 000	5 332 000	17 638 000
Net operating assets(NOA)	35 003 000	19 156 000	5 198 000
Financial assets			
Cash and cash equivalents	884 000	501 000	6 205 000
Total Financial assets	884 000	501 000	6 205 000
Financial liabilities			
Other long term debt	15 516 000	0	0
Other short term debt	7 632 000	9 391 000	1 401 000
Total financial liabilities	23 148 000	9 391 000	1 401 000
Net financial obligations (NFO)	-22 264 000	-8 890 000	4 804 000
Common shareholders equity			
Share/company capital	3 705 000	3 705 000	3 705 000
Total retained earnings	9 034 000	6 562 000	6 297 000
Total Equity (CSE)	12 739 000	10 267 000	10 002 000

As previously mentioned, there were some areas where there could be uncertainty regarding whether the items in the balance sheet have been correctly placed or not, due to the lack of disclosure. In specific, the property of 7,159 million NOK could be an investment, which is supposed to generate returns, without it having to do anything with the operating activities. It could also be an operational asset, if one assumes it is necessary for the daily operations.

Accounts receivables and accounts payables can also potential bear interest, if one has to 1) Either pay interest on longer deadlines to ones suppliers or 2) Claim interest to longer deadlines on accounts receivables for customers. Another potential pitfall is the cash and cash equivalents.

Cash could either be investment in interest bearing securities like bonds, or working cash to cover the daily requirements for liquidity. To better get an understanding of what causes what, let's take a look at reformulated income statement, and see where the confusion arises.

Reformulated income statement:

Reformulated Income statement:	2 008	2 007	2 006
Operating revenues	113 874 000	96 580 000	87 871 000
Cost of sales	51 867 000	43 780 000	34 566 000
Gross margin	62 007 000	52 800 000	53 305 000
Operating expenses			
Salaries	6 986 000	6 887 000	6 519 000
Depreciation intangible assets	3 320 000	2 321 000	1 616 000
Other operating expense	45 876 000	37 674 000	37 378 000
Operating income from sales (before tax)	5 825 000	5 918 000	7 792 000
Taxes			
Taxes as reported	1 458 000	1 397 000	2 156 000
Tax on financial items and other operating inc.	-174160	-264320	-25480
Operating income from sales (after tax)	4 192 840	4 256 680	5 610 520
Financial income (expense)			
Interest income	0	34 000	43 000
Other financial income	605 000	0	0
Other financial expense	1 227 000	964 000	134 000
Interest expense	0	14 000	0
Net interest expense	-622 000	-944 000	-91 000
Tax effect (0,28)	-174160	-264320	-25480
Net interest expense after tax	-447 840	-679 680	-65 520
Comprehensive income	3 745 000	3 577 000	5 545 000

The first thing to take note of is that there is reported interest income in 2006 and 2007, of 43000 and 34000 respectively. This should then be related to some of the financial assets. In 2006 we had cash and equivalents of 6,205 million, and 0,501 million in 2007. Hence at first sight it seems like some of the cash and equivalents are interest bearing securities. However, in 2008, this interest income disappears, although cash and equivalents are still positive. This could mean that the cash and equivalents in 2008 were working cash only. The problem is how do we separate it? We have no information on the interest, so determining what is working cash and what's not is a very difficult task. You could argue that the cash and equivalents should be reported as financial assets in 2006 and 2007, and operating asset in 2008, since it appears to be working cash only.

The next potential issue is the sudden reported financial income of 605 000 in 2008, with no previous recordings in 2007 or 2006. This should imply that there should be a

financial asset of such a magnitude that it could justify such a financial income. As we can see the only one is cash and equivalents, and since the financial income is almost as large as its proposed counter measure on the balance sheet, we can rule that out. So what generated this amount of financial income? Lot, building and property went from 0 to 7,159 million NOK, from 2007 to 2008. If one imagines some of the operating expenses in 2007 and 2006 to be renting costs associated with the lot, building and property item, then perhaps they recorded the savings as financial income. However if so where the case, it should be reported as an operating income, since the fact that you have to rent a building to produce your merchandise is an operating activity. On the other hand, accounts receivables increased from 1,962 million to 21,703 million during the same period. In this period there where a financial crises that emerged, so perhaps their customers were unable to pay on time, and needed longer credit, which then causes the financial income. If that where the case, one would perhaps assume that the same goes for accounts receivables, is this measure also increased significantly, from 4,414 million to 16,130 million. However no financial expense of the same sort is reported. The last perhaps peculiar incident from 2007 to 2008 balance sheets, was the change in finance structure and the cost of the debt.

