



**LUND UNIVERSITY**  
School of Economics and Management

# CAN PRIVATE EQUITY FIRMS CREATE VALUE?

A STUDY OF PRIVATE EQUITY FIRMS ABILITY TO CREATE VALUE IN PUBLIC BUYOTS.

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## ABSTRACT

This thesis proposes an alternative way of comparing the performance of private equity funds and testing if they through active involvement can increase the value of their investments.

Recent studies has shown that the true performance of Private Equity funds are about the same as the markets return so by measuring the performance of the companies that most resemble the private equity firms actual targets, we should be able to see if private equity funds actually create value, or, if they are simply picking targets from the right "pond".

The research resulted in two different portfolios containing the stocks of companies calculated to be the most likely takeover targets. The portfolios were created by matching observed takeover targets to all companies in the market that were not targeted. From parameters in a logistical regression we could see which variables included that did not fit the data and used these to restrict the model in order to test if our variables would lead to higher returns even though they did not statistically fit the data.

The empirical findings showed that both portfolios had indeed outperformed the comparable market index. Returns in our portfolios under the holding period was 13,15% and 23,72% better than the index for the logistic and matched samples portfolios respectively. The findings also showed that the volatility in our portfolios were lower compared to the European markets.

This study has also shown that the Private Equity industry as a whole are good at picking targets that will eventually increase in value without active involvement from the Private Equity fund managers. By comparing these results to studies that show how Private Equity returns are approximately the same as the market index we can deduce that Private Equity funds do not (on an aggregated level) create value in Public Buyouts. Parallel to this we have also found a rather interesting strategy for other investors in the public markets to invest.

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## Table of Contents

Acknowledgement .....	3
1. INTRODUCTION.....	7
1.1 Problem discussion .....	7
1.2 PURPOSE .....	9
1.3 Hypothesis.....	9
1.4 EARLIER STUDIES.....	9
1.5 THESIS DISPOSITION .....	12
2. METHODOLOGY .....	13
2.1 SAMPLE .....	13
2.1.1 SAMPLE STATISTICS .....	16
2.1.2 CUT-OFF POINT .....	17
2.2 VARIABLES .....	17
2.2.1 INDUSTRY .....	17
2.2.2 MARKET CAPITALISATION.....	17
2.2.3 FREE CASH FLOW .....	17
2.2.4 GROWTH .....	17
2.2.5 MARKET-TO-BOOK VALUE .....	18
2.2.6 DEBT-TO-EQUITY RATIO .....	18
2.2.7 NPP/TA.....	18
2.3 PORTFOLIO CONSTRUCTION .....	18
2.3.1 MATCHING SAMPLES .....	18
2.4 LOGISTICAL MODEL.....	19
2.4.1 REGRESSION RESULTS .....	21
2.5 BENCHMARKS.....	24
2.6 CRITICAL EVALUATION OF CHOSEN METHOD & DATA.....	24
3. THEORY: PART I.....	25
3.1.1 PRIVATE EQUITY: STRATEGIES AND BUSINESS MODELS.....	25
3.1.2 THEORETICAL FRAMEWORK .....	25
3.1.3 PRIVATE EQUITY .....	25
3.1.4 PRIVATE EQUITY FUND STRUCTURE.....	26
3.1.5 LEVERAGED BUYOTS .....	28

3.2	STRATEGY – HOW PRIVATE EQUITY CREATES VALUE.....	28
3.2.1	SYNERGY.....	29
3.2.2	UNDERVALUATION.....	29
3.2.3	GOVERNANCE.....	30
3.3	TARGET FIRMS.....	32
3.3.1	INDUSTRY SECTORS.....	32
3.3.2	COMPANY SIZE.....	32
3.4	VALUATION MODELS.....	33
3.4.1	DISCOUNTED CASH FLOW.....	33
3.4.2	ADJUSTED PRESENT VALUE.....	34
3.4.3	MULTIPLES.....	35
3.5	THEORY: PART II.....	36
3.6	VARIABLES.....	36
3.6.1	INDUSTRY.....	36
3.6.2	FIRM SIZE.....	36
3.6.3	FREE CASH FLOW.....	37
3.6.4	GROWTH.....	38
3.6.5	UNDERVALUATION.....	38
3.6.6	LEVERAGE.....	39
3.6.7	FIXED ASSET RATIO.....	40
3.6.8	LOGISTICAL REGRESSION.....	41
4.	EMPIRICAL RESULTS.....	43
4.1	PORTFOLIO PERFORMANCE.....	43
4.2	RESULT DISCUSSION.....	45
5.	CONCLUSION.....	46
5.1	Suggestions for further studies.....	47
6.	REFERENCES.....	48
6.1	APPENDIX A.....	51
6.2	APPENDIX B.....	52

## **GLOSSARY**

<b>APV</b>	Adjusted Present Value
<b>CAPEX</b>	Capital Expenditures
<b>DCF</b>	Discounted Cash Flow
<b>EBITDA</b>	Earnings Before Interest, Taxes, Depreciation and Amortisation
<b>EVCA</b>	The European Private Equity and Venture Capital Association
<b>FCF</b>	Free Cash Flow
<b>GP</b>	General Partner
<b>IPO</b>	Initial Public Offering
<b>LBO</b>	Leverage Buyout
<b>LP</b>	Limited Partnership
<b>LSE</b>	London Stock Exchange
<b>M&amp;A</b>	Merger and Acquisition
<b>MDA</b>	Multiple Discriminant Analysis
<b>P/E</b>	Price to Earnings Ratio
<b>PE</b>	Private Equity
<b>PPE</b>	Property, Plant & Equipment
<b>SME</b>	Small and Medium-sized Enterprises

# 1. INTRODUCTION

## 1.1 Problem discussion

Since the 1980s, a period we can identify as the beginning of the Private Equity era. The Private Equity industry has grown in large numbers and after the invention of the Leveraged Buy Out and the media coverage of the, at the time, biggest ever public buyout of RJR Nabisco by KKR & Co. in 1988 (Caselli, 2010) the Private Equity concept has gained world wide awareness.

The last decade we have seen an increase of invested capital in European Private Equity funds. Since 2007 private equity funds have invested approximately €230bn in European companies. The funds mainly invest in small and medium sized enterprises across most industries in order to diversify their holding portfolios.

