



Trouble in Private Equity Paradise

- Who Benefits When a Portfolio Company Invests? -

Anders Berger ©

Marcus Ugglä®

Abstract

Problems arise when a private equity owned portfolio company wants to make an additional investment in assets and the private equity company has to make an investment decision based on capital budgeting models presented by the management of the portfolio company. Since a private equity firm evaluates their holdings using LBO valuation models with the resulting IRR and their portfolio company evaluates investments using various budgeting methods, the purpose of this Master's Thesis is to analyze whether such an additional investment could in some cases be value improving for only one of the parties, and if that is the case, when that is most likely to occur. To answer the thesis question asked, an analytical approach comparing the outcomes of different investments on capital budgeting models and the LBO valuation model is used. Several investments were tested, and the analysis showed that there is a risk of a discrepancy between value improvement for a private equity firm and value improvement for their holding, the portfolio company. In the cases where the investments generate earnings late and when investments are made closer to the exit time, the different interests are more likely. Underinvestment is the most likely consequence and a negative change in the exit multiple used in the LBO model could alter that effect even further.

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Keywords: Private equity, LBO, leveraged buy out, capital budgeting

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Presentation Date: December 18th, 2007

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ACKNOWLEDGEMENT

In the process of writing this Master's Thesis, we have had insightful discussions, received help, and support from many people and we would like to take the opportunity to thank them here.

We would first like to thank our tutor, Tomas Hjelström, who has always been available for questions and open discussions. To say the least, we have really taken advantage of his open door policy and his knowledge of corporate valuation and we are really grateful for all the insightful comments that have helped us forward.

This thesis would not have been possible without the Private Equity Company. From the meetings and interviews with partners and analysts working at the firm as well as management for some of their portfolio companies, we have been able to understand and define the underlying problem discussed in this thesis. Moreover, we want to thank the representatives of the Private Equity Firm for helping us taking our thesis from an interesting problem to really analyze it with realistic examples.

Of course we need to thank the one who inspired us to write our thesis about this fascinating industry in the first place. Ph.D. Per Strömberg opened our eyes for private equity with his fantastic course Venture Capital.

We would also like to direct an acknowledgement to Karin Albinsson who has been outstanding in administrating this Master Thesis course.

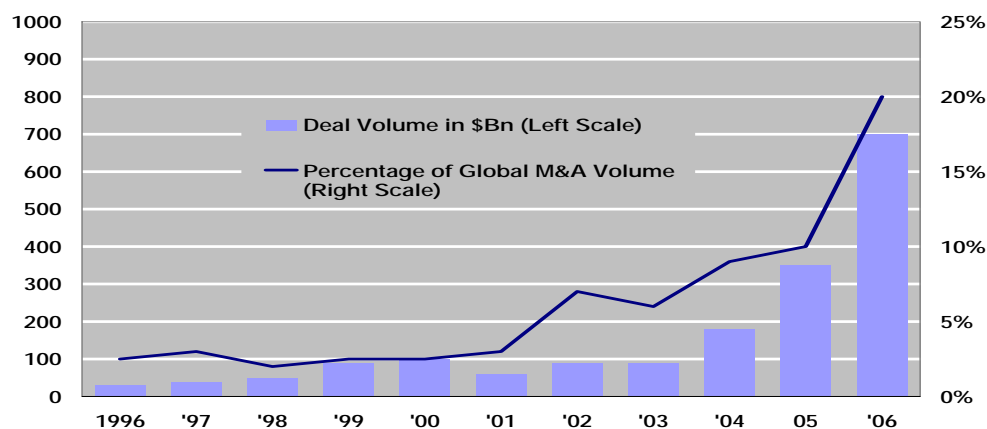
Finally, we would like to thank all our friends that have read our paper and gave great feedback. Thank you, Hanna Clausén, Kristian Holmström, Mattias Holmström, Erik Landfeldt, Victor Larsson, Henric Roth Markus Rydmell, and Camilla Thunell for all your insightful comments and support.

Anders Berger & Marcus Ugglå

1 INTRODUCTION

The private equity industry is a growing institution in the business world and in 2006, as seen in Fig. 1, private equity leverage buy outs accounted for almost 20 percent of the total mergers and acquisitions activity in the world, and the total value that the private equity industry accounted for reached \$700bn.¹ Moreover, it is not only a growing industry, also the companies active within it grows bigger. One of the largest private equity companies in the world, has an aggregated enterprise value (EV) of its investments that reaches over \$315bn.² Along with the growth of the industry and its greater importance for the business world, critics raise their voices against the industry and question the business model asking if it really is beneficial for the portfolio companies they own. Some people even proclaims that the industry is only about stripping companies of assets, desperately hunt cash flows, and think more about debt pay down than about the future of their portfolio companies.³ Advocates for the industry on the other hand argue that private equity firms' ownership and management are in many cases superior to other forms of ownership. With a private equity company as owner, the portfolio companies can disregard the short term requirements from the stock market and focus more on running the company efficiently and creating a strong firm ready for future challenges.⁴ This controversy concerning the very fundamentals of this industry makes it interesting and appealing to study.

Fig. 1: The graph shows the development of the global private equity industry during the last years in terms of deal volume (\$Bn) and percentage of global mergers and acquisitions volume.



Source: Wall Street Journal, (2006), *Who Is Who in Private Equity?*

¹ Wall Street Journal, (2006), *Who Is Who in Private Equity?*

² www.kkr.com, 2007-11-05.

³ Aronsson, 2007-01-16.

⁴ Karlsson, 2007-01-15.

The private equity industry uses a business model that is by many considered to be complex, but the basics behind this idea of making money are rather intuitive. The majority of the money a private equity firm use for investments is raised from outsiders. Thus, a private equity firm raises money from investors to create an investment fund. The fund's capital, in combination with a substantial amount of debt, is then used to create an investment portfolio and buy a number of companies; listed or privately held. As opposed to some other shareholder categories, the private equity company is an active owner when it comes to both strategy and operations in order to maximize value. The portfolio company is held for, on average, three to five years before exited to an industrial player, another financial player, or put on a stock exchange. After the exit in all portfolio companies, and when the investment fund is closed, the money is paid out to the outside investors. Due to the risk of the business, the investors demand a substantial rate of return and the success of the private equity company is then measured using internal rate of return (IRR).⁵ The IRR measures the yearly return on the money the private equity firm invests compared to the money received after the exit is completed.

From interviews with professionals in the industry, the authors of this paper have understood there is a general worry that there is an inherent problem with the differences between how a private equity firm measure success and the way their portfolio companies measure value added.⁶ This problem becomes real when additional investments or improvements need to be done in the portfolio company. Private equity firms use the leveraged buy out (LBO) valuation model to see if a prospective investment in a company is expected to generate a satisfactory IRR.⁷ On the other hand, their portfolio companies analyze capital budgeting models when they evaluate investments in a new plant, new equipment, or other improvements. The results from various capital budgeting methods such as a positive net present value (NPV), a short payback time, or a high IRR from the project might be enough information for the management of the portfolio company to invest in a certain project⁸, but the private equity firm, on the other hand, need to satisfy their investors by increasing the value and the IRR of the portfolio company.⁹ It is when the management of the portfolio company presents those investment plans to the private equity firm in order to make an investment decision, problems may arise.¹⁰ From the interviews it has also become clear that there are several problems related to an investment decision within the

⁵ Kaplan, (3/3), 9.

⁶ Private Equity Company, 2007-09-30.

⁷ Strömberg, 2007-01-15.

⁸ Bergstrand, 189-199.

⁹ Private Equity Company, 2007-09-30.

¹⁰ Private Equity Company, 2007-09-30.

portfolio company. Firstly, it is not certain that interests are always aligned between the portfolio company and their owner. Since different measures of value added are used in the capital budgeting models and in the LBO valuation model, based on the outcome of the models, there might be different incentives to invest in certain projects. Secondly, private equity firms do not always have sufficient time to analyze an investment and, therefore, has to rely on the capital budgeting models prepared by the portfolio company to make the decision. To further complicate the issue for the private equity firm, the portfolio companies may use different kinds of capital budgeting methods. It then becomes hard for the private equity firm to know if an investment adds value also from the perspective of the LBO by improving the crucial IRR. Hence, there is a problem of efficient allocation of resources. Finally, the portfolio companies are not always aware of what creates shareholder value when having a private equity firm as the owner. As a result, they might put forward investment proposals that decrease the LBO valuation simply due to lack of knowledge.¹¹ Realizing this knowledge gap in the industry and the lack of studies tackling those issues, this thesis aims to shed light on those problems to add value both in theory and in practice.

1.1 PURPOSE AND THESIS QUESTION

As stated above, the purpose of this paper is to bridge the knowledge gap, and as a result, increase the understanding within private equity firms as well as within their portfolio companies in order to decrease information gaps and increase efficient allocation of resources. Thus, clarify the differences between the private equity firm's, and the portfolio company's, way of evaluating additional investments and what the consequences are of those different techniques used. Through this, the thesis aims to make clear if there are investment decisions that is value creating for one party while value destroying for the other and if that is the case, when such a discrepancy is likely to occur.

With the purpose stated above, this thesis aims to answer the following question: In a situation of additional investments in a portfolio company, when is there a difference between value improvement for the private equity firm and value improvement for the private equity owned portfolio company, and if so, when is that likely to occur?

¹¹ Private Equity Company, 2007-09-30.

1.2 LIMITATIONS

With the purpose of this thesis and to reach a sensible conclusion, a number of limitations in different areas had to be done: Purpose limitations; empirical evidence limitations; model and input limitations; as well as investments and investment timings limitations.

1.2.1 Purpose Limitations

The thesis aims to analyze the existence and the characteristics of the problem stated above. Hence, it does not intend to research how common a value discrepancy is among private equity firms or their portfolio companies. Consequently, it does not aim to analyze the probability of an investment to be value adding for only one party.

1.2.2 Empirical Evidence Limitations

The analyzed phenomenon in the thesis is based on interviews with one of the leading private equity firms in the Nordic region. As a result, it is their view of what is common practice, complemented with guest lectures held by other leading Swedish private equity firms and discussions with Ph.D. Per Strömberg at the Stockholm School of Economics, that is the foundation for the input, assumptions, and models used.

1.2.3 Model and Input Limitations

Based on theory and on the interviews conducted, the capital budgeting models used in the analytical approach has been limited to three methods: the NPV method, the IRR method, and the payback method. They are chosen because they are all commonly used in investment decisions in traditional companies and are well described and researched in capital budgeting theory. Furthermore, based on the interviews, guest lectures, and Ph.D. Strömberg, the single method used to evaluate the portfolio company is the LBO valuation model.

Even though a LBO model can be very complex in practice, to capture everything that affects the value it has, for the purpose of this thesis, been limited to only include the most important factors. They have been selected based on two criteria. Either because the item affects the IRR or because the item is commonly used in LBO models, this to make it more realistic, but still keeping it simple.¹² Also, the input in the models is chosen to present an easy but realistic example of a private equity investment. The validity of the input has also been checked and confirmed by the interviewed private equity firm.

¹² For more details about the LBO model, see Appendix I.

The exit multiple in the LBO model is held constant throughout the first part of the analysis. The exit multiple is indeed an integral part of a LBO valuation, changing its value impacts the outcome. However, in order to fully incorporate such a change, a statistical analysis would be needed in order to know when and how much the multiple would change as a result of different investments. From the interviews, private equity professionals have discussed what investment characteristics that would increase and decrease the multiple. They are, however, not able to accurately predict by how much. In order to still capture the effects of a change in the multiple, an exit multiple sensitivity analysis is presented in the latter part of the analysis section. In this way not confusing the perception of the analysis of the different investments effect on the capital budgeting- and the LBO model, but rather supporting some results while questioning other results and, in that way, fine-tuning the analysis.

To measure value added from an investment, the NPV has been chosen from the portfolio companies' perspective and the IRR in the LBO valuation from the private equity firms' perspective. They are not the only measures used in practice or discussed in financial theory, but for the purpose of this paper, such a limit is adequate.

1.2.4 Investments and Investment Timings Limitations

The number of investments with different cash flow patterns was limited to three. Also, the number of investment timings was limited to three. As a result, the total number of investments analyzed was nine. They were chosen to show the implications different characteristics of cash flows have on the capital budgeting models and on the LBO model. Hence, they are not based on empirical data or from case studies of real investments; they are only figures to present a variety of investments, but still keeping the results easy to comprehend. The summary of the cash flows is in all cases equal, but as a result, their respective NPV differs. This is questionable from a theoretical comparison point of view, but useful to understand the difference between investments that in reality might be perceived as equal.

1.3 DISPOSITION

This paper is divided into the following sections; Theory & Empirics, Method, Input & Assumptions, Analysis, Conclusion, Discussion, Future Research, as well as Reliability & Validity. In the Theory & Empirics section, an overview of the private equity industry, some LBO valuation theory, value creating factors for a private equity investment, and capital budgeting models are presented. Then, the Method section first describes the method chosen to study the thesis question, how input was collected, followed by a detailed description of the analytical

approach and the models used. The Input & Assumptions section describes what data that were used in the analytical approach. The Analysis section then presents the analytical approach, the results, and an analysis of the interesting observations. Then, the analysis is discussed and taken into a broader context in the Conclusion section. After that a further discussion of the future of the private equity industry is put forward in the Discussion section. Then, suggestions of Future Research that would broaden the understanding of this field are presented. Finally, a Validity & Reliability discussion about the thesis is held to confirm the meaningfulness of the results and conclusions.