In 2007 there were no long term debt recorded, only short term which accounted to 9,391 million and the other financial expense where 964 thousand. This would account to a pretax borrowing cost of 10,26%. In 2006 the short term debt was 1,401 million with 134 thousand other financial expenses. This results in a pretax cost of debt of 9,56%. However, if we assume that the borrowing cost for this short term borrowing is approximately 10%, what happens that cost if we look into the long term loan separately? The amount of short term debt was 7,632 million that year, and with 10% assumed interest we would get 763,2 thousand interest due to short term debt. The total amount of interest was 1 227 thousand leaving 463,8 thousand for the long term loan of 15,516 million. That would leave the long term interest to approximately 3%. What's interesting about this is the fact that the interest given by the Norwegian bank at this year was ranging between 3% to 5,75% (http://www.norges-bank.no/templates/article_67652.aspx), with 3% being at the end of the year. This happened due to a collapse in the financial market following the financial crises. In addition to this we know the government established funds of 100 billion NOK in order to help businesses (and households) during this period (<http://arbeiderpartiet.no/Aktuelt/Nyhetsarkiv/Skatter-avgifter-og-oekonomisk-politikk/Tiltakspakke>), to make it easier to get loans. The fact that this happened makes it a

question of whether or not the current structure is equal to the cost of debt, in the respect that the low interest loan was a temporary event.

To sum up, there were issues with the reformulation of both the balance sheet and the income statements. What part of cash and equivalents that relate to working cash (operating asset) or interest bearing securities (financial assets) were hard to define. The large financial income reported in 2008 was also an issue. Is it from the lot, property and building or a part of interest payments from accounts receivable? Lastly, the cost of debt is elusive as well. The assumed low loan interest on the long term debt makes it hard to predict whether or not the current loans are at market value. One could argue that if this interest is long term, than there will be residual expenses related to it, if for instances the market interest changes within the next years. Originally the thought was to use the model of residual operating income, since one does not have to assume anything about the value of debt, other than its book value equals market value. However as Penman(2010) states the RE model should be used if we cannot separate financial and operating activities, and if the debt is not recorded at market value, which seems to be the case here.

RE calculation:

As discussed previously the Residual earnings method should be used rather than residual operating if 1) We can't separate financial and operating activities and 2) The cost of debt is not equal to the net financial expense. As mentioned, the fact that net borrowing cost has decreased dramatically through refinancing to more long term debt, suggests that the rate at which they borrowed may not be the rate at which they could. This also implies that perhaps the current borrowing cost is not the optimal one. Therefore we will first try to value the equity, and then separately try to value the net financial obligations, to arrive at a value of the firm. The real cost of debt will be as discussed a measure under high degrees of uncertainty.

A critical part to the valuation is the estimation of the growth rate in residual earnings. Normally one would perhaps look at several years of financial statements, and analyze the changes in the two value drivers of Residual earnings, ROCE and book value of common equity. In this case we don't have that luxury. Instead, let's remind ourselves of the industry which Sørlandchips is in. Potato chips and other snacks is a mature industry, no doubt about

that. In essence it is a stable business, in respect of consume. Numbers from www.ssb.no, a statistical database, shows us that the consume of potato products (which I can only assume represents snack based products) have been under a stable growth of 4,5 kg's per person from 1997-1999 to 5,2 kg's in the period 2006-2008 (Statistisk sentralbyrå, 2008, Emne 05 Personlig Økonomi og Boforhold). In addition, as most people have recognized, there have also been a healthier trend recent years, focusing on healthy foods, losing weight, various supplements etc, that have grown in popularity. The reason this is discussed is that there is not much else information to rely on, when trying to uncover which case type of valuation the business is in.

Recall that we have three cases of residual earnings valuation. The first case is where you assume the residual earnings to converge towards zero, and that there is no residual earnings to calculate a continuing value. Logically this seems appropriate for a firm that currently has a competitive advantage at which they are assumed to lose due to increased competition or a less attractive market.

The second is when you have residual earnings at the forecast horizon, enabling you to calculate a continuing value of residual earnings, which is expected to remain at a constant level. Again, this seems appropriate for a business that is expected to maintain a certain competitive advantage, and earn returns over the average of the industry. The reason it's proposed this way goes back to the discussion in the theoretical part. If all firms within a business have residual earnings (excess earnings), then unless there are restrictions in entering this market, suggests there is something seriously wrong with all microeconomic theory.

The third is a firm which it seems appropriate for growing residual earnings (excess earnings) at the unforeseeable future, enabling it to maintain and strengthen its competitive advantage.

Before choosing the appropriate case, let's look at the calculated residual earnings to the end of 2008.

Pe	0,1004			
	2005	2006	2007	2008
Earnings		5 544 000	3 577 000	3 745 000
Dividends				1 273 000
Book value	4 458 000	10 002 000	10 267 000	12 739 000
RE(10,04% charge)		5096416,8	2572799,2	2714193,2
RE growth rate			-49,52 %	5,50 %
Value drivers				
Roce		124,36 %	35,76 %	36,48 %
Change in book values		124,36 %	2,65 %	24,08 %

Here we have chosen the price of equity of 10,04%, the low end discussed in previous segments regarding cost of equity and the compensation for illiquid investment and lack of diversification. The book value of common equity in 2005 is calculated through the stocks and flows equation $CSE_t = CSE_{t-1} + Earnings_t - Net\ dividends_t$, from Penman(2010) chapter seven. We don't know the net dividends but the assumption is there where none like most other years. A special note is the fact that there were no reported dividends in 2008 in the original income statement. However, the stock and flows equation for common stockholders equity, does not add up if there were none in 2008.