All of this has also made the researchers more interested in the area and many articles have been written showing; that Private Equity funds often beat their specific benchmark index (Ernst and Young, 2013), experienced fund managers generate a higher return (Aigner et al, 2008), how the funds manages to create value (Aigner et al, 2008), and also that finding the true returns and specific strategies from different private equity firms is close to impossible (Phalippou & Gottschalg, 2008).

The biggest reason for the increased popularity in Private Equity Funds as an investment type is of course the fact that it has generated large returns for its investors. Studies have shown that the European private equity industry reached its highest number of exits in 2011 since the peak in 2006-2007, where almost 90 % of these investments generated a positive return and outperformed many European indexes between 2005-2011 (Branching out - How do private equity investors create value? A study of European exits, 2012).

So how is it that many private equity funds manage to create all this value? If we think about it, the firms they buy usually have the same goal: to maximise shareholder value. Some of the reasons could be bad management, Synergies or that the target firm is currently undervalued. It could also be because of tax and other legislative reasons. When making a company private with only a few owners the freedom to operate increases, the owners can now make more use of tax deductibility, take more risks by adding on huge amounts of debt and generally care less about their social and environmental consciousness.

The reason why Private Equity Funds usually have few owners is because it requires large capital commitments from its investors. In order to make its investment at any given time the Fund managers need to call these commitments with rather short notice. Usually the minimum required commitment ranges from €5m to €10m. There have also been studies

that showed that predicting the Private Equity targets are to some extent possible from different financial key ratios. (EVCA, 2013).

Can the problem with the elusive Private Equity Funds be solved by predicting the types of companies in which the Private Equity Firms evidently target, and make the investment directly? Or does the input of which the Private Equity funds contribute lead to a much higher return than that of the potential targets running as stand-alone?

A big development that counts against the Private Equity Funds came in 2008 when researchers Phalippou & Gottschalg showed that not only is the performance figures that the Private Equity firms report extremely hard to come by but also that they are strongly exaggerated. The article showed that after correcting for different accounting variables the average fund performance changes from outperformance of 3% to an underperformance of 6% per year compared to the S&P 500 (Phalippou & Gottschalg, 2008).

The private equity business model is based on investments with a holding period, usually between 5-7 years, where the goal is to generate substantial capital gains during the holding period and when the PE-fund makes an exit. Since the actual returns given by Private Equity funds to their investors are hard to find our study will instead examine the actual investments they make.

By looking at previous transactions specifically public buyouts Private Equity funds have made in some of the European Developed markets we should be able to base a model of which type of firms the Private Equity funds generally choose. To do this we will focus on a number of different firm specific variables such as financial ratios and industry classification. By doing this we can create different subsamples in which Private Equity funds generally invests and by creating portfolios containing companies from these subsamples and comparing them to the market index (of which we know the Private Equity funds generally return about the same profits) we can test if Private Equity funds are actually creating value or if they are simply “fishing in the right ponds”.



## 1.2 PURPOSE

The purpose of this study is to examine if portfolios consisting of companies that resemble takeover targets can outperform the market index. By doing this we hope to conclude where some of the value is created in the private equity business model. Also if it turns out that the model we develop is returning higher profits than the market, can this be a way for other investors in the market to base their investment decisions.

## 1.3 Hypothesis

We expect our portfolios to have performed only slightly better than the market index, because of all the input the private equity firms contribute to their targets we expect that when they buy public targets they are in fact looking for companies that are performing only average in the market. We do, however, expect to find that the firms they buy should tend to be less volatile compared to the average market firm.

## 1.4 EARLIER STUDIES

*Previous researchers of this topic have based their studies on models using common financial figures, measuring variables like profitability and size trying to predict takeover activity in various sectors. We want to gather major M&A- and PE studies, which of them that typically is based on the US/UK market, and apply this to our thesis. Majority of the studies conducted in the 80's and 90's used logistic regression models to predict takeover targets; this method will be explained further on. The alternative method that researchers used was MDA, LDA etc. Other studies that this thesis will consider as a benchmark, is research about the performance of the private equity funds and important drivers that create value post-buyout.*

**Palepu (1986)** has become one of the most mentioned researchers in this area with his study "Predicting takeover targets". The starting point of the study focused on improving and correcting for methodological errors by earlier studies. With the criticism of earlier studies he concluded that the sample sizes were too small but also the incorrect use of the use of random samplings. By using more equally weights of targets and non-targets in the sample, he could show that the true probability of a firm being acquired would be significantly different from earlier studies. Palepu's extended work improved the validity of using prediction models. With the refined method Palepu examined the takeover activity of the US market, using logistic regression consisting of variables that are based on takeover theory. The variables are represented through following theoretical hypothesis; inefficient management, firm size, firm undervaluation, free cash flow, growth-resource imbalance and P/E ratios. Palepu uses a sample of 163 targets and 256 non-targets between 1971 and 1979 where he concluded that the findings were consistent with the hypotheses of inefficient

management and high cash flows. While the model showed that it is statistically significant, the explanatory power became very small. This implied that the model couldn't predict takeovers any better than the market.

**Powell (1997)** wrote the paper "Modelling takeover likelihood" where he tried to create a model that could estimate when a target firm has highest probability to be acquired. The study segregates two types of takeover strategies, where Powell separates between friendly- and hostile takeovers. This study looks at listed companies on the London Stock Exchange (LSE) between 1984 and 1991. As previous researchers like Palepu, Powell uses logical regression models based on financial ratios that includes hypothesis of free cash flow, firm size, real property and growth. Powell's study highlights two key aspects for the use of takeover modelling, where he explains the benefits of the policy- and investment perspectives. The policy perspective tells us that we will be able to gain our understanding of the motives for takeovers, while the investment perspectives recommend that we should invest in firms that are likely to be takeover target because of the positive abnormal returns. Powell distinguishes between two time periods in the study, something that affected the explanatory power in the result negatively. Furthermore, Powell concludes that hostile takeovers are more common in firms with inefficient a management and stable cash flows, he also pointed out that the study would have a higher degree of validity if he refocused on characteristics of the buyer instead of the target.