THEORY & EMPIRICS

1.4 INTRODUCTION

This section will describe the theoretical background used in the analysis. First, the buyout process will be explained in order to provide some general knowledge about how the private equity industry works and what players are involved. Thereafter, the LBO valuation model that private equity firms use will be described in depth. This will improve the understanding of the valuation process in the industry, but also make it clear what lay behind the models used in the analytical approach. When knowing the background and the basic elements of an LBO model, the value creating process will be described to show what factors that affect the outcome of an LBO valuation. Finally, the three capital budgeting models used in the analysis will be presented and discussed. Theory will be complemented and supplemented by empirics when needed in this section. The empirics are based on interviews with one of the leading private equity firms in the Nordic Region and lectures at the Stockholm School of Economics covering this topic.

1.5 BACKGROUND

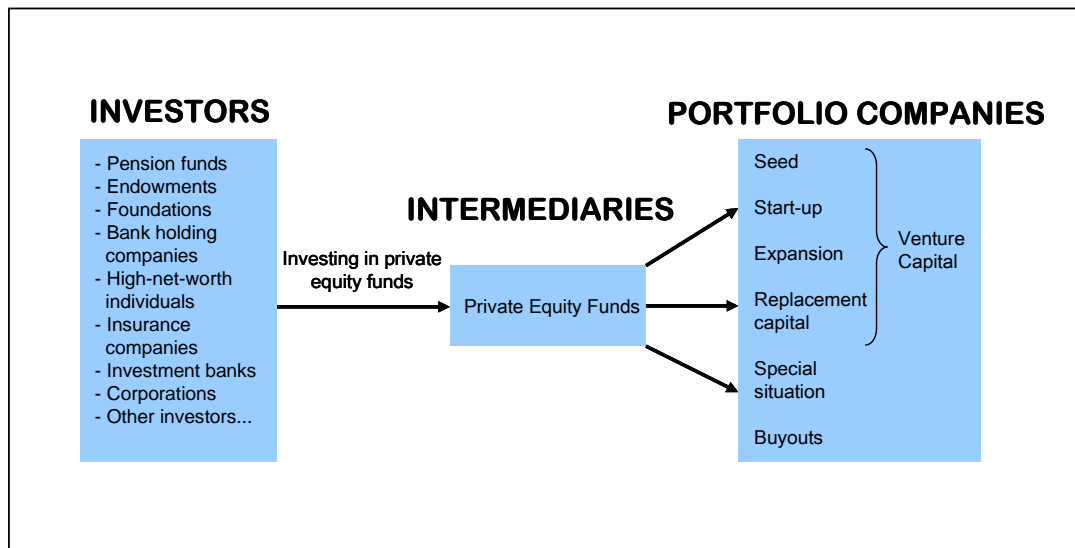
When private equity companies value a potential company they want to invest in, they use the LBO valuation model. The model is used to evaluate the investment by looking at the equity invested in the portfolio company and the equity received at the time of exit. The resulting performance measure used is the IRR. The investments are made with a large amount of debt and the cash flows generated by the portfolio company are used to pay down debt. Furthermore, the entry and exit value is calculated based on a multiple: enterprise value divided by earnings before interest, tax, depreciation, and amortization (EV/EBITDA). This multiple could be seen as the general valuation for a company in the same industry and with the same size. Private equity companies therefore strive to receive at least the same exit multiple as entry multiple.

1.6 THE BUYOUT PROCESS

In order to understand how private equity firms evaluate a potential investment in a company, the fundamentals of how a buyout works is needed. Furthermore, it is important to gain knowledge about the process to understand the reason behind the private equity company's decision of approving or declining an investment idea suggested by the portfolio company.

As shown in Fig. 2, there are three important parties involved in a private equity deal.¹³ First, there is the private equity firm that raises money for an investment fund and targets acquisitions that they are interested in buying with the fund's capital. Second, if the target acquisition is pursued, the company bought becomes a portfolio company that is owned during a limited number of years to create value for the owner until time of exit. Third, the external investors; pension funds, mutual funds, corporations, wealthy individuals, or school endowments that provide capital and expect a high rate of return.¹⁴ ¹⁵

Fig. 2: The chart gives a simplified overview of the parties involved in a private equity deal.



Source: IFSL, (2006), *Private Equity City Business Series*.

In order to make the investments, private equity firms need external capital from investors to create the investment fund. Private equity firms normally also invest some of its own equity in the fund. They do this mainly for two reasons. First, they want to show the external investors that they have confidence in their own abilities to generate return on invested capital. Second, by investing, they take part in the value increase of the fund.¹⁶ When a sufficient amount of capital is raised, the investment fund is closed and the private equity firm starts to screen the market for investments. Different private equity firms focus on different companies based on size, industry, geographic, and maturity. The investment fund has a predetermined date of maturity, normally after about ten years. Before that, all investments in the portfolio need to be exited. During this

¹³ Disregarding support functions such as investment banks, management consultants, and lawyers.

¹⁴ Fenn et al., 45-49.

¹⁵ IFSL, (2006), *Private Equity City Business Series*.

¹⁶ Strömberg, 2007-01-15.

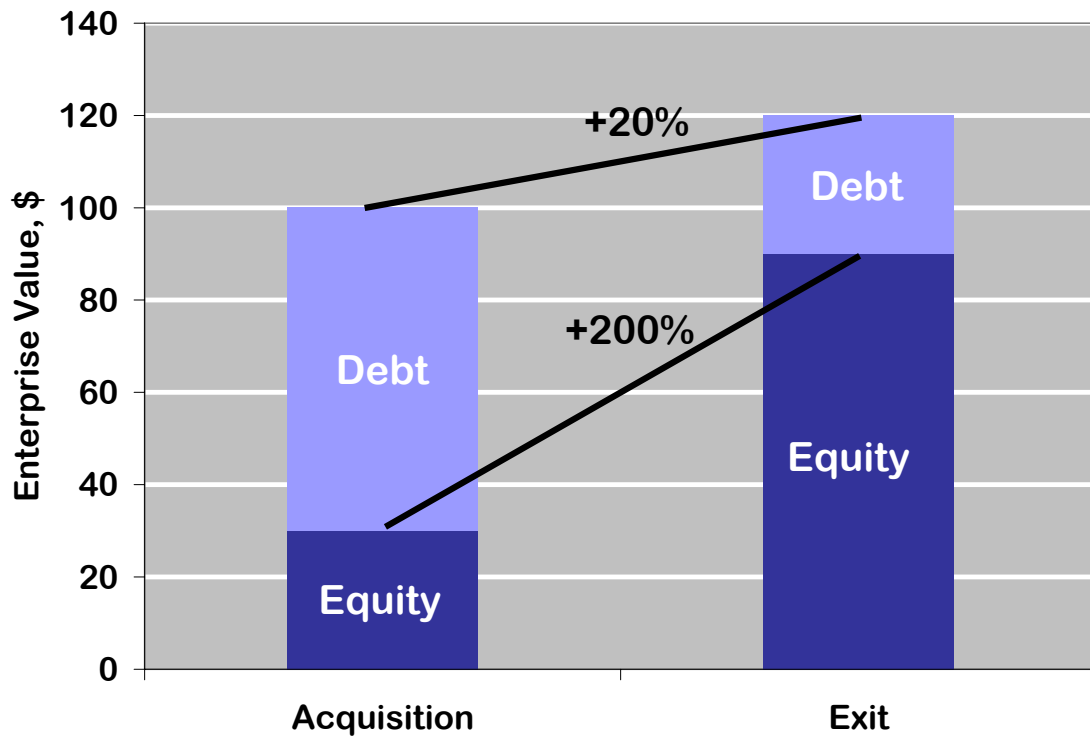
period the private equity firm is supposed to invest in a portfolio of companies with the aim to improve their performance, and exit them with high returns as a result. To do this, the private equity firms scan markets for investments and then evaluate potential buyouts in depth before proceeding with a bidding process. When a target company is located, debt is raised to finance the acquisition together with capital from the fund. A characteristic of the industry is the high debt to asset ratios¹⁷, normally of around sixty to seventy percent of total assets, depending on the current interest rate situation¹⁸. Each portfolio company is then held for around five years and the goal is to sell the company at a higher EV, but with less debt, and as a result the value of equity is highly increased.¹⁹ Fig. 3 below shows a generic example of a private equity company's investment in a portfolio company. The portfolio company is acquired at an EV of \$100, using 70 percent debt and 30 percent equity. During the holding period, the cash flows generated are used to pay down debt. During the holding period, the EV improves due to value improving activities, more detailed described below. The EV increases by 20 percent, but what is more striking and a strategy of the private equity firm, is that the value of equity at the same time increases by 200 percent. If a holding period of 5 years is assumed, the resulting IRR from the investment is 25 percent.

¹⁷ Bierman , 25.

¹⁸ Private Equity Company, 2007-09-30.

¹⁹ Aniansson, 2007-09-18.

Fig. 3: The chart gives a simplified overview of the parties involved in a private equity deal.



Source: Aniansson, 2007-09-18

The underlying valuation model used in the example in Fig.3 is the LBO valuation model. This model is created to evaluate the private equity investment with an IRR, which is calculated by comparing the entry amount of equity with the exit amount of equity. There are several important factors in this model to generate a satisfactory IRR: the ability to create free cash flows, increase the EBITDA and prepare the company so that a high exit multiple can be defended when selling the company. Before digging deeper in the value adding process, a detailed explanation of the LBO valuation model is needed.

1.7 LBO VALUATION

The LBO model is a mix between the more traditional ways of valuating a company. Financial theory emphasizes two valuation techniques: discounting valuation techniques and multiples valuation techniques. The discounting techniques normally use cash flows, profits, or dividends to compute a value. Some of the discounting methods used are the discounted cash flow model

and the adjusted present value method.²⁰ Multiples used for valuation purposes are divided into trading multiples and comparable transaction multiples.

A combination of the models described above is used in a LBO valuation model. Before describing all parts of the LBO valuation model, it is important to go back to basics to understand where the respective items come from and what affects them. First, a description of how to arrive at the cash flows used in a LBO model, the cash flow to equity, will be presented. For that purpose, some understanding of basic financial statements is necessary and therefore a short section will explain the items taken from the income statement and the balance sheet. Thereafter, the debt structure will be discussed followed by an explanation of the exit multiples. Finally, the performance measurement, IRR, will be described to conclude how the LBO model is built up and how it works.

1.8 FINANCIAL STATEMENTS

1.8.1 Income Statement

The income statement presents the results of operations of a business over a specified period of time and is composed of revenues, expenses, and the resulting net income. Revenue is a source of income that normally arises from the sale of goods and services. An expense is matched against the revenue it generated and is what it costs to produce the goods and services. When subtracting operating expenses from operating revenue and adding other revenue, the result is the operating income measure, EBITDA which is often used when computing the multiples in a LBO valuation model.

After the operational part there are adjustments made for depreciation and amortization on the assets held by the company, and the resulting earnings measure is earnings before interests and taxes, EBIT.²¹ This profit measure is the starting point for calculating the cash flow to equity in the LBO model.

1.8.2 Balance Sheet Statement

The balance sheet presents the financial position of a company at a given point in time and is comprised of two sides: one side with the assets owned by the company and the other side with

²⁰ Koller et al, 103-104.

²¹ White et al, 31-35.

the liabilities the company has together with the residual item equity. Assets are the economic resources of a company and are used to operate its business and include equipment, inventories, and cash. The assets are financed with a combination of liabilities and equity. The liabilities are obligations that the company has promised to pay back over a specified period of time and equity is the residual on the balance sheet.²²

The items needed from the balance sheet in the calculations of the cash flows in the LBO model are capital expenditures (CAPEX)²³ and net working capital (NWC)²⁴. They are not stated separately in the balance sheet, but have to be calculated. The NWC is calculated as current assets subtracted by current liabilities. Current assets are accounts receivables and inventories and current liabilities are accounts payables.²⁵ Net CAPEX are estimated by taking two factors into account; the difference between closing and opening balance of property, plant, and equipment and then depreciation is added back since it is not a cash flow.²⁶

1.8.3 Free Cash Flows

Free cash flows are calculated to find all cash available in an all equity firm, i.e. the after-tax cash flow available to all investors, both debt and equity holders. Unlike the reported cash flows from operations in the financial statements, the free cash flows are unaffected of the financing of the company and the non-operating items. It can be described as if the company held only core operating assets and financed the business entirely with equity. Hence, a potential buyer of a company estimates how much cash the company will generate in the future which is then available to pay out as dividends. This is why the free cash flows are so crucial in corporate valuation.²⁷ Now, when knowing how to calculate EBIT, CAPEX and NWC, it is possible to perform a free cash flow calculation. The free cash flows are needed in order to arrive at the cash flows that in the end used in the LBO valuation to pay down debt; the cash flow to equity.

The calculation of free cash flows is done in several steps using the information from the financial statements described above. The calculation starts with EBIT that is found on the income statement. The tax on EBIT is reduced from this amount using the country specific corporate tax rate since it is a negative cash flow. Then, depreciation and amortization is added

²² White et al, 61-65.

²³ $CAPEX = PPE_{CB} - PPE_{OB} + \text{Depreciation}$, where PPE is property, plant and equipment

²⁴ $NWC = \text{Current Assets} - \text{Current Liabilities}$

²⁵ Koller et al, 180.

²⁶ Ibid, 181.