$$CSE_t = CSE_{t-1} + Earnings_t - Net\ dividends_t$$

Where we get:

$$12,739\ mill = 10,267\ mill + 3,745\ mill - Net\ dividends_t$$

Solved for net dividends we get that:

$$Net\ dividends_t = 10,267\ mill + 3,745\ mill - 12,739\ mill = 1,273\ million$$

The growth rate of residual earnings in 2007 was negative 49,52%, versus positive 5,5% in 2008. ROCE declined from 2006 to 2007 and then increased slightly to 2008. The book value of equity has increased the entire period with very varying rates. From these numbers it's very difficult to get a sense for where the future numbers are going. The first reason is the few years of accounting numbers, the second reasons is the degree of variation in the key figures. Although not optimal, the assumption to be made is that the company follows a fixed residual earnings, following 2009, towards "infinity". The residual earnings grew in 2008 but this might be due to the unexplained financial income in 2008, previously discussed.

The declination in operating income in 2008 might partly be because of the financial crises, although as discussed, we assume this company not be as affected by others by such events(the beta discussion). In summary, the steady residual earnings assumption seems like a conservative assumption, perhaps appropriate with the limited information at hand.

The residual earnings where as presented, was 2 714 193 NOK in 2008. Assuming this continues for the near future we input the book value of 2008 in the residual earnings formula and solve for earnings:

$$2\,714\,193 = \text{Earnings}_t - (0,1004 * 12\,739\,000)$$

$$\text{Earnings}_t = 2\,714\,193 + (0,1004 * 12\,739\,000) \approx 3\,993\,189$$

This gives us the following formula for the equity:

$$V_{2008}^E = B_{2008} + \frac{RE_{2009}}{P_E - 1}$$

$$\text{Where we get: } V_{2008}^E = 12,739 + \frac{2,714193}{1,1004-1} \approx 39,77 \text{ million}$$

Before we get to the attempt of valuing the debt, and get a firm value, let's look at the value we receive from this model assuming the cost of equity is in the high end instead, as previously discussed. Below is the calculation of new RE with a different discount rate:

Pe	0,1434			
	2005	2006	2007	2008
Earnings		5 544 000	3 577 000	3 745 000
Dividends		0	0	1273000
Book value	4 458 000	10 002 000	10 267 000	12 739 000
RE(10,04% charge)		4904722,8	2142713,2	2272712,2
RE growth rate			-56,31 %	6,07 %
Value drivers				
Roce		124,36 %	35,76 %	36,48 %
Change in book values		124,36 %	2,65 %	24,08 %

Due to the higher discount rate, the residual earnings have changed as well. Following the same assumption of steady residual earnings in 2009 and beyond, the new number is 2 272 712 million approximately. The new value then becomes:

$$V_{2008}^E = 12,739 + \frac{2,272712}{1,1434 - 1} \approx 28,59 \text{ million NOK}$$

The difference in value is striking, from 39,77 to 28,59 million, from 10,04% cost of equity to 14,34% percent, which accounts to a difference of 39,1% increase, going from 14,34% to 10,04%. Take note however, that in the second case, the implied earnings growth from 2008 to 2009 is higher than it was with the 10,04% equity cost. This stems from the fact that the required rate of return is higher and hence the earnings in 2009 will be deducted a larger value, to get to the residual earnings. If taken for granted the value of equity is between 28,59 million and 39,77 million NOK, we will now proceed to look into the value of the debt.

Now remember, the 10,04% cost of equity is based on the lowest excess return of 5%, and the lowest beta calculated earlier. The second valuation is based on the highest excess returns of 8% and the highest calculated levered beta with the book D/E ratio. The excess return study was as discussed based on private equity fund investment, who's excess returns might partly be affected by lack of diversification in addition to the lack of liquidity. In that respect one would assume an investor purchasing an entire firm instead to be more affected by this lack of diversification. In that respect the value based on the highest discount rate seems more appropriate, to account for some of this. As noted before, we don't really know which of the factors (illiquidity, lack of diversification or value of control), contribute to this excess returns, so it is in essence a poor valuation regardless of which end of the spectrum one chooses. But if forced to make an assumption about the value, a value of equity closer to 28,59 million seems the most reasonable.

Value of debt(net financial obligations)

If you recall the reformulation of both the income statement and the balance sheet, there were some problems in determining where the different element belonged as far as operating or financial activities are concerned. As a recap the cash and equivalents were difficult to separate, as far as what was working capital or interest bearing securities. There were also the fact that there were a rather large amount of financial income in 2008 which had no financial asset to measure up against. Thirdly, the interest on the long term loan in 2008 seemed very low, at least considering a long term perspective, and in addition to this, there were a restructuring of long term/short term debt, and were previously no long term debt was recorded.