**Kaplan & Scholar (2005)** published a major study that investigated the performance of the private equity funds from 1980 to 2001. The paper examined whether the performance by the partnership, between the limited partners (LP) and the general partners (GP), of an average PE-fund where able to outperform the S & P 500 and show persistency during the given period. The finding showed that an average return, measures that where calculated from PME and IRR, from buyout funds was closely equal to the benchmark, while venture funds in fact did outperform the S & P 500. Even if small differences where proven between private equity funds at an aggregated level and the S & P 500, Kaplan and Scholar could also conclude that there was a significant difference between the individual funds. The heterogeneity is explained in many different aspects. Firstly the GP's with a strong track record had a close relationship of raising new capital in the future. Secondly the researchers found evidence that funds raised during periods of strong market conditions performed worse, resulting in higher degree of difficulties when raising new capital in the future. However, the results from the study recognised problems after disregarding risk parameters of the returns. This was explained with private equity funds having higher risk level than S & P 500, which would result in an overestimation of the performance in relation to the risk – also referred to the risk adjusted performance.

**Phalippou & Gottschalg (2008)** focused their research on evaluating the performance of private equity funds. The study showed that a major part of the performance is affected by different kinds of accounting events during the holding period, investments and taxation effects mainly cause these. The study concludes that the annual average performance of the private equity fund is below S&P 500 with 3 % after fees. Furthermore, when the fund adjusted for risk the performance decreases with additional 3 % in average yearly performance, totalling the net performance by – 6 % compared to the performance of S&P 500. Phalippou & Gottschalg points out the importance that the estimates only can be reliable depending on maturity of the funds, something that the majority of funds have not reached in the study.

## 1.5 THESIS DISPOSITION

**Chapter two** will present information about the data and methodology that were used. This chapter will provide the reader with a detailed guide over how the data was obtained and how this will be used. Explanations of the statistical analysis that will quantify this study will be a part of this chapter as well.

**Chapter three** is divided into two parts: first part will give the reader a quick overview of the frameworks in the private equity industry and give a more detailed description over the investment model for PE-firms, highlighting the characteristics which M&A- and PE theory suggests. Last part in chapter three will give a descriptive explanation over how we tend to use the earlier explained characteristics transformed in to variables and apply it to our study.

**Chapter four** contains with the results and output generated by the statistical models based on the data that were presented in previous chapter. Results from the logistical regression models will give information about the importance of different characteristics, while the output from the matching models and portfolio construction will show the performance through abnormal returns.

**Chapter five** will analyse the results by using earlier studies and theoretical literature as foundations for our conclusions. This chapter will also provide the reader with deeper understanding for why certain characteristics of takeover targets are more important for private equity firms, and finally explain which sectors that is potentially most successful of generating highest returns.

## 2. METHODOLOGY

This chapter will give a detailed description over the gathering of the data process where explanations of variables will be discussed in different aspects that are relevant for our study. These aspects will be related to earlier research and the statistical framework that we will use to quantify our study. All the data where obtained from Capital IQ, a brief description of the database will be presented below.

*“Due to the inherent lack of public disclosure that has traditionally surrounded the private capital markets, we employ a multitude of sources and coverage techniques to properly build and maintain the dataset. S&P Capital IQ has originated and perfected these techniques to offer the most complete and up-to-date solution. Our coverage extends to a complete review and synthesis of publicly disclosed sources, as well as the well-established practice of working directly with sponsors to verify existing information or gain access to detail that has not been otherwise disclosed.*

*A truly global provider of Private Equity content, all of S&P Capital IQ’s sourcing efforts are conducted in both English and local language.”*

– Capital IQ

### 2.1 SAMPLE

We will in this study need two datasets, the first will contain all the buyouts made by private equity firms from the four of the most active European developed markets between 2002-01-01 and 2009-12-31 This is our estimation window in which we will select potential targets.

The second set will contain all firms listed on the exchanges below. Each company will have one entry for each year containing the specific variables we aim to test.

The countries and stock exchanges that will be examined are:

Countries	Stock Exchange
France	Euronext Paris
Germany	Deutsche Börse
Sweden	Stockholm Stock Exchange
United Kingdom	London Stock Exchange

Table 1: Countries and stock exchanges included in the study

To be included in the sample the firm need to be (1) Listed on any of these stock exchanges<sup>1</sup> in any of the years included. (2) Be headquartered in any of the above countries. (3) Have a

<sup>1</sup> Does not need to be Primary Listing

market value in the range \$5m-\$55m<sup>2</sup>. (4) Not classified by SIC code to be a financial company. The restrictions were thereafter implemented in Capital IQ. We obtained one list for each year in the study with the company specific information as of December 31 that year. Next, all private equity buyout transactions were obtained in the same way. To be included in this list the transaction had to be (apart from the restrictions above) successful and completed. The two lists were then merged and all firms that had been targeted received a one in the sample a year before the transaction (if firm x was bought in June 2008 this entry in the sample was removed and firm x's entry in 2007 was tagged as a target.) and all non-targets a zero in the same column. The idea behind this is that when the private equity firms choose their targets they base their decision on the data available at that time, which we have assumed to be the latest annual report. The final data file with all firms for all years consisted of 10 073 companies of which 231 were companies that had been bought by private equity firms. After additional screening for outliers and data requirements the sample was reduced to 6439 companies of which 156 were targeted.

The outliers have been excluded for a couple of reasons. First because the high probability that these are inaccurately reported data. Second because extreme values have a negative effect of the normality in the sample and third because it leads to a weakened model with low explanatory power (Pallant, 2011). To avoid this outcome the outliers have been excluded by only using variables with values within the 10th and 90th quintile.

The timeframe or estimation window in this study is chosen only so that we could include a satisfactory amount of transactions, since we are choosing portfolio firms on a matched yearly basis we do not need to worry about market conditions or periods of higher volatility, this will all be reflected in the results.

Reasons for including most of the available industries except the financial services is because the great risk of getting biased results, since these industries often operate with completely different capital structure (Ogden et al, 2002). Many of the earlier researchers have used US and specific European countries when choosing the geographical location. This study will use countries in Europe which has shown highest activity (See Table 3) compared to earlier studies, mainly because the limitation of transactions.