²⁷ Ibid, 166-167.

back since those items are not cash flows, but has reduced EBIT in the income statement. Furthermore, the calculation is adjusted for CAPEX, which occur when a company acquires or upgrades physical assets such as property, industrial buildings or equipment. Since it is an outflow of cash, the amount is deducted in the calculation. After that, an adjustment is made for the change in net working capital. If net working capital has increased during the time period, there has been a cash outflow and, hence, results in a negative number in the calculation. If net working capital has decreased, the opposite is true.²⁸ This is what is needed to be done to calculate the free cash flows, and the formula below shows how this is done:

$$FCF = EBIT(1 - T_c) + Depreciation + Amortization - \Delta NWC - CAPEX \pm OtherCF^{29}$$

1.8.4 Capital Cash Flow

The free cash flow is what is needed to perform a discounted cash flow valuation. However, in the case of a LBO valuation, large amounts of debt are issued. The high debts to asset ratios give rise to two factors that, indeed, exist in a normal company, but have a greater impact in a private equity deal. Hence, it could be regarded as a part of operations. The factors are the debt tax shield and the interest payments.

Since large amounts of debt are involved in private equity, the investments are considered to be riskier than normal companies. A company with high debt to asset ratios, normally also has to pay high interest and large debt repayments. High debt levels do not only mean higher interest expenses, but also that the firm will have higher tax shields. The capital cash flow method is a way to value risky cash flows and adjust the free cash flows to include the benefits of interest tax shields that occurs with debt. The interest tax shields decrease taxable income and thereby increase cash flows why it is regarded to have a positive effect on the valuation. Hence, the capital cash flow is larger than the free cash flow. It is calculated using a simple formula of the amount of debt, the corporate tax rate, and the interest rates on the debt. Hence, there is only a slight difference from the free cash flow calculation.³⁰

Capital cash flow is heavily discussed in financial theory and some are of the opinion that since debt is not part of operations in a company, it should not be accounted for in the cash flows either since the base for the valuation only should reflect the operational part of the business.

²⁸ Kaplan, (2/3), 2-6.

²⁹ FCF = Free Cash Flows and CF = Cash Flows

³⁰ Ruback, 1-5.

However, since the debt is such a large part of the company's balance sheet in a private equity owned firm, it could be considered to be a part of operations. The high debt levels are, after all, a strategy used to streamline cash management.³¹

1.8.5 Cash Flow to Equity

The LBO model evaluates the cash flows to the owners, and since debt is such a large part of the process of a private equity buyout it is natural that the large amount of debt comes with large debt interest payments. Because the interest payments are so large and part of the idea behind buying and operating the portfolio company they need to be considered when calculating the amount of cash the portfolio company generates every year. The interest payment is recognized in an additional step in the valuation process, resulting in cash flow to equity. To arrive at cash flow to equity, interest payments are subtracted from the capital cash flow described above. Consequently, the cash left could be used to either pay down debt, pay out dividends to equity holders, or to reinvest in the firm.³² In a private equity deal, all cash flows to equity are normally used to pay down debt each year.³³ This is due to that repaying debt decreases the risk, since a lower debt level is left to pay down.³⁴ There could be occasions when the capital cash flow does not cover the interest payments. If this is the case, the company needs to raise capital to be able to pay the interest expenses. This can be done in three ways: either by cash from the balance sheet; issue new debt; or raise new equity.³⁵

In valuation theories there are always a redundancy to add factors in the calculation that affects the item that should be discounted. Every additional factor increases the risk of making mistakes in the calculation if the new cash flow does not correspond to the basis for the discount rate. In contrast to a discounted valuation model, the LBO model does not discount future cash flows, but instead calculates an IRR that is based on the actual cash flows to equity each year. As a result, no further complications arise when shifting from using free cash flows to use capital cash flows, or cash flow to equity.³⁶

1.8.6 Debt Structure

As described before, the high leverage used in the private equity industry becomes an important part of the calculations in the LBO model. Since the information about interest tax shields and

³¹ Ruback, 5-6.

³² Kaplan, (1/3), 1-3.

³³ Private Equity Company, 2007-09-30.

³⁴ Aniansson, 2007-09-18.

³⁵ Koller et al., 250-253.

³⁶ Kaplan, (1/3), 6-7.

interest payments is used to calculate how much debt can be paid down each year, the model needs to include a detailed debt section that calculates this information. Since the amount of debt is high, creditors are reluctant to give one loan with a single interest rate. Instead, several kinds of debt with different interest rates are taken on by the portfolio company that is different in terms of how, when and to what interest rate they are paid back. Furthermore, the level of seniority and the interest rate is connected. The more senior the debt is, the higher the probability of getting the money back in a bankruptcy situation and, consequently, a lower interest rate is demanded from the bank.³⁷ Furthermore, debt that is to be paid back quickly is also less risky for the bank, which also reduces the interest rates. The interest rate on debt is based on a rate that is used when one prime bank lends money to another prime bank in the area where the debt is raised, called the interbank offering rate.³⁸ With this interest rate as a base, a risk factor is added to reflect the risk level of the loan from the creditor's point of view based on the issues addressed above.³⁹

1.8.7 Multiples

The entry and exit price of a company is in the LBO valuation based on multiples. There are generally two different types of multiples used: transaction multiples or comparable company multiples. The most commonly used trading multiple used for valuation purposes is the share price to earnings per share ratio (P/E). By multiplying the P/E ratio with the estimated net earnings for the coming year, a value of the company is computed.⁴⁰ The rationale behind the comparable transactions method is to find recently acquired firms and calculate ratios between the purchase price and profit measures such as EV/EBIT or EV/EBITDA. Important with both types of multiples is that the companies in scope of a comparison need to be similar; both in terms of industry and maturity. After finding a number of comparable companies and calculating their respective multiples, an average or a median is used when valuating the target firm. The resulting figure is then multiplied with the respective income measure to arrive at an EV or a value of equity.⁴¹

Multiples that are commonly used within the private equity industry are EV/EBITDA, P/E, or EV/sales. All ratios have advantages and disadvantages. Sales multiples could be used in startups that has not yet reached positive net income, but may in other cases be confusing due to

³⁷ Kaplan & Stein, 332-334.

³⁸ Ibid, 330.

³⁹ Aniansson, 2007-09-18.

⁴⁰ Koller et al, 371.

⁴¹ Private Equity Company, 2007-09-30.

differences in the profit margins. The P/E ratio uses the net income as denominator, which leads to several difficulties where the financing of the company will have a direct effect on the valuation and, as a result, it may cause misleading valuation figures if compared to another company with a different balance sheet structure. On the other hand, the P/E is the most commonly used ratio and understood among most investors. The EV/EBITDA measure takes the operating margin into account without confusing the valuation with the debt to equity ratio, and hence, the EV/EBITDA ratio is the most common multiple used for valuation purposes in private equity. In addition to that ratio, a mix of multiples can be used as a benchmark to make sure that paying an over price is avoided.⁴² Since the calculated multiple is used on the final year's earnings, it is probable that the seller wants to peak that earnings figure in order to get a higher valuation. In the same way, a potential buyer is expected to look for a low EBITDA to pay as little as possible. Therefore, the so called normalized EBITDA is used. The normalized EBITDA follows the pattern set the last couple of years with the growth and margins and is used to avoid misleading valuations.⁴³

Private equity companies strive to improve, or at least, keep, the multiple when exiting an investment. Furthermore, Kaplan states that assuming an unchanged multiple, if nothing significant has changed in the company, is to overstate the value because the longer the company is held, the closer it gets to a terminal growth rate. A lower terminal growth rate generates a lower value of the company according to valuation theory.⁴⁴ Also, in practice it has been shown to be hard to maintain high multiples in the long run, even for successful companies that, in all other respects, succeed with value improvement.⁴⁵ The multiple is based both on comparable multiples as well as on the expectations of the portfolio company's future performance. A buyer is therefore reluctant to recognize future values that cannot be proved and, as a result, not yet realized investments might decrease the exit multiple. Insecure future cash flows mean a higher risk and a higher risk is often the same as a discount on the price, even though the investment in the end might be of benefit for the portfolio company and, hence, the future owner.⁴⁶ Therefore, the multiple becomes a key figure when negotiating in a transaction. To prove the value of investments in the portfolio company and get a high multiple is extremely important for the

⁴² Koller et al., 371- 384.

⁴³ Private Equity Company, 2007-09-30.

⁴⁴ The Gordon formula for steady state growth; $P = DIV / (k - g)$

⁴⁵ Aniansson, 2007-09-18.

⁴⁶ Private Equity company, 2007-09-30.

private equity because that in the end determines the value creation and the return of the investment.

1.8.8 Internal Rate of Return

The IRR is the performance measurement most often used in private equity and an IRR that does not reach the hurdle rates set by the private equity firm probably leads to a decision not to invest. The target ratio for the IRR is in the range of 20-30 percent per year for a normal private equity firm. In general, this rate is not theoretically justified; instead it reflects the required rate of return from the investors in the private equity fund.⁴⁷ However, it is supposed to reflect the level of risk in the particular firm.

The IRR is calculated by taking the entry value of equity and compare that to how much the shareholders receive during the holding years and then how much they get when they sell the company. If assuming that no dividends will be paid out, as is normal procedure in a portfolio company during the holding period, the formula for calculating the IRR is:

$$IRR = \left(\frac{E_{exit}}{E_{entry}} \right)^{\frac{1}{n}} - 1$$

The IRR is the implicit discount rate for the money they receive compared to the money they put into the investment. It is also the discount rate that gives a NPV of zero for the investment. Due to the way the IRR is calculated, the holding period has a big impact on the results.⁴⁸ If a portfolio company needs to be held for one more year than estimated, the exit value of equity is discounted with one more year. If looking at Fig. 3 on page 14, a sixth holding year would reduce the IRR to 20 percent from the previous level of 25 percent.

Even though the IRR is the most commonly used performance measurements within the private equity industry, a money multiple is often used as a complement. A money multiple is the money received at exit divided by the money paid at acquisition. Consequently, if the same amount of money is received at exit as the purchase price paid, the money multiple will be one. Normally, a money multiple for an investment needs to be significantly above one in order to be satisfactory from an investor's point of view.⁴⁹ However, in the case of bad investments, a money multiple of

⁴⁷ Kaplan, (3/3), 9.

⁴⁸ Brealey et al, 91- 93.

⁴⁹ Private Equity Company, 2007-09-30.

one could be used as a means of communicating to the investors that they at least did not lose any money, disregarding inflation and opportunity costs. However, theoretically money multiples are not to be used since they do not take the effect of time and risk into account.⁵⁰

1.9 THE VALUE CREATING PROCESS

In order to understand how investments affect the LBO valuation model, it is important to understand how the value creating process works in a private equity investment. A private equity company's objective is to take the portfolio company and make it both a better company in itself and also more attractive to other investors when there is time to exit. They try to obtain this by focusing on certain value drivers. These value drivers can be divided into three areas: profit development, cash flow and financial leverage, and exit multiples.⁵¹

1.9.1 Profit Development

The private equity company's primary objective is to improve the profit of the portfolio company. They work with this in two different ways. First, they try to increase revenue growth in the company, organically or by acquisitions. When it comes to boosting revenue, they could either sell larger volumes or work with an improved pricing strategy to get the customers to pay more for the same volume. Second, private equity firms work with margin improvement, the relative difference between revenues and costs. Here it is important to decrease cost of goods sold by applying cost cutting methods and increase efficiencies within the firm. Moreover, a larger EBITDA is a main objective since it is used as the base for the multiple valuation when the investment is about to exit. Profit and cash flows are often correlated which lead to an opportunity to pay down more debt and create a company that looks better when the time to sell has come.⁵²

1.9.2 Cash Flow and Financial Leverage

Private equity firms work with the capital efficiency of the portfolio companies in the way that the items on the balance sheet, such as properties, plants, equipments, inventories, receivables, and payables are used as rational as possible. This is done by evaluating leasing alternatives for assets, removing unnecessary inventories, and reworking routines and agreements with customers and suppliers to increase liquidity. Furthermore, they also streamline the free cash flow items since they are crucial for the reduction of debt. Hence, it is important to reduce the cash outflow

⁵⁰ Private Equity Company, 2007-09-30.

⁵¹ Aniansson, 2007-09-18.

⁵² Ibid.

and improve the cash inflow. This work includes rationalizing tied-up capital in the business and sell of assets on the balance sheet. They also work with new investments and less capital intensive production alternatives as well as postpone non-urgent investments to reduce outflow of cash. All this comes down to the necessity to maintain a high tempo in the business development to make sure that the changes necessary is planned and carried out in good timing due to the short holding period.⁵³

1.9.3 Exit Multiples

The value creation is dependent on what happens throughout the holding period, but it is not until the private equity firm exits the investment that the value is realized. Then they see if the efforts have paid off in terms of improvements in enterprise value and if they have reached a satisfactory IRR or not. Except the financial aspects of the exit multiple discussed above, the portfolio company needs to have a good commercial profile that attracts customers and other stakeholders. Furthermore, the strategic position needs to be good in terms of the goods or services produced, the geographic area where the company is operating, and its competitive position. Most important is that the company has a good growth potential and that the potential buyer, no matter if it is a strategic buyer or another private equity company, sees that there is potential and opportunities to take advantage of. Hence, a poorly run firm with questionable investments will be hard to sell at a high exit multiple. Finally, and not to be disregarded, is the general performance of the economy which strongly affects valuations, especially during peaks or troughs.⁵⁴

1.10 CAPITAL BUDGETING

So far, the private equity side of investment valuation has been described and how they decide if a company is a good investment target or not. Furthermore, how to create value in it and receive satisfactory returns to the private equity fund. Capital budgeting is the procedure that portfolio companies, as well as other companies, use to evaluate investments and projects. This investment is not, as in the LBO, a valuation of a company, but an evaluation of a machine, a building, or other things needed for the operations in the company. Different methods are used to calculate the value of an investment and also to rank different investment plans for an efficient allocation of a firm's capital. The investment that returns the best results from the capital budgeting models should be approved and taken on. In theory, there are several capital budgeting methods that all has their advantages and disadvantages. Even though some are theoretically regarded as superior

⁵³ Aniansson, 2007-09-18.