All these elements suggest that the true cost of debt, and whether or not the net financial obligations are at market value, seems uncertain. We could of course assume that it was at market value, but that does not seem appropriate. As an example, consider the apparent loan interest of approximately 3% on the long term debt to be lower than the market interest. This would yield a benefit for the company, since it would then be able to pay interest less than long term market interest. In this example we assume that the prevailing market interest for such a loan is 4%, and that the loan is paid back in its entirety at the end of the 10 year period. Below is the calculated value of net financial expense:

Year	0	1	2	3	4	5
Interest reported		463 800	463 800	463 800	463 800	463 800
Net interest cost		333936	333936	333936	333936	333936
interest rate	0,02152204	1,02152204	1,04350728	1,06596569	1,08890745	1,11234296
Book value	15 516 000					
Residual financial expense		-112924,8	-112924,8	-112924,8	-112924,8	-112924,8
Discount rate		1,0288	1,05842944	1,08891221	1,12027288	1,15253674
Present value Residual expenses		-109763,608	-106690,91	-103704,228	-100801,155	-97979,3496
Cosf of debt(after tax)	0,0288					
Year		6	7	8	9	10
Interest reported		463 800	463 800	463 800	463 800	463 800
Net interest cost		333936	333936	333936	333936	333936
Discount rate		1,13628285	1,16073798	1,18571943	1,21123853	1,23730686
Residual financial expense		-112924,8	-112924,8	-112924,8	-112924,8	-112924,8
Present value Residual expenses		1,1857298	1,21987881	1,25501132	1,29115565	1,32834093
Total value residual expenses		-95236,5373	-92570,5067	-89979,1084	-87460,2531	-85011,9101
						-969197,6

Since we assume that the debt currently has a current interest lower than the market rate of interest there is a residual from having such a loan, similar to what we saw with earnings. The loan is cheaper than it should have been and hence generates residual net financial expenses which is calculated like this(Penman,2010,pg 442):

$$\text{Residual net financial expense} = NFE_t - (p_d - 1)NFO_{t-1}$$

Where NFE_t is net financial expense, p_d is the cost of debt and NFO_{t-1} is net financial obligations. Since we assume that the loan currently is at a lower interest than the market interest, the Residual net financial expense is expected to become negative, as the sum shows. These numbers are of course on an after tax basis. The present value of the residual financial expenses is 969 197 kroner. If we then assume that the rest of the financial obligations are at market value the new value of the net financial obligations is the market value of the net financial obligations plus the present value of residual net financial expenses which is: 22 264 000+ 969 198=23 233 198 million.

Take note that this is a hypothetical example. There is no information revealing either the interest on the long term debt or the short term debt. In addition we don't know the maturity of these loans or the repayment plan. In addition there were other issues as well in the reformulation, that could have had implications on the value of net financial obligations. This was merely an example to illustrate what the net financial obligations could have been worth if indeed the interest was too low, in relation to the market interest.

Residual earnings and the value of debt: Can we trust these results?

With private firms there is a potential problem with earnings reported in the financial statement as previously discussed. Management might have reported to large salaries instead of dividends, discretionary expenses might be present and in general the accounting rules from public to private firm might differ. This might make the residual earnings model more inaccurate than it by normal standards is.

In addition, the inputs for estimating the cost of equity is also more suspect than usually. With public firms it is hard enough to get an estimate of the cost of equity, but with private firms we have encountered more problems. The lack of accounting information, the fact that private firm rarely trades, and the fact that the industry at which Sørlandschips AS is in is not comparable to the OBSE industry, makes the beta estimate highly uncertain. There are by no means of the imagination reason to trust these estimates.

We also saw from the reformulation of the financial statements and the cost of debt calculation, that the value of the debt is also an uncertain measure. The other problem was determining what potential case of valuation Sørlandschips AS were in, since the three year accounting data does not give much to go on, and that there are little public information which could lead to a justifiable conclusion. All these issues give an incentive to try to use the method of comparables in addition.

Method of comparables:

In addition to the residual earnings model valuation, we will also try to value the equity of the firm by using the method of comparables previously discussed. There have been large amounts of complications and difficulties in estimating the parameters needed for normal valuation, giving the output results in the residual earnings model little precedence. Even though we discovered that the industry at which Sørlandschips AS is in, is not directly relatable to the industry on the OBSE, perhaps it still could be used, at least as a reference point. As mentioned previously investment bankers floating initial public offering often refer to the methods of comparables in order to get a feel for what the offering should be made at. The first thing in the application part, is going through the three steps noted by Penman(2010). The first is to identify the comparable firms.

The firms have partly already been identified, through the part where we tried to find a comparable beta for Sørlandschips AS. Only Rieber and Son were viewed upon as comparable, from the stocks listed in the same industry in the OBSE. However, let's assume we view the credential of a comparable firm as a firm that gets most of their revenues from selling food. Lets remind ourselves what Damodaran(2002) concludes as credentials for making the assumption of a comparable firm. He stated that risk, growth potential and cash flows where the most important aspects of what is defined as a comparable firm. Another way of looking at it is to assume firms within the same industry share these characteristics, although not always entirely true, as discussed previously. Lets for now assume the companies within that industry are comparable, in terms of risk, growth and cash potential, even though we discussed previously this is probably not the case. In addition, lets assume Ekornes ASA is valid subject as well, due to its similar risk profile (beta) as Rieber and Son ASA.