Our investigation showed that the selected countries in Europe could generate the most satisfying numbers of observations. Even if we haven't restricted this study to a specific industry, but excluding financial services, we don't believe that this will affect our results significantly based on the homogenous preferences that most private equity firms have in common, where most of the PE-firms invest across industries where they believe that they can identify investment opportunities (Caselli, 2010),

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<sup>2</sup> For each year in the study

<b>Company Name</b>	Kaufman & Broad SA (ENXTPA:KOF)	Bongrain SA (ENXTPA:BH)	Schwalbchen Molkerei Jakob Berz AG (DB:SMB)
<b>Exchange: Ticker</b>	ENXTPA:KOF	ENXTPA:BH	DB:SMB
<b>Geographic Locations</b>	France (Primary)	France (Primary)	Germany (Primary)
<b>SIC Codes (Primary Code Only)</b>	1520	2020	2020
<b>industry</b>	2	3	3
<b>P/BV [LTM as of 12/31/2009] (x)</b>	5,32	0,754	1,11
<b>EBITDA [CY 2009] (\$USDmm, Historical rate)</b>	93,4	308,7	7,21
<b>Market Capitalization [2009-12-31] (\$USDmm, Historical rate)</b>	657,7	1 113,8	-
<b>Total Assets [CY 2009] (\$USDmm, Historical rate)</b>	1 257,9	3 871,3	61,6
<b>Net Property, Plant &amp; Equipment [CY 2009] (\$USDmm, Historical rate)</b>	7,81	987,9	21,3
<b>Total Revenues, 1 Yr Growth % [CY 2009] (%)</b>	0,085	-7,76	16,1
<b>Total Revenues, 3 Yr CAGR % [CY 2009] (%)</b>	-12,2	1,3	10
<b>LT Debt/Equity % [CY 2009]</b>	304,2	46	16,2
<b>YEAR</b>	2008	2009	2003
<b>TARGET</b>	1	0	0

Table 2 : Cut out of the raw data file

## 2.1.1 SAMPLE STATISTICS

### *Country Distribution*

	<b>Total Sample</b>		<b>Targets</b>	
	<b>Sample</b>	<b>Distribution</b>	<b>Sample</b>	<b>Distribution</b>
<b>France (Primary)</b>	3047	30%	69	44%
<b>Germany (Primary)</b>	2888	29%	52	33%
<b>Sweden (Primary)</b>	1532	15%	15	10%
<b>United Kingdom (Primary)</b>	2606	26%	20	13%
<b>Total</b>	10073		156	

*Table 3: Distribution of all and targeted companies between countries*

### *Industry Distribution*

Industry	Definition	Sample	Targets	Targets/Sample	Ranking
<b>1</b>	Mining	687	2	0,32%	7 <sup>th</sup>
<b>2</b>	Construction	207	5	2,42%	2 <sup>rd</sup>
<b>3</b>	Manufacturing	4904	71	1,45%	6 <sup>th</sup>
<b>4</b>	Transport, Communication, Electric, Gas	652	13	1,99%	3 <sup>rd</sup>
<b>5</b>	Wholesale Trade	381	9	2,36%	1 <sup>st</sup>
<b>6</b>	Retail Trade	487	9	1,85%	4 <sup>th</sup>
<b>8</b>	Services	2740	40	1,46%	5 <sup>th</sup>

*Table 4: Distribution of the data sample*

By looking at the table we can see that private equity firms usually chooses to invest in the biggest sectors 3 and 4. Of the 10 000 possible takeovers in our study only 1, 5% were bought by a private equity firm. The table above clearly shows that the private equity firms do not invest according to sector size. Instead it seems that sectors 2, 4 and 5 tend to get more interest relative their respective size.



### **2.1.2 CUT-OFF POINT**

As mentioned earlier the estimation window for our stock selection will be between 2002-01-01 and 2009-12-31. During these eight years we will buy and form our portfolios. After the portfolios have been fully invested we need to test them against the chosen benchmark. This means that we will compare the results between 2010-01-01 and 2012-12-31. We feel that we in three years, if we look at a weekly frequency of price observations should be able to draw sufficient conclusions of returns and risk.

## **2.2 VARIABLES**

The following variables will be included when predicting the takeover targets. All variables were sampled together with the firms from Capital IQ. (For the theoretical background of why these variables were chosen see section 3.5)

### **2.2.1 INDUSTRY**

Every firm in our sample will contain its primary SIC code, the SIC code is a four digit code that entails in which line of business the firms largest part of revenue stems from. A firm can have up to eight different SIC codes depending on diversification within the company's revenue. We will only include the primary code since this is where the most revenue comes from. The SIC codes were grouped in two groups, companies that were believed to be in an industry that was likely to be targeted received a one and all else a zero creating a dummy variable. Sectors 2, 4 and 5 were grouped as likely sectors (table 4).

### **2.2.2 MARKET CAPITALISATION**

The second variable that we will include in our research is market capitalisation; the market capitalisation measures the total market value of the firm's equity and is calculated by taking the number of shares times the share price.

### **2.2.3 FREE CASH FLOW**

As we will see in the second theory chapter (see section 3.5) most of the calculated value in a potential takeover target comes from the amount of free cash flow that the company generates. The free cash flow variable in our study is calculated from EBITDA, this is the accounting number that is closest related to true free cash flow. We use this number in order to retain as many firms in our sample as possible since not all firms in the population are reporting the true free cash flow value. We will use a ratio of EBITDA over market capitalisation so that we value how much cash flow is generated compared to firm size.

### **2.2.4 GROWTH**

This variable is given directly from Capital IQ and tells us the one-year change in the company's revenue measured as a percentage.

### **2.2.5 MARKET-TO-BOOK VALUE**

This variable is to measure over/under valuation of the company and is calculated by dividing market capitalisation over book value of assets.

### **2.2.6 DEBT-TO-EQUITY RATIO**

Is our leverage measure to see how much of the company value that is owned by the debt holders. The ratio is given directly from Capital IQ.

### **2.2.7 NPP/TA**

This variable measures how much of the company's total assets that are long-term capital investments that have a vital part in the company and that is not easily sold off i.e. not liquid assets. This was calculated by taking the accounting numbers of net, property and plant and dividing it with the total assets.

## **2.3 PORTFOLIO CONSTRUCTION**

We will construct two different portfolios, the first will use all variables listed above and the second will via a logistic regression determine if some of these variables carry little explanatory variables (and be removed). This will act as a robustness test in restricting our model and at the same time investigate if we are using the correct variables. The logistic regression will also test if there is a rigid model on which investors can base decisions in the future, since the matched portfolio only works in the future if the PE funds continue to make good investments.

### **2.3.1 MATCHING SAMPLES**

When selecting the non-targets in our first portfolio we will conduct a matched sample test. This test is usually used when evaluating medical treatment by matching observations of treated and non-treated patients in order to assess which groups of people that can gain or lose from the treatment.