⁵⁴ Ibid.

to others, many are used in practice. For the purpose of this thesis, three commonly used capital budgeting methods will be presented and examined: the NPV method, the IRR method, and the payback time method.

1.10.1 Net Present Value Method

The NPV method uses annual net cash flows from a project together with a discount rate to compute the value of an investment. The initial investment is a negative cash flow from the project and is followed by each time period's net cash flows generated. Thus, all cash flows related to the investment are taken into consideration. Those cash flows are then discounted to present value using a discount rate that depends on risk and capital structure. As seen in the formulas below, by adding the discounted cash flows together, the investment project's NPV is calculated. The higher the NPV, the more value is added. However, arriving at a NPV of zero is satisfactory since the project then meets the requirements implicit in the discount rate. A NPV above zero is said to be an abnormal return.⁵⁵

$$NPV = \frac{FCF_1}{(1+WACC)^1} + \frac{FCF_2}{(1+WACC)^2} + \frac{FCF_3}{(1+WACC)^3} + \dots + \frac{FCF_8}{(1+WACC)^8}$$

$$NPV = \sum_{i=1}^n \left(\frac{FCF_i}{(1+WACC)^i} \right)$$

The discount rate used should reflect the risk of the project. If the risk of the project is the same as the operational risk of the company, the discount rate that is used for discounting the cash flows in the NPV method should take into account the company's capital structure to capture the return demanded on the whole company. The weighted average cost of capital (WACC) is a rate based on the capital structure and the required rates of return for the market value of debt and equity. A tax factor is added to show the effect of the interest tax shield that occurs when debt is used to finance the company. The higher the corporate tax rate, the smaller the debt's contribution to the WACC. Over the time of an investment, the capital structure might change. There are therefore two ways of calculating for such a change. The first method is the moving WACC that for each year suggests that a new market value for equity and debt should be calculated. The problem with this is that to calculate the market value of equity, the WACC is needed, hence, resulting in circularity problem. The second way is to use a target capital structure,

⁵⁵ Bierman & Smidt 28-30.

the level of debt and equity that the company should have in steady state. This method is easier and avoids a rather complex iterating procedure.⁵⁶

$$WACC = r_e \cdot \frac{E}{E + D} + (1 - T_c) \cdot r_d \cdot \frac{D}{E + D}$$

To obtain the WACC, the required rates of return on equity and on debt are needed. The required rate of return on debt is the interest rate set by the creditor. However, the required rate of return on equity needs to be calculated. This is done by using the capital asset pricing model (CAPM) which states that the required rate of return on equity is equal to the risk free rate of return plus the beta equity times the market risk premium.⁵⁷ Hence, the model needs the risk free interest rate and the beta equity figure. Beta equity is the volatility of a company's share price compared to the volatility of the aggregated market value. If a company has a beta of one, it means that the company's share price has the same volatility as the aggregated market has. If company on the other hand has a beta of negative one, it means that the company's share has the same volatility as the market has, however, in the opposite direction. Finally, there is a factor called market risk premium and it is calculated using the average return of the market and subtracting the market risk free interest rate. The risk premium is most often set to be six percent above the risk free rate.⁵⁸

$$r_e = r_f + \beta_e \cdot (r_m - r_f)$$

- Pros & Cons

The NPV method considers all cash flows during the life of the project and also uses a discount rate to incorporate the implied risk and the impact of time. Hence, from a theoretical aspect, the NPV method captures the most relevant factors. Moreover, it is also easy to compute the value of the projects and easy to compare them. Furthermore, the results are very intuitive since any project value above zero exceeds the demands and expectations and is then worth investing in.⁵⁹

⁵⁶ Koller et al, 113-114, 279.

⁵⁷ Ibid, 300-304.

⁵⁸ Ibid, 305.

⁵⁹ Bergstrand, 192.

Even though the NPV is rather straightforward to compute, the assumptions and decisions behind the discount rate are complex.⁶⁰

1.10.2 Internal Rate of Return Method

The intuition behind the IRR method is similar to the NPV method. By using the IRR method, the discount rate that gives the project a NPV of zero is calculated. Naturally, companies want to find investment projects with as high IRR as possible. Moreover, companies often use IRR hurdles that the projects must exceed in order to be approved.⁶¹

$$NPV = \sum_{i=1}^n \left(\frac{FCF_i}{(1 + IRR)^i} \right) = 0$$

- Pros & Cons

Since no complex discounting rate has to be computed, the IRR method is somewhat simpler than the NPV method. Furthermore, since it results in a single figure, comparisons between different investment projects are rather easy to make.⁶²

Unlike the other capital budgeting methods discussed in this thesis, it is difficult to perform the calculations without an advanced calculator or a computer program. However, it is also difficult to tell what a satisfactory result is and when value is actually created.⁶³

1.10.3 The Payback Method

The payback method evaluates investments by calculating how long time it takes to get the money back that was initially invested in the project. Hence, the method does only take into consideration the cash flows that occur before the initial investment is paid back and not the cash flows that are generated afterwards. Naturally, companies prefer projects with as short payback time as possible and when several investment projects are compared with each other, the investment that repays the initial investment quickest is favored. Furthermore, companies can impose payback time hurdles for investment projects so that no investment with a higher payback time than the hurdle will be accepted.⁶⁴

⁶⁰ Bergstrand, 192.

⁶¹ Bierman & Smidt 31-32.

⁶² Bergstrand, 189-199.

⁶³ Ibid.

⁶⁴ Bierman & Smidt 35-36.

- Pros & Cons

The calculations in the payback method are rather easy to perform and the results are straightforward to interpret and compare.⁶⁵

Even though simplicity is desired, there are several reasons why other methods are more suitable when analyzing an investment proposal. One major disadvantage is that this method does not take cash flows after the payback time into consideration. As a result, two investments with the same payback time could have very different future cash flows and thus add different amount of value to the company. Even worse, investments with moderate future cash flows could be preferred only due to a quick payback time, but still be suboptimal for the company in the long run. The fact that the method does not use discount rates simplifies calculations, but the results are misleading if cash flows are generated far into the future. Hence, it is difficult to see if the cash flows generated are in proportion with the investment amount, due to the fact that money loose value over time. For this reason, the payback method is best suited when calculating shorter investments where the discount rate would have less effect.⁶⁶

⁶⁵ Bergstrand, 190-191.

⁶⁶ Ibid, 190-191.

2 METHOD

The aim of this thesis is to analyze whether an additional investment in a private equity owned portfolio company could, due to the different valuation techniques used, be value adding for only one of the parties involved, and if that is the case, when that is likely to occur. The research problem was specified in the research question: In a situation of additional investments in a portfolio company, is there a difference between value improvement for the private equity firm and value improvement for the private equity owned portfolio company, if so, when is that likely to occur?⁶⁷ This section outlines how the question will be answered by discussing the choice of research method; elucidate the data used in the models; and finally specify how the research study was conducted.

2.1 CHOICE OF METHOD

To answer the thesis question, an analytical approach will be carried out. The analytical approach connects the two theoretical frameworks discussed in the Theory & Empirics section; the LBO valuation method and the capital budgeting methods. By connecting them in an excel model the two frameworks can be analyzed to see how they connect and differ in valuating an additional investment in a private equity owned portfolio company. Adding new values to a theory and see how this impact the evaluation of the result is described in method theory as a deductive approach.⁶⁷ By combining theories and introduce new variables current theories can be further developed and, hence, increase knowledge and understanding. The new angle to the theoretical methods could be used as a base for further research and more extensive empirical studies. Furthermore, a quantitative approach has been used in the analytical approach when testing different investments in the models. Hence, this thesis have chosen to use a quantitative approach when testing different investment scenarios in the excel model. When choosing a quantitative method, it is important to assess the amount of data needed to best reflect the reality. Since this is not a statistical study, but a thesis trying to assess the possibility of a phenomenon, a smaller amount of data is satisfactory

2.1.1 Choice of Theory

As a consequence of the method chosen, two main theoretical frameworks have been chosen when conducting the study. Those frameworks are supposed to give a two-sided picture of the problem that the thesis is investigating. To capture the private equity side, the LBO valuation

⁶⁷ Holme & Solvang, 51.

model is used. The second framework used is the portfolio company's way of evaluating investments.

2.1.2 Method of stating input and assumptions

The input used in the analytical approach is not based on empirical studies, but chosen in collaboration with the private equity company mentioned earlier to reflect realistic examples. Performing the interviews with the private equity company, the thesis gets the most up to date information about how to structure a deal and what kind of assumptions are used in practice when building a LBO model. Furthermore, facts in the thesis are also based on lectures at Stockholm School of Economics.

2.1.3 The Analytical Approach

In the analytical approach, different cash flows from investments are used as input in the LBO valuation model and in the three capital budgeting models. Then, the results from the different models are analyzed and compared to see if and when there is a discrepancy in value creation. For easy comprehension, the results will be presented in a three times four-table.

To start with the LBO model, the cash flow patterns is put into the model. Firstly, there is an increase in capital expenditure, since an investment is made, and thereby affects the free cash flow negative. If the effect of the capital expenditure would be larger than the cash flow generated by the portfolio company in the year of the investment, a deficit would occur where the company would not be able to pay the interest on the debt. When this occurs in the model, the portfolio company is assumed to raise more debt to cover the deficit. This increases the debt level and the interest payment for the coming years. Secondly, in the coming years, there is an increase in EBITDA due to the positive cash flows. The depreciation is also affected and increases the free cash flow when added back. The debt level is affected in two ways. Firstly, the ability to pay down debt during the year of investment is decreased and, secondly, the ability to pay down debt increase in the following years with higher EBITDA and free cash flows. A higher EBITDA also affects the exit EV through the exit multiple. As discussed in the Theory & Empirics section, the private equity firm is in the end evaluated by the outside investors by the IRR generated in the end. As a result of the different investment inputs, different IRR values are achieved.

When it comes to the results from the capital budgeting models, no timing differences are used. The reason for this is because the capital budgeting results are assumed to be presented at the time of the investment and hence, the NPV, the IRR, and the payback time will only change with

different cash flow patterns. Altogether eighteen results are generated in the analytical approach, nine IRRs from the LBO model and nine results from the capital budgeting models. These results indicate different reactions; in the LBO model the new IRR is compared to the base case IRR. If the new IRR is larger than in the base case, we presume that the private equity company is willing to pursue the investment. Vice versa if the new IRR is below the base case IRR, then we presume that the private equity company is unwilling to pursue the investment. In the capital budgeting methods the three results created for each method is compared with each other. For example if one cash flow pattern has much larger NPV than the other two, we presume that the portfolio company is most likely going to pursue that investment instead of the two other.

When comparing the results from the LBO and the capital budgeting models in each of the timings we get a three times four matrix and altogether three matrixes are created, one for each timing, where the capital budgeting results are repeated since they are not affected by timing differences.

2.1.4 Sensitivity Analysis

In the first part of the analytical approach, it is assumed that the exit multiple and the entry multiple is the same. However, the exit multiple has a great effect on the value generated by the private equity firm. It both determines the exit EV and the IRR achieved during the holding period. Consequently, the latter part of the Analysis section includes an exit multiple sensitivity analysis to see the effects on the LBO valuation. In the base case scenario, an entry and exit multiple of six is assumed. In the sensitivity analysis, the exit multiple is allowed to change from five to seven in all cases of cash flow patterns and investment timings. With the results from the sensitivity analysis, the outcome of the first part of the Analysis section can be both questioned and confirmed to support a more accurate conclusion.

2.1.5 Validity and Reliability

Validity is how well the study corresponds to what was supposed to be measured and can also be described how well the results correspond to reality. The study carried out in the paper determines whether or not an investment proposal in a portfolio company should be accepted from a private equity owner's perspective and/or from the company's perspective. The results obtained are whether to accept or reject the investment proposal, from both perspectives. The validity can be questioned upon how well the numbers put into the model corresponds to actual values based on empirical findings.

Reliability is how well the study, if repeated by others and assuming similar conditions, obtains a similar result. The result alters when different numbers are used as input as well as different timings. However, even though the numbers and timings are altered the result will still be either accept or reject the investment. The study is based on models used in companies active on the market, though simplifications are made when appropriate and not affecting the results of the study.⁶⁸

⁶⁸ Holme & Solvang, 94-95.

3 INPUT & ASSUMPTIONS

3.1 The input

The input in the analytical approach is based on assumptions and interviews a private equity firm. The input and assumptions can be divided into three different areas that are combined in the excel model: the investments with different cash flow patterns; the LBO valuation model; and capital budgeting models.

3.2 Cash Flow Patterns

The choice of input for the cash flow patterns is made to reflect three investments that generate different cash flow patterns. As seen in Fig. 4 below, Investment 1 has an increasing cash flow pattern; Investment 2 has an even distributed cash flow pattern; and Investment 3 has a decreasing cash flow pattern.