With the comparable firms at hand we need a set of multiples at which we desire to measure the firms intended market value. The most common ones, Price/Earnings, Price/Sales and Price/Book will be used. In the price/earnings discussion previously, there were three different ways of measuring this ratio. We could either use recent financial year's earnings, the expected next years or the trailing 4 quarterly earnings in the denominator. Since future expected earnings are included in the price, the most reasonable thing seemed to use the expected future earnings. Since we don't have such measures for this firm we will have to settle with recent financial years earnings which are for the year 2008. Related to the earnings

measure, we might also stumble upon firms with negative earnings, at which the Price/earnings ratio makes little sense. This issue will be addressed in step number three, when calculating the multiples and choosing which metrics/methods to give weights to the different multiples.

When choosing the weights of the firms multiples, it's important to remember that the metrics chosen has implicit assumptions connected to them. If you chose geometrical average you are basically assuming that the industry in average has similar risk, growth and cash flow potential (or earnings if you prefer). Before calculating the multiples and the estimated value of Sørlandschips AS equity, recall the betas of the comparable firms:

Betas	
Aker Seafoods	0,4726
Ekornes	0,1759
Codfarmers	0,7624
Lerøy seafood	0,2302
Rieber and Son	0,1745
Average Beta	0,36312

By definition, we know that risk affects the multiples, as shown by the reverse engineering in the theoretical discussion of comparable valuation. The observant reader will notice that some of the firms were taken out the sample. The reason is simply lack of annual rapports, stock prices at that time etc. If we follow the assumption made earlier, that Sørlandschips AS exposure to systematic risk is probably quite low, we could make a weighted average where we take this into consideration. Below is a calculation of the multiples, with the weights of 1/10 on Aker Seafood's and Codfarmers, which have the highest beta, 2/10 on Lerøy Seafood and Ekornes, and finally 4/10 to Rieber and Son the company viewed most comparable. Based on this the following value came from the different multiples:

Sørlandschips		P/E weighted	P/S weighted	P/B weighted	Value of equity
Sales	113 874 000		0,55		62881933
Earnings	3 745 000	10,96			41033493
book value	12 739 000			1,22	15507664
				Average value	39807697

As you can see the different multiples give very different outputs as far as value is concerned, from 15,5 million to 62,9 million(approximately). However, take note that the average value of 39,8 million is fairly similar to the value calculated with the residual

earnings model, when we had 10,04% cost of equity. A note of interest is that the negative earnings multiples were in fact included in this estimation. Part of the reason this was done is because if you use the average, or different weights, the implications are not as pronounced, even though as a standalone measure, it makes no sense. In addition, and perhaps more importantly, taking away the negative earnings measures makes the estimation skewed, towards the high end of the P/E range. The calculation and the numbers can be found in appendix 3. The question now is, is this the best we can do as far as comparable valuation is concerned in regards to private firms? Recall that the accounting standards might be different and the fact that there might be discretionary expenses in private companies, making the earnings measure somewhat unreliable or uncomparable to public firms. If this is indeed the case we could follow the weighted approach above and add weights concerning which multiple is most appropriate. The weights are given arbitrary, to illustrate the fact that we trust the Price/Earnings measure the least:

Sørlandschips		P/E weighted(10%)	P/S weighted(45%)	P/B weighted(45%)	Value of equity
Sales	113 874 000			0,55	28296870
Earnings	3 745 000	10,96			4103349
book value	12 739 000			1,22	6978449
				Weighted value	39378668

Here the Price/earnings multiple were given only 10%, Price/sales 45% and Price/Book value 45%. The value here is only slightly lower (39,38 million) than the one where no such considerations were made (39,38 million). In appendix 3, you will find different ways of calculating these multiples. In addition to these two estimations there have been done three additional ones. One where the arithmetic average is applied (for the weights), the second where negative price/earnings multiples were removed and the third where the earnings and market value were aggregated to get a Price/earnings ratio. For the specially interested these can be found in the appendix 3.

There are some things that have to be noted if using such multiples for private firms. The first is that the public firms are not subject to the illiquidity discount, lack of diversification and the potential value of control. So in essence, even if it theoretically were completely comparable, the multiples would most likely overvalue the private equity, given that the lack of diversification and illiquidity discount is larger than the value of control. Given that we think the value is too high, and would like to attach a illiquidity discount on the

value, we could perhaps use the fixed discount of 20% found in the more recent studies on restricted stock discussed in the illiquidity part of the thesis.

The value of the equity in the last examples approximately 39,38 million. A 20% discount would yield a value of $(39,38/1,2) = 32,82$ million. As you recall this was the most recent study on restricted stock and probably more appropriate than the older studies. Ideally we would like to attach a discount for the lack of diversification as well, but it will suffice that we know this value might be too high due to this.

In addition, these multiples are calculated based on numbers from 2008, when there were worldwide financial crises. Behavioral finance is not a topic for this thesis, but there might be some undervaluing going on in the part of the recession when almost all investors are overwhelmed with fear of losing money. So basically, even if totally correct, the estimate of 32,82 million could 1) be too low because of a pessimistic market and 2) be too high due to not including a compensation for diversification.