In our case the different observation will be listed in two samples. One containing the private equity targets and the second with the non-targets. All individual targets will then be compared to each observation of non-targets and all the firms that meet certain requirements regarding indifference of the variables will be placed in the portfolio, the requirement was optimised so that we could achieve a portfolio of approximately three times the target sample. This resulted in an 80% difference tolerance in the variables. But first the potential target needs to be in the same industry group (see 2.2.1) and country as the target currently examined. All targets will therefore "carry" a different amount of non-targets, this means we will need to weigh the stocks in our portfolio so that for each target all the predicted non-targets it carries into the portfolio will sum to 1.

We have chosen to create a portfolio based on matched samples together with the portfolio estimated with logistical predictions (see below) since it is a way to mitigate the problem with confounding<sup>3</sup> (hidden variable that correlates with dependant and the independent variable, thus leading to biasedness in the prediction).

## 2.4 LOGISTICAL MODEL

In the second portfolio we will instead use the logistical regression technique. The Logistical regression technique will not give us the stocks that most resemble each takeover regardless of value. Instead it will penalise variables that by the regression is considered to be of little or no importance in predicting targets and will because of this only select the stocks that are closest to the target sample with the important variables. This portfolio will be used as a test to show if some variables in our theory are unnecessary, if this portfolio which basically restricts the matched model does not loose a significant amount of value the variables we have chosen cannot explain that the way Private Equity firms pick listed targets are better then a portfolio matched with different variables.

The Logistic Regression is by far the most used technique in takeover predictions. As mentioned in our discussion on earlier research the common way to find takeover targets or to test a hypothesis about which variables that increase or decrease the odds of a firm being targeted is by running a logistic regression with the variables researched. With equal amount of targets and non-targets. Some papers stop here and examine if some variables are significant or not, whereas other papers go one step further and use the estimated betas and perform a prediction probability calculation on all non-targeted firms in the population and see how many of their predicted targets that where actually targeted.

There are a couple of reasons why this approach will not work in our study: first when using many variables in logistic regression there will be a suppressor effect between the variables strengthening and/or weakening the estimators. Second, since the population of non-targets is so large compared to the population of target firms, it is almost impossible to create an equally weighted sample with targets and non-targets that resemble the population. This will mean that the sample of non-targets will need to be increased to such an extent that the estimates in the regression will get to low leaving the model to predict too few targets. King & Zeng (2001) then proposes an alternative technique called the rare event logit regression that amplifies the inputs from the rare events, by weighing all ones heavier in the sample and forcing them to an equal distribution compared to the zeros.

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<sup>3</sup> Rubin, Donald B. (1973). "Matching to Remove Bias in Observational Studies".

We will use the logistic regression in a third, similar way but we will instead calculate estimators and prediction values for each firm for each variable and add them together, giving us a total value of prediction likelihood for each firm. This is done the following way:

*Step 1:*

Estimate the parameters,  $\beta_x$  and  $C_x$  with logistic regression in SPSS. This will give us seven Betas and C's.

$\beta_x$ : The Beta for each variable (x)

$C_x$ : Constant in the regression for variable (x)

*Step 2:*

For each Variable and Observation (non-targets) we calculate the "Predicted-Logit"

$$PL_x = C_x + \beta_x$$

And also the "Predicted-Probability":

$$PP_x = (e^{PL_x}) / (1 + e^{PL_x})$$

*Step 3:*

We sum the Predicted Probability for all variables ( $X_1 - X_n$ ) for each non-target firm this will give us the PV= Prediction Value

## 2.4.1 REGRESSION RESULTS

The interpretation of the results from all models is referred from Pallant (2011) "SPSS Survival Manual – A Step by Step Guide to Data Analysis Using SPSS".

Below are the results from SPSS with the results from our regression, the first table shows us the results from the regression when all variables were forced into the model. And in the next table the unstandardized betas are presented.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step	EBITDAMCAP	-1,628	,648	6,315	1	,012	,196
1 <sup>a</sup>	NPPTA	-1,346	,643	4,383	1	,036	,260
	DE	,002	,001	4,940	1	,026	1,002
	PBV	-,414	,147	7,986	1	,005	,661
	Mcap	,000	,000	1,871	1	,171	1,000
	Growth	,000	,004	,008	1	,930	1,000
	industry	,071	,238	,088	1	,766	1,073
	Constant	,568	,261	4,731	1	,030	1,766

a. Variable(s) entered on step 1: EBITDAMCAP, NPPTA, DE, PBV, Mcap, Growth, industry.

Table 5: Logistical regression output of combined variables

Variables	Unst. B	Stand. B
<b>EBITDAMCAP</b>	-1,6282	-1,0000
<b>NPPTA</b>	-1,3457	-0,0206
<b>DE</b>	0,0022	0,4527
<b>PBV</b>	-0,4141	-0,0852
<b>Mcap</b>	0,0000	0,0116
<b>Growth</b>	0,0004	0,0207
<b>industry</b>	0,0706	0,0029
<b>Constant</b>	,568	

Table 6: Combined table of standardised and unstandardized betas for each variable

When we look at the standardised betas we can see that we are actually getting some valuable information. The standardised betas show us what one difference in the standard deviation in the variable does for the prediction value, instead of what one unit difference leads to in the prediction value of the unstandardized beta.

Next we present what happens if we run the regressions with only one variable present in the model:

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	INDUSTRY	,197	,222	,787	1	,375	1,218
	Constant	-,089	,149	,355	1	,551	,915

a. Variable(s) entered on step 1: INDUSTRY.

*Table 7: Logistical regression output of the INDUSTRY variable*

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	MCAP	,000	,000	1,837	1	,175	1,000
	Constant	-,052	,116	,199	1	,655	,949

a. Variable(s) entered on step 1: MCAP.

*Table 8: Logistical regression output of the MCAP variable*

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	EBITDAMCAP	-1,192	,521	5,239	1	,022	,304
	Constant	,165	,133	1,553	1	,213	1,180

a. Variable(s) entered on step 1: EBITDAMCAP.

*Table 9: Logistical regression output of the EBITDAMCAP variable*

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	GROWTH	-,004	,004	1,146	1	,284	,996
	Constant	,032	,114	,080	1	,778	1,033

a. Variable(s) entered on step 1: GROWTH.