Fig. 4: The table shows the three different investments used in the analytical approach and their cash flow patterns.

| Cash Flow Patterns | | | | | | | | | | | | |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|----|
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Σ |
| Investment 1 | -100 | 5,0 | 7,2 | 10,4 | 14,9 | 21,5 | 22,6 | 23,7 | 24,9 | 26,1 | 27,4 | 84 |
| Investment 2 | -100 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 84 |
| Investment 3 | -100 | 27,4 | 26,1 | 24,9 | 23,7 | 22,6 | 21,5 | 14,9 | 10,4 | 7,2 | 5,0 | 84 |

The initial investment is in all three cases set to be \$100. This number corresponds to eight to ten percent of the revenue in the base case LBO valuation scenario, depending on which year the investment is made.⁶⁹ The reason for having a constant initial investment is that the effects of the cash flow patterns was intended to be isolated from other factors. The increase of Investment 1's cash flow pattern is decided using a growth rate of 20 percent and an acceleration of 100 percent in the first five years. During the last five years, the growth rate is down to 5 percent and the acceleration set to be 0 percent. The reason for adding a growth factor and an acceleration factor to the developments of the cash flows is to make the development more realistic. Furthermore, the choice of changing the rates after year five is made because the project is assumed to mature and, hence, have slower growth. Investment 2 was assumed to have an even cash flow stream during all ten years. Finally, Investment 3 is assumed to have a decreasing cash flow pattern, exactly mirroring the cash flows of investment 1. Moreover, the sum of the cash flows in all three

⁶⁹ Private Equity Company, 2007-09-30.

cases is \$84. The life of the invested asset is assumed to be ten years which with a linear depreciation method results in an annual depreciation of \$10.

3.3 LBO Model

First, the inputs used and assumptions used in the base case scenario will be explained. Then, the items changing in the LBO model from the different investments will also be explained

The private equity firm is assumed to hold the portfolio company for five years. Furthermore, in the base case scenario, revenue is set to \$1000 in the first year which then grows with assumed rates each year. The growth rate starts at three percent and increases to five percent at the end of the holding period. EBITDA is set to ten percent the starting year and grows by a half percentage point every year to twelve percent in year five. The growth rate in both revenue and EBITDA is a result of improvements and value creation done by the private equity firm, in accordance with the Theory & Empirics section.

Depreciation, increase in NWC, and increase in CAPEX are all based upon a percentage of revenue and are all set to be 2 percent for all years. The percentage of revenue for the three elements could be debated and of course differs depending on the industry in which the company is in and the structure of its assets. Most important is that long run depreciation and CAPEX should be more or less the same. Having higher depreciation would indicate a shrinking company.

The interest rate for debt is set to be the Stockholm Inter Bank Offered Rate, STIBOR, of 4.8 percent⁷⁰ with an additional 4 percentage points added to reflect the fact that the debt raised is not risk free.⁷¹ It is assumed that only one type of debt is raised to finance the deal. This contrasts the Theory & Empirics section that described that several types of debt and interest rates are used depending on seniority and maturity of the credit. However, this assumption is made to simplify the model and does not affect the results or conclusions.

The corporate tax rate used in the LBO model is the Swedish rate of 28 percent.⁷²

⁷⁰ www.riksbanken.se, 2007-11-05.

⁷¹ Private Equity Company, 2007-09-30.

⁷² Johansson, 272.

The entry and exit EBITDA multiples are assumed to remain unchanged at six during the holding period. The exit multiple is indeed an integral part of the LBO valuation, and a change impacts the outcome. However, in order to fully incorporate such a change, a statistical analysis would be needed in order to know when and how much the multiple would move as a result of different investments. As discussed above, under investment or unrealized investments might depress the multiple, however, the exact effect is unknown. Furthermore, in the first part of the analysis, the effects of only changes in the investments' characteristics want to be seen, where in the latter part of the analysis the impacts of changes in the multiple will be tested to fine-tune the whole analysis and its results.

Another important part of the LBO valuation is the debt to asset ratio. The entry debt to asset ratio is set to be 70 percent and, as a result, equity accounts for 30 percent of assets.⁷³ When the general state of the economy is unstable, it may however be difficult to sustain such high debt levels.⁷⁴ Given the opening EBITDA of \$100, the amount of debt at entry is \$420, value of equity is \$180, and total EV is \$600.

When the cash flows from the different investments are put into the LBO model, several items are affected. Those items are: EBITDA, depreciation, CAPEX, and as a result, EV, debt to asset ratio, value of equity, and the IRR.

3.4 Capital Budgeting

For the capital budgeting calculations, the basic input is the cash flow patterns described above. The input is enough to calculate an IRR and a payback time. However, to calculate a NPV an additional factor is needed; the discount factor. The investments are assumed to have the same risk as the portfolio company's operating risk. Hence, the WACC with the market value capital structure of the firm will be used. Moreover, as described in the Theory & Empirics section, there are two ways of calculating the WACC: moving WACC, or using a target capital structure. In the analytical approach, the WACC with a target market value capital structure is used. The target value is assumed to be the capital structure in the year of exit in the base case scenario. This is the capital structure that the private equity firm aims for when investing and, hence, an appropriate assumption.

⁷³ Private Equity Company, 2007-09-30.

⁷⁴ Aniansson, 2007-09-18.

To calculate the WACC, the required rate of return on equity first needs to be calculated assuming that CAPM holds. For the risk free rate, STIBOR of 4.8 percent is used. Beta equity is set to be 1.5, assuming that the volatility in the portfolio company is slightly higher than the volatility in the market. The market risk premium is set to be six percent.⁷⁵ As a result the required rate of return on equity is 14 percent and calculated as follows:

$$r_e = 4.8 + 1.5 \cdot (10.8 - 4.8) = 14\%$$

To proceed to calculate the WACC, some additional input is needed. The tax rate used is the same as in the valuation model and is the Swedish corporate tax rate of 28 percent.⁷⁶ The interest rate of debt is set to the same as used in the base case model, STIBOR plus four percentage points.⁷⁷ Having all the information needed, the WACC adds up to 11.3 percent and is calculated as follows:

$$WACC = 14\% \cdot \frac{587}{587 + 289} + 8.8\% \cdot (1 - 0.28) \cdot \frac{289}{587 + 289} = 11.3\%$$

3.5 The Exit Multiple

The exit multiple is negotiated between the seller, the private equity firm, and the bidder for the portfolio company and depends on the future expectations about the portfolio company. The private equity firm tries to pinpoint the potential in the portfolio company to get as high multiple as possible. The buyer on the other hand of course wants to buy as cheap as possible and, hence, looks for indications that the future may not be as bright as the private equity firm argues. Here, the investments play an important role. If the private equity firm under invests during the holding period, it is probable that the exit multiple decreases because the portfolio company is not equipped for future growth. On the other hand, large investments, that are made late in the holding period and that does not yet generate positive cash flows, could easily be seen as too insecure to increase value in the future. It is difficult to only use positive NPV projections in a negotiation process. As a result, too little investments or too many unrealized investments could lower the exit multiple which impacts the exit EV and IRR.⁷⁸

⁷⁵ Koller et al., 305.

⁷⁶ Johansson, 272.

⁷⁷ Private Equity Company, 2007-09-30.

⁷⁸ Ibid.

4 ANALYSIS

In order to understand whether there is an inconsistency between value improvement for a private equity firm and value improvement for their portfolio company, when it comes to additional investments, the analytical approach described in the Method section is conducted and analyzed here in this section.

First, the impact of different investment projects on the three capital budgeting models will be tested to see the effects on the portfolio company. Second, the different investments' effects on the LBO valuation model will be studied to see the effects on the shareholders in this case: the private equity firm. In the second case, both cash flow patterns and investment timings are of importance for the outcome. Third, a comparison between the results from the capital budgeting analysis and from the LBO valuation analysis is pursued and from this it will be clear if there is a risk of a discrepancy between value improvement for a private equity firm and value improvement for their portfolio company. Finally, those results are tested for changes in the exit multiple. In this way, not confusing the analysis of the different investments' effect on the capital budgeting models or the LBO model, but rather supporting some results while questioning other results and in that way fine-tuning the analysis to reach reliable conclusions.

4.1 CAPITAL BUDGETING AND THE EFFECTS ON THE PORTFOLIO COMPANY

In order to understand how investments with different characteristics affect the results of capital budgeting models, three cash flow patterns were used and analyzed. First, Investment 1 that generates increasing cash flows, then Investment 2 that generates even cash flows, and finally, Investment 3 that generates decreasing cash flows over the ten year life of the investment project.

4.1.1 Investment 1: Increasing Cash Flows

After the initial investment, this project generates increasing cash flows over time, meaning that the smallest cash flows are found early on in the life of the investment, while the largest are found towards the end of the investment.

With a WACC of 11.3 percent⁷⁹, the NPV of the investment with increasing cash flows is \$-6.1. When discounting, investments with the largest cash flows far into the future are punished harder due to the interest-on-interest effect. The higher the discount rate and the larger the project, the

⁷⁹ See Method section, page 35, for the calculations behind this number.

greater that effect is. Since the increasing cash flow pattern does not reach satisfactory levels of return from a NPV capital budgeting view, the NPV method would suggest that Investment 1 destroys value for the portfolio company. However, there might be circumstances when the investment would be needed in order to sustain the company and its other investments. In such a case, the firm would be even worse off not investing.

With the increasing cash flow pattern, the IRR for the investment is 10.0 percent. It is worth noting, that the number is lower than the WACC used in the NPV model, indicating that the investment does not meet the requirement based on the risks involved in the project. However, without calculating a WACC, it is hard to dismiss an investment on the basis of just an IRR figure. In practice, companies who perform IRR capital budgeting might use hurdle rates that needs to be exceeded in order to proceed with an investment.

Looking at Investment 1 from a payback time capital budgeting perspective, the outcome is 7.8 years. This is almost as long as the lifetime of the investment which is slightly worrying. Hence, only small negative deviations from the estimates might result in the project not being paid back at all during the life of the investment. Since the payback time capital budgeting model is best used when comparing different projects or when having a minimum payback time, it is not possible to reject or accept a project only based on this number.

4.1.2 Investment 2: Even Cash Flows

After the initial investment, this project generates even cash flows throughout the whole project life. This means that the cash flows in year one are equal to the cash flows in the final year.

Putting Investment 2 in the NPV capital budgeting model generates a value of \$6.2. Consequently, this investment meets the demand of a positive NPV. Thus, this investment would add value to the portfolio company.

The IRR from the even cash flow pattern is 12.9 percent, but is as stated before difficult to interpret without specified hurdle rates or if the investment in focus is compared to other alternatives.

Using the payback method, the initial investment is paid back after 5.4 years, which is just above half of the project's length. It is hard to estimate if this number is good or not without knowing if the specific company has a minimum payback time hurdle imposed for investments.

4.1.3 Investment 3: Decreasing Cash Flows

After the initial investment, this project generates decreasing cash flows, meaning that the largest cash flows are generated early in the life of the investment, while the smallest amounts are generated towards the end of the investment.

The NPV from the project is positive, \$17.7. Reaching this result, Investment 3 would add value to the portfolio company even after discounting the cash flows with the WACC. The large cash flows early on raise the value of the project when discounting which explains why the results are almost three times higher than in Investment 2.

The IRR figure for the decreasing cash flow investment is 17.0 percent. This is a rather high number, but without company specific hurdle rates or other investments to compare with, it is hard to decide whether it would add value or not.

The payback method shows that the initial investment will be paid back already after 3.6 years, just above one third of the life of the project. This is a good number compared to the number of years of the project. However, if the payback method is the only capital budgeting method used to make an investment decision, even a very low number could be misleading because the outcome does not reveal what happens after the initial investment is paid back..

- Conclusions from the Capital Budgeting Analysis

As stated in the Theory & Empirics section, the three different capital budgeting methods generate different kinds of results. Hence, different conclusions can be made depending on which method that is used.

Starting with the NPV method, it gives either a positive number or a negative number which makes it easy to interpret. Investment 1 is the only one generating a negative NPV and should thereby under normal circumstances be rejected by the portfolio company because it is value destroying. The two other investments both generate positive NPVs and, hence, should be accepted by the portfolio company. Furthermore, if the investments are to be compared internally, Investment 3 creates the most value for the private equity company and should be favored.

It is more difficult to interpret the outcomes of the IRR method since most companies use a specified internal investment hurdle that the investment needs to exceed. However, if we would

assume that the portfolio company would use the WACC calculated as a hurdle rate for investments, the decisions would be exactly the same as for the NPV method. Investment 1 should be rejected, both the other accepted.

As with the IRR method, it is hard to interpret and draw conclusions from just the result of a payback time analysis. However, comparing the payback times of the three investments analyzed, Investment 3 would be the best and Investment 1 would be the worst. However, important to keep in mind is that the payback time does not reveal anything about the cash flows generated beyond the day the initial investment is paid back.

To conclude, if a board of directors were to choose between the three different investments, all capital budgeting methods would arrive at the same results favoring Investment 3 before the other two. As seen in Fig. 5, the least favored investment would be Investment 1, no matter what capital budgeting model used.