Discounted cash flow calculation and valuation:

The discounted cash flow model was only briefly discussed in the theoretical segment and the application of this model will be brief as well. There are several reasons for this, and the most important ones stem from the private firm in question. As discussed, there were several disadvantages mentioned by Penman(2010) in his segment regarding the discounted cash flow model. The recap, they were: 1) DCF valuation is partly a liquidation concept, and treats investment as a loss of value 2) Fails to recognize value created in the short run, 3) Forces the analyst to sometimes build high weights into the continuing and speculative part of valuation and 4) Is difficult to use when faced with firms with current negative cash flows.

In this case there were no cash flow statement reported, so instead of forecasting accruals etc the methods used to calculate the free cash flows were method 1 and 2, described by Penman(2010,pg 342):

$$\text{Method 1: } C - I = OI - \Delta NOA$$

Where C-I is the free cash flow, OI is comprehensive operating income and ΔNOA is change in net operating assets. The second method is to use the net financial obligations/assets change as a starting point instead:

Method 2: With either Net financial obligations (Penman,2010,pg 342):

$$C - I = NFE - \Delta NFO + d + \text{Min. interest in income} - \Delta \text{Min. interest in the balance sheet}$$

Or with net financial assets:

$$C - I = \Delta NFA - NFI + d + \text{Min. interest in income} - \Delta \text{Min. interest in the balance sheet}$$

The first formula is when you have net financial obligations and the second where you have net financial assets. Below are the free cash flows calculated using both methods:

Method 1)			
	2008	2007	2006
Operating income	4 192 840	4 256 680	5 610 520
Net op. Assets	35 003 000	19 156 000	5 198 000
Delta Net op.assets	15 847 000	13 958 000	
FCF	-11 654 160	-9 701 320	
Method 2)			
	2008	2007	2006
Net financial assets/obligations	-22 264 000	-8 890 000	4 804 000
Delta NFO(NFA)	13 374 000	13 694 000	
Net financi income/expense	-447 840	-679 680	-65 520
dividends	1 273 000	0	0
Minority interest in income	0	3 312 000	2 643 000
Minority interest on balance sheet	0	0	3 671 000
Delta minority interest balance sh.	0	-3 671 000	
FCF	-11 653 160	-9 702 320	

As you can see there were negative free cash flows in both 2007 and 2008, using both methods, which basically amounted to the same number. In order to use this method, we would have to calculate/estimate when the cash flow turns positive, by how much and how much we expect it to grow. One of the main problems with the discounted cash flow method appears when we indeed have a case of negative cash flows, like Sørlandschips AS in this case. The problems mentioned in the introduction of this segment seem to be present in this

case. Indeed it looks at first sight as if the investments here are causing a decrease in value. Recognizing the value potentially created also seems difficult. The investment return in net operating assets in 2008 would have to be “estimated” somehow, in respect to how much return they are expected to create and when the cash flows arrive. Most likely this would force the main part of the value to be focused on the continuing value. It’s even possible that the next year(2009) would have negative cash flows as well, making the continuing value(which is referred to as the speculative part) to contain more than 100% of the value calculated. This is of course not preferable, since one the main tenets of fundamental analysis is to anchor a valuation on what you know instead of speculation. This case right here would force us to anchor all of the value on pure speculation. Of course, the residual earnings model presented earlier is also of speculative nature. Generally since it requires a continuing value as well, but specifically since there are so many uncertainties regarding private company valuation. If there indeed were positive cash flows in this case, one could argue that this model should be used as well, taking into consideration that the accounting earnings might not be correct due to the various reasons discussed previously.

Value of control:

As mentioned this part of the valuation is a particularly tricky one. Assuming the notion of a private investor buying the entire firm, there should undoubtedly be some sort of control premium associated with this, compared to another investment with no control. The reasons discussed where the fact that you might be able to generate more earnings, if the incumbent management weren’t running the business optimally, and the fact that if the assets allow it, you might be able to offset some of the distress with the purchase of an illiquid asset, which a private company is.

In order to evaluate the current management performance you would need much more information than just a financial statement report for three years. You would have to know the business, and optimally know the decisions made by the current management, and an ability to evaluate these. This is information we don’t have so no such attempt will be made although an example following the example in the theoretical part is going to be provided.

Let's assume that due to the current management, the earnings in 2008 are 10% lower than they should be, with the cause being both discretionary expenses and poor management. In the same breath we are still assuming that the growth opportunities are limited, due to what was discussed as a fairly stable business in which the company operates in. Given the lower cost of equity of 10,04%, the new residual earnings would be:

Pe	Residual earnings, VOC	
	2008	No_growth RE 2009
Earnings	4 119 500	4 367 689
Dividends	0	0
Book value	12 739 000	17 106 689
RE(10,04% charge)	3088693,2	3088693,4
RE growth rate	20,05 %	0,00 %
Value drivers		
Roce	40,12 %	
Change in book value:	24,08 %	

Using this input to calculate the new value of equity:

$$\text{Where we get: } V_{2008}^E = 12,739 + \frac{3,088693,4}{1,1004-1} \approx 43,503 \text{ million}$$

Since the value of control is the difference between value as it is run now (39,77 million with 10,04% cost of equity) and 43,503 million, it would be approximately 3,73 million in this specific case. Of course this example is very simplified, it does not take into consideration of unexploited growth opportunities, it only changes the last financial year's earnings, but it is done simply to give a notion of how to incorporate it, if one had such information.