*Table 10: Logistical regression output of the GROWTH variable*

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	MTBV	-,052	,061	,745	1	,388	,949
	Constant	,057	,128	,198	1	,657	1,059

a. Variable(s) entered on step 1: MTBV.

*Table 11: Logistical regression output of the MTBV variable*

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	DE	,002	,001	3,340	1	,068	1,002
	Constant	-,172	,132	1,692	1	,193	,842

a. Variable(s) entered on step 1: DE.

*Table 12: Logistical regression output of the DE variable*

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	NPPTA	-1,068	,571	3,499	1	,061	,344
	Constant	,171	,143	1,436	1	,231	1,187

a. Variable(s) entered on step 1: NPPTA.

*Table 13: Logistical regression output of the NPPTA variable*

We can now look at all these values and see how much each variable explains the odds of a firm being bought. What these values essentially show is how important the variable is when comparing targets to non-targets. After we have calculated the prediction value and sorted the stocks accordingly what we will have are the companies with the best values in the variables with the highest betas listed first. The firms with good values in less important variables (debt/equity, growth, market capitalisation) and bad values in the more significant variables will not be in the portfolio. Thus, we have effectively sorted this portfolio on the basis that the variables; EBITDA/MCAP, NPP/TA, INDUSTRY and MTBV values are the most important when private equity firms select targets.

## **2.5 BENCHMARKS**

In order to draw any relevant conclusions from the returns of our portfolios we need to compare them against a benchmark. The purpose is to compare the portfolios to the same market index the firms operate in. The study includes companies listed on different exchanges in different countries, so there is no common index for only these markets, we will therefore construct our own index weighing the different countries according to size in our portfolios. We will also include the European developed market index of which our countries contribute 95%. Country specific indices will also be compared to their respective stocks in our portfolios to see if the results differ between countries.

## **2.6 CRITICAL EVALUATION OF CHOSEN METHOD & DATA**

The data supplied by Capital IQ should be considered as reliable as it relies on the company's financial statements and current market data. There could of course be errors in the reporting to Capital IQ, but we believe that this margin of error is quite small. We have only selected to work with four European companies, which could become a problem when generalising to other markets but since we are working with highly correlated developed and stable markets the results should be able to generalise across other resembling markets in the developed world.



## 3. THEORY: PART I

### 3.1.1 PRIVATE EQUITY: STRATEGIES AND BUSINESS MODELS

*This chapter will give a brief summary of PE-firms business models and how their investments strategies usually look like in practice. The reader will also gain knowledge of how the ownership structures in a private equity fund usually looks like.*

### 3.1.2 THEORETICAL FRAMEWORK

The literature describes specific characteristics for target companies in M&A transactions, constructed through hypotheses mainly based on inefficient markets and economic theory. This study will only focus on takeovers by PE-firms, defined as financial M&A's. The opposite side or strategic buyers focuses mainly on the synergies, created through the integration process with the target that usually operates in the similar industry, while financial buyers are related to PE-firms that focuses on value creation process with an exit goal after 7-10 years (Koller, Goedhart & Wessels, 2005). We will investigate the financial M&A's, meaning that we cannot build the assumptions based on general M&A theory that often are related to strategic buyers. We will combine theories from the literature with hypotheses used in earlier studies, which will be applied in the model that will explain which characteristics in the manufacturing sector that are interesting when PE-firms invest.

### 3.1.3 PRIVATE EQUITY

*“An asset class consisting of equity securities in operating companies that are typically, not publicly traded on a stock exchange.*

*A Private Equity firm acquires or purchases companies through a variety of investment strategies including leveraged buyouts, recapitalization, industry consolidation, mezzanine/sub debt, turnaround, PIPES etc.”*

- Capital IQ

The European Private Equity & Venture Capital Association (EVCA) has described the great importance of this industry by its contribution to the global markets. This is explained by defining key functions that private equity firms are fulfilling in order to create value and growth within global industries. The private equity companies can help to resolve management issues, develop new technologies and introduce them to new markets, stabilise the targets companies' balance sheet, optimise working capital or make acquisitions that would benefit the target firm (EVCA, 2013). Empirical evidence has revealed that private equity firms are more attracted to investments in mature companies rather than start-ups.

The reason for this is because mature companies have reached a satisfying phase in the business cycle, where less has to be developed and less risk taken. But most importantly because mature companies tend to generate higher and more stable cash flows (Caselli, 2010).

### 3.1.4 PRIVATE EQUITY FUND STRUCTURE

*“A partnership involving two parties; limited partners, who provide financial backing and have little role in management and no personal liability; and general partners, who are responsible for managing the entity and have unlimited personal liability for its debts.”*

- Capital IQ

Most commonly is that the private equity fund is organised so that investors place money in a fund which is operated by the fund management company (Caselli, 2010). The investor does then take a silent position and the managing firm makes the investments in different ventures over a limited period of time. These ventures can in theory be any asset in the economy public or private firms, real estate or even operating assets. The term private equity refers to the fact that the company consists only of securities that are not publicly traded, or public securities that are bought from the market with the intention of delisting the securities (Stowell, 2010). However most funds have different levels of specialisation and restrictions as to what they are allowed to invest in. This could be to not invest in real estate or to only invest in pharmacy start-ups.

The private equity funds are organised as a limited partnerships (LP), where institutional investors like pension fund and general partners (GP) are included, the GP's are the investment managers from the private equity firms. While the limited partnerships in practice are the majority shareholder of the portfolio company with control over the management, the general partner, with a minority stake of the portfolio company, makes sure to serve the all shareholders through active management strategy (EVCA, 2007). This implies that general partners replace some parts or the whole management group in order to reach the growth goal, something that can be done by implementing new structures of the operation and the financing. As limited partners and general partners share the same interest, conflicts through incentive problems and information asymmetry can be effectively reduced (Finn et al, 1995). The most common structure of a private equity fund is illustrated below:

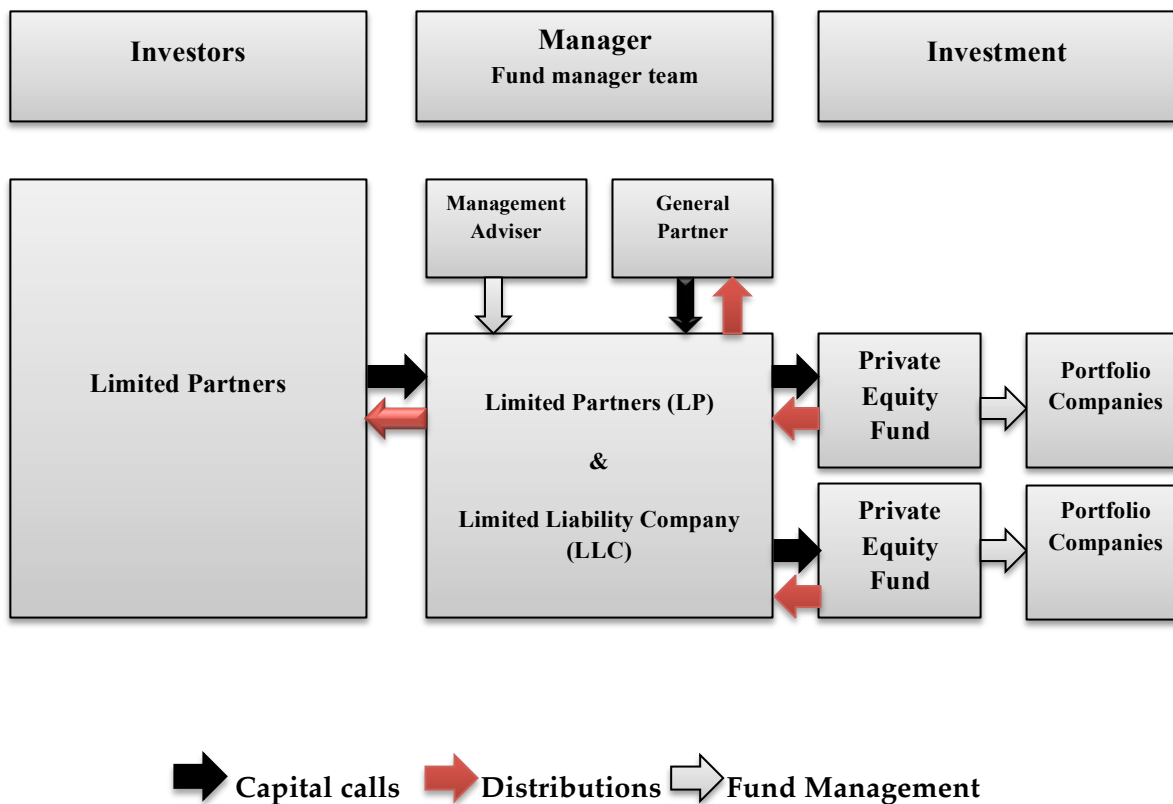


Figure 1: Structure of private equity funds.

Source: HSBC

As PE-firms create funds institutional investors are invited to participate as limited partners (LP), this by committing to invest a large amount of capital. The general partner (GP) will thereafter actively manage the portfolio companies through different measures and strategies in order to create excess value. The private equity funds typically have a lifetime of ten years, with possibility of extension on in some cases by between 1-3 years (EVCA, 2007). Because of the high amount of invested capital in each fund, this has become a highly profitable industry. With pre-determined compensation systems that have been negotiated with the limited partners, general partners receive different fees depending on the specified contract. The fees are typically divided in to two parts: fixed fees, which is a fixed rate of the committed capital commonly somewhere between 1 and 3 %, and variable rate which usually is based on performance of the fund – where 20 % of the profits after exit is distributed to the general partners, also known as the “80/20 profit-sharing rule” (Gompers and Lerner, 1999).

### **3.1.5 LEVERAGED BUYOUTS**

The leveraged buyout is a common model investor's use when valuating and acquiring a target firm and also considered to characterise one of the foremost important activities of a PE-fund (Stowell, 2010). The acquiring firm finances the deal with debt where the most common source of financing is bank debt (Caselli, 2010). Instead of buying a firm with equity that is harder to raise and requires a higher return to its lenders, bank debt therefore works as a lever to create higher value with less initial cash contribution. In practice the buyer will place the new debt in the acquired company or a special purpose vehicle to ensure that the acquirer does not suffer from a default in the acquired firm. With the ability to perform an LBO higher prices and more private equity deals can be made in the economy. LBOs also contribute to more risk in the companies since the point of default, which occurs when the cash flow in is below interest payments, will be closer when more debt is added (DePamphilis, 2012). If a transaction is financed with only equity, no fixed costs from the financing are present and the firm will have more freedom to operate.

### **3.2 STRATEGY – HOW PRIVATE EQUITY CREATES VALUE**

One of the main characteristics that differentiate private equity funds from other alternative asset classes like mutual funds, hedge funds, stocks etc., is their unique way of improving the portfolio companies by creating value. Before private equity firms make investments they carefully screen the market for potential targets through due diligence. PE-firms primarily are attracted to companies where they can identify businesses, which have the possibility to increase its productivity, something that typically starts by restructuring the governance of the target firm (EVCA 2013). Masulis and Randall (2009) concluded that the publicly traded companies, with their transparency through quarterly reporting requirements and obligations to follow certain regulations and legislative outlines, were not able to boost the firm's efficiency in the same way that private equity firms are able to. When the private equity firm has bought its target it becomes easier for them to make significant changes in order to improve the efficiency and growth in the company, this because of a more concentrated ownership and less monitoring from stakeholders (Masulis & Randall, 2009).

Guo, Hotchkiss and Song (2011) examined if LBOs of publicly traded companies were able to create value. The results showed that higher cash flows were created by an increase of the company's leverage after the buyout, but also that the growth was consistent with the theory of replacing an inefficient management. LBO-deals imply that PE-firms take on high amount of debt that forces them to liberate as well as generate cash under a limited timeframe. This is typically handled through a variety of measures. The increase of liquidity can be accomplished by reducing the inventory, close projects of low value with high expenses and managing both payables and receivables more efficiently. Their explanation of

successful performance, concerning firms' specific characteristics and changes, could be expressed in three ways. First, improving the already stable cash flows by redeploying the assets more efficiently. Second, the target firm can beyond the cash flows increase its enterprise value from higher industry multiples. Third, by choosing targets with tangible assets will allow higher leverage as it can be used as security. Higher leverage will even benefit for tax reasons through tax shields, which can help to increase the returns as more cash becomes available (Guo et al 2011).