Fig. 5: The table below shows a summary of the results of the investment budgeting analysis using three investments in the NPV, the IRR; and in the payback time capital budgeting model.

| <i>Investment Budgeting Analysis</i> | | | |
|---|------------|------------|---------------------|
| | NPV | IRR | Payback Time |
| Investment 1 | -6,1 | 10,0% | 7,8 |
| Investment 2 | 6,2 | 12,9% | 5,4 |
| Investment 3 | 17,7 | 17,0% | 3,6 |

4.2 LBO VALUATION AND THE EFFECT ON THE PRIVATE EQUITY FIRM

In this section, the LBO valuation model will be examined using the same three investments that were analyzed in the capital budgeting section. In addition, the effects of changes in the timing of the investments throughout the private equity company's holding period will be analyzed. Thus, three different investment timings will be used: Timing 1 where the investment is made in the first year; Timing 2 where the investment is made in the end of the third holding year; and finally Timing 3 where the investment is made in the final holding year of the portfolio company. The performance measurement used in the LBO model is the IRR for the private equity company's holding. In addition, the effects on EV, the debt to asset ratio, and the exit value of equity when changing the investment input in the LBO valuation model will be shown to present a comprehensive picture of the effects.

When the investments are included in the LBO model, there are scenarios where the initial investment is greater than the free cash flows generated by the company that year, resulting in a deficit. To cover that deficit, the company could raise more debt, take in more equity, or use outstanding cash on the balance sheet. According to our assumptions stated earlier, the deficit would be covered by a new issue of debt. The interest rates on the newly raised debt are assumed to be the same as for the debt already held.

4.2.1 Base Case Scenario

In order to see the effects of the investments on the LBO valuation, a base case scenario is used as a benchmark to show the effects of the different investments on the outcome of the LBO model valuation. The base case scenario assumes that the portfolio company performs according to plan and that no additional investments are made. The new investment input in the model is kept to zero and therefore not affecting cash flows, EBITDA, or the debt to asset ratio.

In the LBO base case scenario, the exit enterprise value is \$876, which is an increase of 46 percent compared to the value at entry using the same purchase EBITDA multiple of six. The debt is paid down with the cash flow to equity from \$420 to \$289 at the time of exit, which is a decrease in the debt to asset ratio from 70 to 33 percent. This results in a value increase of equity of 226 percent, from \$180 to \$587. As a result, the IRR for the holding is 26.7 percent, which is in the range of what is normally satisfactory for private equity firms.⁸⁰

4.2.2 Timing 1: Early Investment

First, the early investment timing will be examined, where the portfolio company invests already after one year of the holding period. This implicates that the private equity firm will be affected by the performance of the investment for almost the entire holding period. The initial investment will negatively affect the free cash flows and the cash flows to equity early on and consequently have a negative effect on the debt repayment. However, the chance of realizing positive cash flows and, hence, improving EBITDA for the portfolio company before exit increases the earlier the investment is made.

- Investment 1: Increasing Cash Flows

Even though the large cash flows are received late in the project, the increasing cash flows have a positive effect on EBITDA in the exit year due to the early investment timing. The EBITDA

⁸⁰ Kaplan, (3/3), 9.

increases from \$146 to \$161. Assuming an exit multiple of 6, the EV then increases from \$876 in the base case scenario to \$965.

More positive cash flows can be used for debt pay down with early investment timing. However, the large initial investment impairs the possibilities of paying down debt. The exit debt is increased from the base case amount \$289 to \$375. In other words, the positive cash flows from the investment are not able to fully compensate for the initial investment. However, the debt to asset ratio is decreased to 39 percent at exit. Deducting the debt outstanding from the exit EV, an exit value of equity of \$590 is reached which is \$3 higher than in the base case.

The larger EBITDA increases the exit EV as well as the exit value of equity and, thus, drives the IRR to a level above the base case scenario. Since the investment would raise the IRR to 26.8 percent the investment is adding value to the private equity firm and for the investors of the private equity fund.

- Investment 2: Even Cash Flows

Investment 2 increases the EBITDA to \$164 at the time of exit, which in turn implies an enterprise value of \$986 using an exit multiple at 6. Thus, the EV is 13 percent higher than in the base case.

In this case, larger cash flows are available to pay down debt resulting in a debt to asset ratio of 35 percent at the point of exit. This is two percentage points higher than in the base case, but at the time of exit, the value of equity is nine percent higher than the base case, reaching \$640.

As a consequence of the higher EBITDA and larger cash flows, the IRR is increased to 28.9 percent in Investment 2 which is above the IRR in the base case. This would make the private equity firm benefit from accepting Investment 3.

- Investment 3: Decreasing Cash Flows

With a decreasing cash flow pattern, the largest cash flows are generated the first year after the initial investment and the speed and acceleration of the drop in cash flows decides the level of EBITDA at the year of exit. A faster decrease might actually lower the EBITDA compared to the other cash flow patterns discussed. The decreasing cash flow pattern used in the analytical approach is, however, simply the mirror of the increasing cash flows pattern and the EBITDA is still at a high level of \$170. The EBITDA multiplied with the exit multiple gives an EV of \$1,018.

With early large cash flows, the project is able, during the holding period, to compensate for the initial investment of \$-100. As a result, the debt to asset ratio is lower than in the base case scenario at the time of exit, down to 32 percent. Subtracting the debt of \$323 from the EV gives an equity valuation of \$695. That is 18 percent higher than in the base case and 286 percent higher than the value of equity at the point of the acquisition.

The resulting IRR with this investment is 31.0 percent. Since it substantially improves the IRR compared to the base case, the investment adds value to the private equity firm.

- Summary of Timing 1

From a private equity firm's perspective, all three investments add value when looking at the early investment timing. In all three cases the IRR is improved compared to the base case rate. The main reason for this is that the projects start to pay off in terms of earnings during the holding period which results in increased earnings at the time of exit. This gives a multiplied effect due to the way the exit value of equity is calculated in a LBO valuation model; the exit multiple times EBITDA subtracted by outstanding debt. Fig. 6 further summarizes the factors affected by the investments.

Fig. 6: This table shows a summary of investment timing 1 and the impact on different factors in the base case scenario, in Investment 1, in Investment 2, and in Investment 3.

| <i>Timing 1</i> | | | | |
|------------------------|------------------|---------------------|---------------------|---------------------|
| | Base Case | Investment 1 | Investment 2 | Investment 3 |
| EBITDA | 146 | 161 | 164 | 170 |
| EV | 876 | 965 | 986 | 1018 |
| Exit Debt Level | 289 | 375 | 346 | 323 |
| Exit D/A | 33% | 39% | 35% | 32% |
| Value of Equity | 587 | 590 | 640 | 695 |
| IRR | 27% | 27% | 29% | 31% |

4.2.3 Timing 2: Medium Time Investment

The second timing scenario used in the analytical approach is when additional investments in the portfolio company are made in year three. In this case, the initial investment will affect the debt pay down with the same amount as in the previous scenario. The biggest difference is that the investment will start to pay off later in the holding of the portfolio company and, hence,

compensate less for the initial investment due to fewer years of holding. As a result, the exit debt to asset level will be higher.

- Investment 1: Increasing Cash Flows

The EBITDA in the end of the final holding year is slightly positively affected by the investment due to the fact that only smaller cash flows are generated during the years left of the holding period with this cash flows pattern. As a result, the exit EV is \$919 compared to the base case value of \$876.

Another effect of the cash flows being moderate during the holding period is that the debt pay down is slowed down. As a result, the debt to asset ratio is increased to 42 percent. The residual, the value of equity, is only reaching \$532, which is lower than in the base case scenario.

The IRR is negatively affected by the limitations in debt pay down, resulting in a lower number than in the base case scenario. With an IRR decreasing to 24.2 percent, the private equity firm would be worse if this investment was made in the portfolio company.

- Investment 2: Even Cash Flows

Due to the evenly distributed cash flows, the exit EBITDA reaches a higher value than in the base case scenario. Multiplied with the exit multiple of 6, an exit EV of \$986 is reached.

Even though this investment generates higher cash flows during the holding period, the cash flows are still not large enough to retain the debt to asset ratio from the base case scenario. The ending debt level is now at \$369, compared to base case scenario of \$289. Yet, the increase in the EV is enough to increase the ending value of equity to \$617, around 5 percent higher than in the base case.

The modest increase in equity improves the IRR to 28.0 percent. This is well above the base case IRR of 26.7 percent, but slightly lower than in the early timing of the investment with the same cash flow pattern. Still, it would add value to the private equity firm.

- Investment 3: Decreasing Cash Flows

Due to the fact that this investment starts off with its largest cash flows and that the investment is made after a few years of holding, the EBITDA at the time of exit is high, \$172. With an

unchanged exit multiple at 6, the EV then reaches to \$1,033, which is 18 percent above the value in the base case scenario.

Due to the late investment timing, even the investment with decreasing cash flows leads to a slightly higher ending debt to asset ratio than in the base case scenario. With ending value of debt outstanding of \$356, the debt to asset ratio is 35 percent.

The combined effect of the rather low debt level and the power of the exit multiple on the improved EBITDA, the IRR is up to 30.3 percent. With a few percentage points higher than the base case IRR, the private equity firm and its investors would be better off if this investment was made.

- Summary of Timing 2

When analyzing the effects of the three investments with medium investment timing, the IRR is improved in two cases. With even cash flows and with decreasing cash flows, the resulting IRR is still higher than in the base case scenario, which would then add value to the private equity company. Only Investment 1 underperforms and would be value destroying for the private equity firm. Fig. 7 further summarizes the affected factors of the different investments.

Fig. 7: This table shows a summary of investment timing 2 and the impact on different factors in the base case scenario, in Investment 1, in Investment 2, and in Investment 3.

| <i>Timing 2</i> | | | | |
|------------------------|------------------|---------------------|---------------------|---------------------|
| | Base Case | Investment 1 | Investment 2 | Investment 3 |
| EBITDA | 146 | 153 | 164 | 172 |
| EV | 876 | 919 | 986 | 1033 |
| Exit Debt Level | 289 | 387 | 369 | 356 |
| Exit D/A | 33% | 42% | 37% | 34% |
| Value of Equity | 587 | 532 | 617 | 676 |
| IRR | 27% | 24% | 28% | 30% |

4.2.4 Timing 3: Late Investment

The third investment timing analyzed is when the initial investment is made in the end of the final year of holding. This creates a situation where all cash flows generated by the investment will reach the portfolio company after the private equity firm's exit. Hence, the cash flows will fall in the hands of the new owners and all investments will have the same effect on the LBO valuation and the IRR.

Since no cash flows are generated by the investment during the holding period, the EBITDA will remain unchanged. The initial investment will have no effect on EBITDA since it is not an operating cash flow. With an unchanged exit multiple, the EV is \$876, the same as in the base case scenario, with all three investments.

The debt pay down is on the other hand affected by the investment. The initial investment increases the debt since less cash flow to equity is available to pay off the debt. In addition, there are no cash flows generated to compensate that increase in debt during the holding period. The debt to asset ratio is only lowered to 44 percent from the level of 70 percent at the time of investment. As a result of the higher debt levels and unchanged EV, the value of equity is lower than in the base case scenario.

Even though the exit EV is the same as in the base case scenario, the IRR decreases due to the higher debt to asset ratio. The IRR for all three investments is only 22.0 percent and value destroying for the private equity firm.

- Summary of Timing 3

Any investment made in the final holding year destroys value for the private equity company, no matter the cash flow pattern of the investment. The reason for all investments to be value destroying for the private equity firm is the increased debt to asset ratio at the exit time induced by the initial investment. Fig. 8 further summarizes the affected factors of the different investments.

Figure 8: This table shows a summary of investment timing 3 and the impact on different factors in the base case scenario, in Investment 1, in Investment 2, and in Investment 3.

| <i>Timing 3</i> | | | | |
|------------------------|------------------|---------------------|---------------------|---------------------|
| | Base Case | Investment 1 | Investment 2 | Investment 3 |
| EBITDA | 146 | 146 | 146 | 146 |
| EV | 876 | 876 | 876 | 876 |
| Exit Debt Level | 289 | 389 | 389 | 389 |
| Exit D/A | 33% | 44% | 44% | 44% |
| Value of Equity | 587 | 487 | 487 | 487 |
| IRR | 27% | 22% | 22% | 22% |

4.3 COMBINING THE LBO AND CAPITAL BUDGETING

In the analysis, it has first been examined which investments that are value adding for a company and which are not. By using capital budgeting models, three different investments have been analyzed from the portfolio company's perspective. Then, to see the consequences for the private equity firm of such an additional investment, the cash flows from the investments were put into the LBO valuation model. Furthermore, in this case, investment timings were introduced as an additional factor that has effect on the valuation of the portfolio company. That timing effect is of no importance from a capital budgeting point of view since they always return the same answer. The results from the capital budgeting analysis and the LBO valuation analysis will now be put side by side to illustrate if and when there is value creation for only party.

4.3.1 Timing 1: Early Investment

As shown in Fig. 9, investing after one year is value adding for the private equity firm, as it has an increased IRR, regardless of which cash flow pattern is generated by the project. This is due to the fact that the investments start to pay off and raise the EBITDA while at the same time not impairing the debt repayment significantly. With a decreasing cash flow pattern, the exit debt to asset ratio even decreases compared to the base case scenario. The order of the value added from the investments to the private equity firm from the three cash flow patterns is also accordingly: the most value adding investment is Investment 3, second Investment 2, and least Investment 1. The same order is also true when looking at the capital budgeting models' results. What is striking here though is that from the portfolio company's perspective, Investment 1, with increasing cash flows, would actually destroy value. This since the NPV analysis of the project generates a value of \$-6.1. The other two investments both generate positive NPVs. However, when examining the investments from an IRR or a payback time point of view, it is not obvious whether certain investments will be value adding or not. Only ranking of the investment is possible without specified hurdle rates. To conclude, in timing 1 there are one investment that would benefit the private equity firm, but at the same time destroy value for the portfolio company. A discrepancy in value creation therefore exists.