Ultimately we would like to consider the potential impact the value of control has on the illiquidity distress to the investor as well. If you recall the value of control discussion, the nature and the magnitude of the non operating assets seem to have some influence on this premium. Logically a company with high degrees of liquid financial assets would be preferable as far as liquidity goes, in the fact that the need for liquidity at least partially could be resolved liquidating some of these assets. In 2006 the company had more financial assets in cash and cash equivalents than it had financial obligations. Other than that the firm was short term financed in 2007 and a mix of short term and long term debt in 2008. The cash and equivalents in 2008 were 884 000, but it is really difficult to say if this is an amount that would have a positive effect to an investor considering his liquidity needs. As mentioned this thesis was more about discovering the potential problems, then to actually try to solve them,

as most of them has proven basically unsolvable. This segment was merely to illustrate the considerations needed to be taken, which in most cases are of highly subjective nature.

Conclusion:

So the question is what is the company worth? To be honest we don't know. If anything this thesis has shown the difficulties regarding valuing private firms, and the uncertainty with these estimates. The equity has been ranged from 28,59 million to 43,503 million. The debt has been discussed to probably not be valued at book value and perhaps worth a premium.

Normal valuation might be difficult enough itself, as there have been written several books on the topic, with different methods giving different valuations. In addition to this, we have learned that private firm valuation, from an outside point of view, is especially difficult. The differences in private firms versus public firms demands other possible solutions to the cost of equity parameters and cost of debt parameters, in addition one should theoretically account for the issues of diversification, illiquidity and value of control as well. This has proven to be very difficult, although we know that these are things to consider with private firm valuation. In an ideal world one would value the firm from inside, with several years of accounting data, detailed knowledge about the firms operations and growth opportunities. It is basically the lack of information that has caused most of the problems and shortcuts taken in this thesis, which is no surprise. The thesis in itself has not proven to be conclusive, but rather it should inform the reader of the potential traps and extra caution demanded if valuing a private firm. There were never an intention of trying to get a precise estimate as what value is concerned, rather than that, investigate what it potentially might be, taking all considerations.

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Appendix 1: Income statement

Income statement	2008	2007	2006
Valutakode	NOK	NOK	NOK
Revenues	113 874 000	96 580 000	87 871 000
Other op. Income	0	0	0
Total operating revenues	113 874 000	96 580 000	87 871 000
Cost of goods sold	51 867 000	43 780 000	34 566 000
Change in stocks	0	0	0
Wage cost	6 986 000	6 887 000	6 519 000
Appreciation intangible assets	3 320 000	2 321 000	1 616 000
Write down intangible assets	0	0	0
Other op. Cost	45 876 000	37 674 000	37 378 000
Total op. Cost	108 049 000	90 662 000	80 079 000
Operating Income	5 825 000	5 918 000	7 792 000
Income from investment in subsidiary	0	0	0
Total other interest income	0	34 000	43 000
Total other financial income	605 000	0	0
Total financial income	605 000	34 000	43 000
Total other interest expense	0	14 000	0
Total other financial expense	1 227 000	964 000	134 000
Total financial expense	1 227 000	978 000	134 000
Net finance	-622 000	-944 000	-91 000
Earnings before taxes	5 203 000	4 974 000	7 700 000
Taxes reported	1 458 000	1 397 000	2 156 000
Net income before unusual items	3 745 000	3 577 000	5 544 000
Unusual income	0	0	0
Unusual expenses	0	0	0
Net unusual items	0	0	0
Taxes on unusual income	1 458 000	1 397 000	2 156 000
Net income	3 745 000	3 577 000	5 544 000
Dividends	0	0	0
Minority interest	0	3 312 000	2 643 000
Transfers to/from common equity	3 745 000	265 000	2 901 000

Note: Data for the financial statements were collected from www.1881.no (see references)

Appendix 2: Balance statement

Balance statement	2008	2007	2006
Assets			
Research and development	0	0	0
Franchise, licence and patents	0	0	0
Deferred tax advantage	0	0	0
Total intangible fixed assets	0	0	0
Lot, buildings and property	7 159 000	0	0
Machines and plant	17 173 000	18 815 000	11 679 000
Ships,rigs,plain etc.	0	0	0
Mov prop, equipment and tools	0	73 000	117 000
Total noncurrent assets	24 333 000	18 888 000	11 797 000
Stocks/investments subsidiary	0	0	0
Investments in stocks and share	0	0	0
Bonds and longterm debt?	0	0	0
Total financial assets	0	0	0
Total fixed assets	24 333 000	18 888 000	11 797 000
Total inventory	4 105 000	2 835 000	2 512 000
Accounts receivables	21 703 000	1 962 000	8 412 000
Other receivables	2 900 000	803 000	116 000
Corporation receivables	0	0	0
Claims on share capital	0	0	0
Total receivables	24 602 000	2 766 000	8 527 000
Stocks and shares same corporation	0	0	0
Marketbased stocks	0	0	0
Marketbased bonds	0	0	0
Other marketbased fin. Instruments.	0	0	0
Other fin. Instruments	0	0	0
Total Investments	0	0	0
Cash and cash equivalents	884 000	501 000	6 205 000
Total Current assets	29 591 000	6 102 000	17 244 000
Total assets	53 924 000	24 990 000	29 041 000
EQUITY AND DEBT			
Share/company capital	3 705 000	3 705 000	3 705 000
Preferred stock	0	0	0
share premium account	0	0	0
Total Invested equity	3 705 000	3 705 000	3 705 000
Reserve for valuation variances	0	0	0
Other reserves	9 034 000	6 562 000	6 297 000
Total retained earnings	9 034 000	6 562 000	6 297 000
Minority interest	0	0	0
Total Equity	12 739 000	10 267 000	10 002 000
Debt			
Pension obligations	0	0	0
Deferred tax liability	580 000	412 000	323 000
Other provisions	0	0	0
Total other provisions	580 000	412 000	323 000
Long term corp. Debt	0	0	0
sub. Loan capital	0	0	0
Other long term debt	15 516 000	0	0
Total long term debt	16 096 000	412 000	323 000
Convertible loan	0	0	0
Certificate loans	0	0	0
debt to creditinstitutions	0	0	0
Accounts payable	16 130 000	4 414 000	13 351 000
Tax payable	795 000	21 000	819 000
Deferred public expenses	532 000	485 000	-526 000
Dividends	0	0	0
Short term corporation debt	0	0	3 671 000
Other short term debt	7 632 000	9 391 000	1 401 000
Total short term debt	25 089 000	14 311 000	18 716 000
Total debt	41 185 000	14 723 000	19 039 000
Total equity and debt	53 924 000	24 990 000	29 041 000

Appendix 3: Comparables

The method of comparables: Input numbers						
Betas		P_2008E	OS.2008E	BookE_2008E	Sales 2008	Earnings_2008
Aker Seafoods	0,4726	6,45	48 598 291	826000000	2678000000	-79000000
Ekornes	0,1759	66,3	36 824 866	1 103 533 000	2673100000	347600000
Codfarmers	0,7624	4	20 394 650	191 095 000	74 215 000	-147 950 000
Lerøy seafood	0,2302	50	53 577 368	3 764 343 000	6 057 053 000	127052000
Rieber and Son	0,1745	35,5	76 430 000	1 966 547 000	6 806 397 000	187 540 000
Average Beta	0,36312					
1) Pure average, negative earnings included						
Betas		P/E	P/S	P/B		
Aker Seafoods	0,4726	-3,967835151	0,117049655	0,379490287		
Ekornes	0,1759	7,02384527	0,913354763	2,212429185		
Codfarmers	0,7624	-0,551393038	1,099219834	0,426900756		
Lerøy seafood	0,2302	21,08481881	0,442272571	0,711643014		
Rieber and Son	0,1745	14,46766023	0,398634549	1,379710223		
Average Beta	0,36312	7,611419225	0,594106274	1,022034693		
Sørlandschips		P/E average	P/S average	P/B average	Value of equity	
Sales	113 874 000		0,594106274		67653257,89	
Earnings	3 745 000	7,611419225			28504765	
book value	12 739 000			1,022034693	13019699,96	
				Average	36392574,28	
2) Removing negative earnings measures						
Betas		P/E	P/S	P/B		
Aker Seafoods	0,4726		0,117049655	0,379490287		
Ekornes	0,1759	7,02384527	0,913354763	2,212429185		
Codfarmers	0,7624		1,099219834	0,426900756		
Lerøy seafood	0,2302	21,08481881	0,442272571	0,711643014		
Rieber and Son	0,1745	14,46766023	0,398634549	1,379710223		
Average Beta	0,36312	14,19210811	0,594106274	1,022034693		
Sørlandschips		P/E average	P/S average	P/B average	Value of equity	
Sales	113 874 000		0,594106274		67653257,89	
Earnings	3 745 000	14,19210811			53149444,86	
book value	12 739 000			1,022034693	13019699,96	
				Average	44607467,57	
3) Aggregate the earnings and compute new price too earnings						
	Earnings	Market values				
Aker Seafoods	-79000000	313458977				
Ekornes	347600000	2441488616				
Codfarmers	-147 950 000	191 095 000				
Lerøy seafood	127052000	3 764 343 000				
Rieber and Son	187 540 000	1 966 547 000				
Aggregate values	435242000	8676932593				
Aggregated P/E	19,93588071					
Sørlandschips		P/E aggregate	P/S average	P/B average	Value of equity	
Sales	113 874 000		0,594106274		67653257,89	
Earnings	3 745 000	19,93588071			74659873,27	
book value	12 739 000			1,022034693	13019699,96	
				Average	51777610,37	

Note: Annual rapports at which the input was found is in the reference list.