Fig. 9: This table shows a summary of the three different investments in Timing 2, and their respective effect on the LBO valuation model's IRR, the NPV, the IRR, and the payback time capital budgeting analysis.

| <i>Timing 1: Summary</i> | | | | |
|---------------------------------|------------|------------|------------|----------------|
| | LBO | NPV | IRR | Payback |
| Base Case | 26,7% | n/a | n/a | n/a |
| Investment 1 | 26,8% | -6,1 | 10,0% | 7,8 |
| Investment 2 | 28,9% | 6,2 | 12,9% | 5,4 |
| Investment 3 | 31,0% | 17,7 | 17,0% | 3,6 |

4.3.2 Timing 2: Medium Time Investment

When investing two years later, timing 2 in the analysis, the impact of less realized cash flows become clear in the LBO valuation. As seen in Fig. 10, the resulting IRR from the investment with increasing cash flows falls below the base case IRR. The small increase in EBITDA is not enough to compensate for the increase in the outstanding debt that is a result of the initial investment. Hence, the later timing of the investment destroys value for the private equity firm with this cash flow pattern. However, Investment 2 and Investment 3 still improves the IRR in the LBO valuation and it is clear how important the early cash flows are when the portfolio company invests a few years down the holding period. The EBITDA increase needs to be sufficiently large, so that when multiplied with the exit multiple, it at least compensates for the increase in debt. When comparing these results with the outcome of the NPV analysis, it becomes clear that what is value adding for the private equity firm is also value adding for the portfolio company in timing 2. Again, looking at the other two capital budgeting methods, IRR and payback time, it is not possible to see which investments add value and not. To summarize timing 2, the private equity firm and the portfolio company would benefit from the same investments and also loose out from the same ones. No discrepancy in value creation exists here.

Fig. 10: This table shows a summary of the three different investments in Timing 2, and their respective effect on the LBO valuation model's IRR, the NPV, the IRR, and the payback time capital budgeting analysis.

| <i>Timing 2: Summary</i> | | | | |
|---------------------------------|------------|------------|------------|----------------|
| | LBO | NPV | IRR | Payback |
| Base Case | 26,7% | n/a | n/a | n/a |
| Investment 1 | 24,2% | -6,1 | 10,0% | 7,8 |
| Investment 2 | 28,0% | 6,2 | 12,9% | 5,4 |
| Investment 3 | 30,3% | 17,7 | 17,0% | 3,6 |

4.3.3 Timing 3: Late Investment

The results from timing 3, shown in Fig. 12, are interesting. Since the investments are made during the sensitive exit year; the investment does not generate any cash flows to pay back the initial investment or to contribute to an increased EBITDA. As a result, any investment during the last year is a burden for the private equity firm when looking at the effects on the LBO valuation. Both an increasing debt to asset ratio and the unchanged EBITDA explains the drop

in IRR compared to the base case scenario. The outcomes from the capital budgeting models are the same as before, why there are two instances where the portfolio company would benefit from an investment while the private equity firm would lose out. Again, a discrepancy in value creation exists.

Fig. 12: This table shows a summary of the three different investments in Timing 3, and their respective effect on the LBO valuation model's IRR, the NPV, the IRR, and the payback time capital budgeting analysis.

| <i>Timing 3: Summary</i> | | | | |
|---------------------------------|------------|------------|------------|----------------|
| | LBO | NPV | IRR | Payback |
| Base Case | 26,7% | n/a | n/a | n/a |
| Investment 1 | 22,0% | -6,1 | 10,0% | 7,8 |
| Investment 2 | 22,0% | 6,2 | 12,9% | 5,4 |
| Investment 3 | 22,0% | 17,7 | 17,0% | 3,6 |

4.3.4 Summary

The analysis of the different investments clearly points out that there is an existence of discrepancy between value added for a private equity firm and value added for their portfolio company. This because of the different ways a certain investment affects a traditional company's capital budgeting models' results and a private equity firm that is evaluated based on the IRR of their investments. Furthermore, the timing of the investment is not only important for the portfolio company to stay competitive on the market, but also becomes a strategic decision due to its large impact on the IRR. Especially when the initial investment is made close to the exit year, the benefits for a private equity firm from additional investments drastically decreases. At any given timing of investment, the patterns of the cash flows generated are also important and has an impact on the valuation. It is then preferred to invest if a large part of the cash flows is generated early on. That is true both for the private equity firm and for the portfolio company. In Fig. 13, the results from the analysis are combined to give an overview of which investments that are value creating for which party and when.

Figure 13: This table shows a summary of all investments and of all investment timings and the results in the LBO valuation's IRR, the NPV, the IRR, and the payback time capital budgeting model.

| Result Matrix | | | | | |
|----------------------|--------------|------------|------------|------------|----------------|
| | | LBO | NPV | IRR | Payback |
| Base case | | 26,7% | n/a | n/a | n/a |
| Timing 1 | Investment 1 | 26,8% | -6,1 | 10% | 7,8 |
| | Investment 2 | 28,9% | 6,2 | 13% | 5,4 |
| | Investment 3 | 31,0% | 17,7 | 17% | 3,6 |
| Timing 2 | Investment 1 | 24,2% | -6,1 | 10% | 7,8 |
| | Investment 2 | 28,0% | 6,2 | 13% | 5,4 |
| | Investment 3 | 30,3% | 17,7 | 17% | 3,6 |
| Timing 3 | Investment 1 | 22,0% | -6,1 | 10% | 7,8 |
| | Investment 2 | 22,0% | 6,2 | 13% | 5,4 |
| | Investment 3 | 22,0% | 17,7 | 17% | 3,6 |

4.3.5 Connecting the LBO with Capital Budgeting

From the analysis above it is clear that there are discrepancies between value creation for a private equity firm and for its portfolio company in terms of new investments in the latter. As a result, there is a risk of different incentives between the two stakeholders and therefore conflicts of interest in an investment decision depending on what capital budgeting model is used. From the private equity firm's point of view it is important that the portfolio company does not only act in the interest of the portfolio company, but also in line with what is value increasing in the LBO valuation. Consequently, from a practical point of view it is interesting to see what capital budgeting method that is most alike an LBO valuation model and that responds to changes in investments in the same way.

An LBO valuation model is in effect looking at a specified number of years, the holding period, whereas most capital budgeting models look at the full length of the project analyzed. The outcome from the NPV and the IRR models are based on all cash flows generated by an investment. However, looking at the payback time model, it is only affected by the cash flows generated until the initial investment is paid back. In that sense it is similar to an LBO valuation model that neither is affected by anything that happens after the exit. If large cash flows are generated after the exit, the LBO valuation would remain unchanged as would the payback time, given that the investment reached break even before the exit. However, the results from the NPV and the IRR models would increase. If a portfolio uses and understands the payback time model, they implicitly understand the effects of an investment on the LBO model.

4.4 EXIT MULTIPLE ANALYSIS

The results above are all assuming that the exit EBITDA multiple is held constant no matter what investment is chosen. As discussed above, changes on the exit multiple are not unlikely in a situation of an additional investment, especially not if cash flows and earnings are not fully realized. This section analyzes to what degree a change in the exit multiple will affect the IRR in the LBO valuation model for the different investments and Fig. 14 summarizes those results.

Fig. 14: This table shows an exit multiple sensitivity analysis. The effects of a change in the exit multiple is shown on the LBO valuations IRR in the different investment cases.

| <i>Exit Multiple Analysis</i> | | | | | | |
|-------------------------------|--------------|-------|-------|-------|-------|-------|
| EBITDA Multiples | | 5,0 | 5,5 | 6,0 | 6,5 | 7,0 |
| Base Case IRR | | 19,6% | 23,4% | 26,7% | 29,7% | 32,4% |
| Timing 1 | Investment 1 | 19,0% | 23,1% | 26,8% | 30,1% | 33,1% |
| | Investment 2 | 21,5% | 25,4% | 28,9% | 32,0% | 34,9% |
| | Investment 3 | 23,9% | 27,7% | 31,0% | 34,1% | 36,9% |
| Timing 2 | Investment 1 | 16,0% | 20,4% | 24,2% | 27,6% | 30,7% |
| | Investment 2 | 20,3% | 24,3% | 28,0% | 31,2% | 34,1% |
| | Investment 3 | 22,9% | 26,8% | 30,3% | 33,5% | 36,4% |
| Timing 3 | Investment 1 | 13,6% | 18,1% | 22,0% | 25,5% | 28,6% |
| | Investment 2 | 13,6% | 18,1% | 22,0% | 25,5% | 28,6% |
| | Investment 3 | 13,6% | 18,1% | 22,0% | 25,5% | 28,6% |

In Timing 1, the earnings and cash flows have been generated for some years and the debt to asset ratios remains fairly low. As a result, it should be possible to show the potential and value of the investment at the time of exit and the exit multiple should therefore remain stable, decrease a little, or increase a little. If the multiple increases, the IRR is improved and all investments would still add value to the private equity firm. However, when decreasing just by 0.5, only Investment 3 would still benefit the owner. As a result, the difference between value added for the private equity firm and the portfolio company increases.

In Timing 2, there are only a few years left of the holding period to generate cash flows, increase earnings and repay debt. As a result it becomes harder to convince a buyer of the benefits of the investment at the point of exit. This becomes even harder the larger the investment. Hence, it is most likely that the exit multiple would remain unchanged or decrease by a little. If decreased by 0.5, an additional investment would be value destroying compared to the base case and as with Timing 1 further widening the gap between the two stakeholders discussed. Moreover, if the multiple were to decrease to 5.0, all investments would be value destroying for the private equity firm.

Finally, in Timing 3, the investments have not yet started to pay back their initial investments. Hence, revenues remain unchanged while the debt to asset ratio increases. This is the hardest case to sell to a potential investor since it could well be a hole in the ground where in a few years time a new plant will operate. It is in this case easier for a buyer to put pressure on the private equity firm to lower the multiple and it would most likely decrease by 0.5 or 1.0. No matter the decrease in the multiple, all investments would destroy value for the private equity firm as in the base case scenario. An interesting thing to note is that if there is a case of under investment and the private equity company suspects that the multiple would be at least 1.0 lower than if investing, less value would be destroyed for the private equity firm accepting the investments. As a result, it has to be taken into consideration whether it destroys more value to make a bad investment or not invest at all.

To summarize, in the case of a lower exit multiple, there will be an increased difference between value improvement between the private equity firm and the portfolio company. Consequently, it will be a greater risk for underinvestment in the portfolio firm. However, if there are reasons to think that the exit multiple will drop even more if underinvesting than if making late and large investments, there could be cases where investing is the least value destroying for the private equity firm.

5 CONCLUSION

As seen in the summary and results of the analysis above, there are risks of differences for which party an additional investment in a portfolio company adds value. Private equity firms favor investments where the earnings and cash flows are realized early. In that way the debt can be paid down and a high IRR achieved within the holding period. Disregarding liquidity issues, the portfolio company on the other hand wants to invest in order to improve the value of the company, to invest in positive NPV projects. Hence, the short holding period that the private equity company works with narrows down the actions that can be taken. Large and late projects would almost always be value destroying for them as owners and shareholders. At the same time making large investments that sometimes have long lifetimes, and are insecure in ability to create profit the first couple of years, is a must for normal companies to be able to compete, excel and gain market shares. The interest of the two parties is not always aligned and, as a result, there is a market imperfection in the relationship between the private equity firm's short term investment horizon and the portfolio company's goal to strive for long term sustainable growth investing in positive NPV projects.

As private equity firms do not always have time to analyze in depth every investment proposal that is put forward by the management of the portfolio company, it is difficult to conclude how common the problem really is. Furthermore, as not all portfolio companies use the NPV capital budgeting method as a base for investment decisions, it is even harder to say that they themselves work consciously for value improvement. Good management most likely has a good business sense and favors a low payback or a high IRR, but still, without a deeper analysis they do not really know the effects on the value of the company they are leading. Even less, they know about how their actions impact the private equity firms' LBO valuation model. From the analysis it was clear that good numbers in those capital budgeting models had a great negative impact on the LBO valuation. Even if the management knew the impact on the LBO valuation model, it is still not certain that it would be a conflict of interest between them and the private equity firm as an owner. In many cases, management has incentive based payments that align their interests with value creation in the view of a private equity firm. In that way, the conflict of interest would be between management and the company it runs.

Whatever the individual case may be, there will still be an underlying problem with the fact that private equity companies benefit from some projects that destroy value for the portfolio companies, and vice versa. Due to the effects of the cash flow patterns and investment timings a risk of underinvestment is prevailing.

When the effects of a change in the exit multiple on the LBO valuation is taken into account, things change drastically. Since the multiple is in general most likely to remain unchanged or decrease, those results are the most interesting. Late investments become even worse for private equity firms. With a decrease of only 0.5 in the exit multiple, most investments would actually destroy value for the private equity firm in the analytical approach. Moreover, decreasing it with 1.0 makes all investments bad from a private equity firm's point of view. According to those results, private equity firms should be very careful investing in projects where they fear a lowered multiple. This further strengthens the point about underinvestment. However, underinvestment weakens the portfolio company and can drastically lower the future potential for the firm. Such bad active ownership might actually decrease the exit multiple by even more than when investing in a large and late project. As a result, there is a choice to reach the least value-destroying alternative, invest or not invest.

6 DISCUSSION

The question to be asked from the conclusions drawn above is if there is an inherent underinvestment within private equity owned companies, and that the ownership per se is value destroying for its portfolio firms due to the market imperfection discovered.

It has been proven that private equity could in certain cases actually be value destroying for their portfolio companies. However, more likely is that they just dismiss additional investment proposals that are too big or addressed too late. As shown earlier, the private equity industry stands for a large part of the annual mergers and acquisitions deals in the world and owns a significant amount of firms. If value destruction or underinvestment is common, the problem could therefore be huge.

However, if looking at other companies, often listed, the use of cash flows are not near the efficiency in private equity firms. As a result, shareholders put a huge amount of pressure on management and the board of directors to use the cash wisely, either to invest or to pay out as dividends. Management could then feel that they have to invest the money in just about any project proposal or acquisition proposal that is put forward. In such cases, value destruction for shareholders and for the company itself is evident. Furthermore, incentive programs could alter such a behavior if it is tightly linked to the size of the firm, further facilitating acquisition activities. In a private equity firm on the other hand, the management has to use cash wisely just to be able to repay the large amount of debt. As a result of better cash management, the investment decisions are in many cases more thought through and probably more value creating. The private equity firms as owners could then not be said to be worse for a firm's growth compared to other forms of ownership, rather the opposite.

What could be said to be bad for the portfolio company is the LBO valuation as such. It does only in the exit multiple incorporate future growth and potential. Since the multiple is so heavily used in negotiations, they are often depressed. If instead negotiating over terminal growth rates or steady state margins in a discounted cash flow valuation would be more directly connected to the operations. On the other hand, if certain investments were doubtful, their cash flows would also depress such a valuation. In that sense, both large investments and investments performed close to a sale would still be value destroying for the current owner. In short term investments, it

then becomes very important to make sure there is no need for further investments and focus should be on the other value creating factors in that process.

Notable is that if assuming the same entry as exit multiple, then the only variable affecting the IRR is the ability to generate free cash flows and thereby pay down debt. The ability to pay down debt, without any change in the multiple, creates the difference between the entry and the exit value of equity. The larger the amount of cash flows generated, the lower the debt at exit, which gives a higher value of equity when selling the company. Hence, the higher the value of equity at exit, the higher the generated IRR. If assuming that an investment in the portfolio company would in fact affect the exit multiple, positive if value is added, the LBO valuation would more closely correspond to the capital budgeting valuations of the investment.

7 FUTURE RESEARCH

After writing this thesis, the private equity industry has shown to be very interesting and closely linked to the purpose of this study, several other research topics have been found.

Firstly, to further enhance the analysis and conclusion in this thesis, an empirical study of the effects on the exit multiple from different investments would have been valuable. To analyze historical transaction multiples in the private equity industry, and statistically relate them to investments made in the portfolio company, more accurate predictions could have been made in the sensitivity analysis and the size of the problem of the market imperfection could have been estimated.

To continue with the same issue, it would also be of great interest to conduct a qualitative study concerning the negotiation process within the industry. This would perhaps shed light on what are the key issues when discussing a transaction multiple.

Finally, from a management control point of view it would be interesting to see how much of the private equity mindset that has influenced the management of the portfolio companies. To be able to understand to what extent the portfolio companies' management tries to add value to the private equity company and to the portfolio company would also shed light on the severity of the market imperfection problem.

8 RELIABILITY & VALIDITY

This thesis has shown that there is a potential market imperfection existing, and that this could create a problem in obtaining the optimal result for the private equity company and a bright future for the portfolio company. However, even though the aim of the study was fulfilled, there are elements in how the conclusion was obtained that can be discussed.

The study does create results that from both a private equity- and a portfolio company perspective can decide whether investments are value added or not. What can be questioned are the few examples of cash flow patterns that are used as input and the way they are structured. In the real world there are an unlimited number of investments, all with their specific cash flow pattern and all with their individual timing. However, no matter the cash flow pattern, if the study would be repeated with other numbers, the result would still be to either accept or reject the investment. Thus, even though a few cash flow patterns have been used as input, conclusions are drawn about the whole industry. Therefore, the validity of the study is high in sense that different values would most likely create the same conclusions. Furthermore, the probability that the results and conclusions in this thesis corresponds to the reality is high even though it does not tell about the frequency of the occurrence of the difference in value added.

In the LBO model we use the same entry as exit multiple in the first part of the analysis even though theory suggest that this is wrong due to time effects. This approach is taken in discussion with the private equity company that suggested this approach. They base this on the fact that the improvements normally done in an investment should be enough to sustain the multiple and also because that is always the initial aim. If the study would be repeated with other conditions and assumptions around the exit multiple and other elements in the model, the result would most likely be different. However, even though the exact results would be different, the conclusions would be the same. Therefore, the reliability of the study is also high.

Conclusively, both the reliability and validity are high in this study.

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10 APPENDIX I

| <i>Cash Flow Patterns</i> | | | | | | | | | | | | |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|----------|
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Σ |
| Investment 1 | -100 | 5,0 | 7,2 | 10,4 | 14,9 | 21,5 | 22,6 | 23,7 | 24,9 | 26,1 | 27,4 | 84 |
| Investment 2 | -100 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 | 84 |
| Investment 3 | -100 | 27,4 | 26,1 | 24,9 | 23,7 | 22,6 | 21,5 | 14,9 | 10,4 | 7,2 | 5,0 | 84 |

11 APPENDIX II

| INCOME STATEMENT | | | | | | | | | | | |
|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Revenues | 1000,0 | 1030,0 | 1066,1 | 1108,7 | 1158,6 | 1216,5 | 1253,0 | 1290,6 | 1329,3 | 1369,2 | 1410,3 |
| Growth | | 3,0% | 3,5% | 4,0% | 4,5% | 5,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% |
| EBITDA | 100,0 | 103,0 | 111,9 | 122,0 | 133,2 | 146,0 | 150,4 | 154,9 | 159,5 | 164,3 | 169,2 |
| Margin | 10,0% | 10,0% | 10,5% | 11,0% | 11,5% | 12,0% | 12,0% | 12,0% | 12,0% | 12,0% | 12,0% |
| Depr. + Amort. | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| EBIT | | 82,4 | 90,6 | 99,8 | 110,1 | 121,7 | 125,3 | 129,1 | 132,9 | 136,9 | 141,0 |
| Margin | | 8,0% | 8,5% | 9,0% | 9,5% | 10,0% | 10,0% | 10,0% | 10,0% | 10,0% | 10,0% |
| Change in net Working Capital | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| Capital Expenditures | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| cwc/rev | | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% |
| capex/rev | | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% |
| Depr/rev | | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% |
| EBIT (1-t) | | 59,3 | 65,2 | 71,8 | 79,2 | 87,6 | 90,2 | 92,9 | 95,7 | 98,6 | 101,5 |
| Depr | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| CAPEX | | -20,6 | -21,3 | -22,2 | -23,2 | -24,3 | -25,1 | -25,8 | -26,6 | -27,4 | -28,2 |
| INWC | | -20,6 | -21,3 | -22,2 | -23,2 | -24,3 | -25,1 | -25,8 | -26,6 | -27,4 | -28,2 |
| FCF | | 38,7 | 43,9 | 49,7 | 56,1 | 63,3 | 65,2 | 67,1 | 69,1 | 71,2 | 73,3 |
| Interest tax shield | | 10,3 | 10,0 | 9,5 | 8,9 | 8,1 | 7,1 | 0,0 | 0,0 | 0,0 | 0,0 |
| CCF | | 49,0 | 53,9 | 59,2 | 65,0 | 71,4 | 72,2 | 67,1 | 69,1 | 71,2 | 73,3 |
| Interest | | -36,8 | -35,7 | -34,1 | -31,9 | -29,0 | -25,3 | 0,0 | 0,0 | 0,0 | 0,0 |
| CFE | | 12,3 | 18,2 | 25,1 | 33,1 | 42,4 | 47,0 | 67,1 | 69,1 | 71,2 | 73,3 |

| DEBT CALCULATIONS | | | | | | | |
|--------------------------|-------|-----|-----|-----|-----|-----|-----|
| STIBOR (assumed) | 4,8% | | | | | | |
| Debt outstanding (3%) | 7,8% | | | | | | |
| Senior debt (4%) | 8,8% | 420 | 408 | 389 | 364 | 331 | 289 |
| High yield debt (6%) | 10,8% | | | | | | |
| Bridge loan (10%) | 14,8% | | | | | | |
| Total debt | | 420 | 408 | 389 | 364 | 331 | 289 |

| VALUATION | |
|------------------|-------|
| Entry Multiple | 6 |
| EV entry | 600 |
| Debt entry | 420 |
| Equity entry | 180 |
| Equity at entry | 30,0% |
| Debt at entry | 70,0% |
| Exit Multiple | 6 |
| EV exit | 876 |
| Debt exit | 289 |
| Equity exit | 587 |
| Equity at exit | 67,0% |
| Debt at exit | 33,0% |

| IRR CALCULATIONS | | | | | | |
|-------------------------|-------|---|---|---|---|-----|
| Cash flows to PE funds | -180 | 0 | 0 | 0 | 0 | 587 |
| IRR | 26,7% | | | | | |
| Money Multiple | 3,26 | | | | | |

| INCOME STATEMENT | | | | | | | | | | | |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Revenues | 1000,0 | 1030,0 | 1066,1 | 1108,7 | 1158,6 | 1216,5 | 1253,0 | 1290,6 | 1329,3 | 1369,2 | 1410,3 |
| Growth | | 3,0% | 3,5% | 4,0% | 4,5% | 5,0% | 3,0% | 3,0% | 3,0% | 3,0% | 3,0% |
| EBITDA | 100,0 | 103,0 | 111,9 | 122,0 | 133,2 | 146,0 | 150,4 | 154,9 | 159,5 | 164,3 | 169,2 |
| EBITDA investment | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 18,4 | 18,4 | 18,4 | 18,4 | 18,4 |
| Margin | 10,0% | 10,0% | 10,5% | 11,0% | 11,5% | 12,0% | 13,5% | 13,4% | 13,4% | 13,3% | 13,3% |
| Depr. + Amort. | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| Depr investment | | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | 10,0 | 10,0 | 10,0 | 10,0 | 10,0 |
| EBIT | | 82,4 | 90,6 | 99,8 | 110,1 | 121,7 | 133,7 | 137,4 | 141,3 | 145,3 | 149,4 |
| Margin | | 8,0% | 8,5% | 9,0% | 9,5% | 10,0% | 10,7% | 10,6% | 10,6% | 10,6% | 10,6% |
| Change in net Working Capital | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| Capital Expenditures | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| Capital expenditure investment | | 0,0 | 0,0 | 0,0 | 0,0 | 100,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| cwc/rev | | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% |
| capex/rev | | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% |
| Depr/rev | | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% | 2,0% |
| EBIT (1-t) | | 59,3 | 65,2 | 71,8 | 79,2 | 87,6 | 96,2 | 99,0 | 101,7 | 104,6 | 107,6 |
| Depr | | 20,6 | 21,3 | 22,2 | 23,2 | 24,3 | 25,1 | 25,8 | 26,6 | 27,4 | 28,2 |
| CAPEX | | -20,6 | -21,3 | -22,2 | -23,2 | -24,3 | -25,1 | -25,8 | -26,6 | -27,4 | -28,2 |
| INWC | | -20,6 | -21,3 | -22,2 | -23,2 | -24,3 | -25,1 | -25,8 | -26,6 | -27,4 | -28,2 |
| FCF | | 38,7 | 43,9 | 49,7 | 56,1 | -36,7 | 81,2 | 83,1 | 85,2 | 87,2 | 89,4 |
| ITS | | 10,3 | 10,0 | 9,5 | 8,9 | 8,1 | 9,5 | 0,0 | 0,0 | 0,0 | 0,0 |
| CCF | | 49,0 | 53,9 | 59,2 | 65,0 | -28,6 | 90,7 | 83,1 | 85,2 | 87,2 | 89,4 |
| Interest | | -36,8 | -35,7 | -34,1 | -31,9 | -29,0 | -34,0 | 0,0 | 0,0 | 0,0 | 0,0 |
| CFE | | 12,3 | 18,2 | 25,1 | 33,1 | -57,6 | 56,7 | 83,1 | 85,2 | 87,2 | 89,4 |

| Net Present Value Analysis | | | | | | | | | | | |
|----------------------------|-------|----|----|----|----|----|----|----|----|----|----|
| Increasing Cash Flows | -100 | 5 | 7 | 10 | 15 | 21 | 23 | 24 | 25 | 26 | 27 |
| NPV | -6,1 | | | | | | | | | | |
| Even Cash Flows | -100 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| NPV | 6 | | | | | | | | | | |
| Decreasing Cash Flows | -100 | 27 | 26 | 25 | 24 | 23 | 21 | 15 | 10 | 7 | 5 |
| NPV | 18 | | | | | | | | | | |
| | | | | | | | | | | | |
| Re | 14% | | | | | | | | | | |
| Rf | 4,8% | | | | | | | | | | |
| Beta | 1,5 | | | | | | | | | | |
| Rm-Rf | 6% | | | | | | | | | | |
| Tc | 28% | | | | | | | | | | |
| | | | | | | | | | | | |
| WACC | 11,3% | | | | | | | | | | |
| E | 587 | | | | | | | | | | |
| D | 289 | | | | | | | | | | |
| Rd | 8,8% | | | | | | | | | | |

[illegible][illegible]