Even if private equity executives are required to act fast in the beginning phase of the value creating process, private equity firms are considered as long-term investors where they usually limit the fund's investment period between 3 to 5 years (Caselli, 2010). During this timeframe PE-firms makes continuous assessments of potential targets' that would match specific criteria's. When the fund is fully invested with its portfolio companies, private equity firms typically have a holding period of 10 years before they exit with the goal of capital gains (Caselli, 2010).

### **3.2.1 SYNERGY**

A synergy is the value that is created through a successful combination between two companies. By achieving synergies the value of the combined firm will be more valuable than two separate companies. This is of course something that can arise if private equity funds acquire new companies to its portfolio that in some way will benefit other firms within the portfolio. Even if synergies in this context actually are used in some business strategies, PE-firms do not focus too much on these alignments in their business model (Caselli, 2010). Synergies are instead an objective that is more commonly aimed among strategic buyer's i.e. industrial competitors.

### **3.2.2 UNDERVALUATION**

A second way in which a target firm can increase in value is because it is undervalued and the market does not identify this mispricing. The PE-firm can then buy the firm for a low price and sell it later when market realises the true value. It is important to remember that if the efficient market hypothesis holds it contradicts the undervaluation idea. Fama (1970) introduced this theory and argued that the market prices of different securities must reflect the fair value because the assumption of rational investors and perfect information.

This study will not be able to test if private equity firms are able to find these companies, first because we assume the EMH holds and second because we cannot accurately measure the returns from the private equity funds. We will however be able to see if the Private Equity firms are able to predict which type of markets, industries and types of companies that will in the near future have an increased demand for its products. If the EMH holds the

reason for a company to increase its value (more than other companies in the market) must be attributed to the information that this company is generating higher profits and if all resembling firms achieve the same increase this must mean that the aggregated demand for its products have increased or that the cost of producing the good/service has decreased.

### **3.2.3 GOVERNANCE**

The third and last way of creating value in this context is to restructure the corporate governance, which is the part of how a firm is controlled and managed. A governance structure mainly includes three closely related functions that consider the distribution of rights and duties among the different parties (shareholders, managers, stakeholders, regulators etc.). First is shareholder activism, defined as the shareholder involvement through proposals in different business matters and proxy contests. Second is the board of directors that elect a management group and votes in matters that common shareholders cannot influence, such as issuance of stocks, bonds, dividend payments. The last component in the corporate governance is the management hierarchy that typically starts at the top with the CEO (Ogden et al 2002). The corporate governance structure is an essential mechanism for a firm because it supports to carry out and execute certain business objectives, but also to monitor policies and actions more efficient. While the theory suggest a governance model where major shareholders should be a significant part of the board and management groups, to achieve a long term growth through common incentives, conflicts between the different participants can arise and cause agency problems. This is especially something that can appear in quoted firms that have a large base of shareholders and stakeholders with different interests (Bishop, 2012). Private equity owned companies are able to avoid the traditional interest conflicts i.e. agency problems, by operating with a contrasting ownership structure where the shareholders consist of a more reduced and concentrated group that shares same interests.

Heel and Kehoe (2005) analysed why some private equity firms were able to perform better than other from a governance perspective – more explicit if an active ownership can be a superior driver of successful fund performance. The results could surprisingly reveal that the primary source of the value was created through integrating a more efficient management – before factors like market/sector appreciation, financial constructions (through leverage) and arbitrage (under-priced investments)

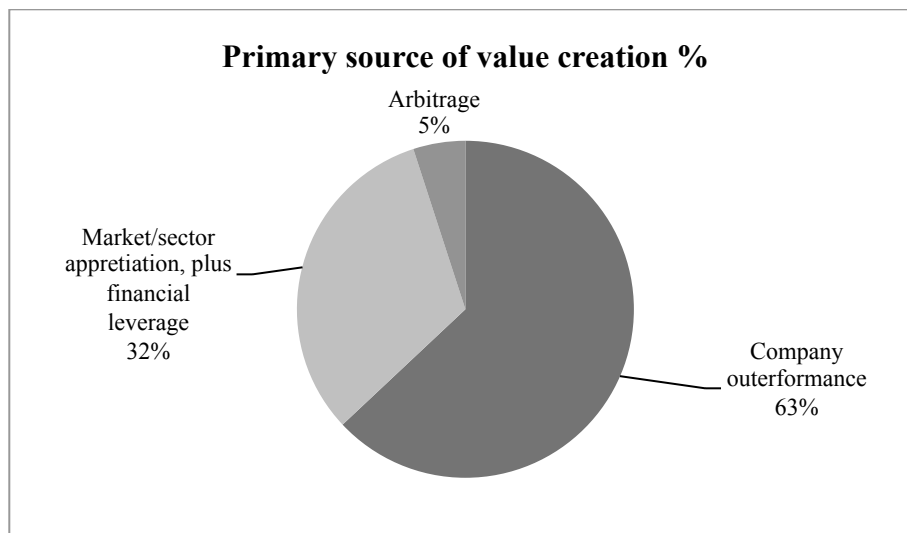


Figure 2: illustration over components that contributes most value in PE-deals.

Source: Heel and Kehoe (2005)

Heel and Kehoe (2005) could explain their results of high correlation between company outperformance, referred as “more engaged form of corporate governance”, through four key elements: focused approach, performance incentives, decisiveness and engagement. The focus is referred as the concentrated ownership structure where GP’s (PE-directors) represent a homogenous group of shareholders. This creates an atmosphere with clear agreements of important issues between the shareholders, such as common expectations of risk, return and investment horizon. Before entering a target firm, PE directors will try to reduce the information asymmetry through insights of the management and board. By securing initial knowledge of the target is explained as one success factor by Heel and Kehoe (2005). The performance incentives are typically very large for the PE-firms, where successful deals can generate as much as a 20 % return of the exit value. The decisiveness is created through clear and measurable objectives in combination with a reduced communication line between the different functions of the business. A company lead by a PE-board can therefore act more efficient and quickly with less bureaucracy and other constraints that can be involved in public firms. Last alignment is engagement that is described as the close working relationship between functions that usually are separated and have specified work descriptions. The environment in private equity lead companies are typically characterised with regular communications between the board and the executive group. As all functions work closely together and are involved in the overall firm, Heel and Kehoe (2005) could conclude that the most successful PE-firms devoted significantly more time in the beginning phase of the portfolio companies. Moreover, PE-firms that restructured the company’s management in an early stage, preferably before closing of a deal, showed for a higher degree of success.

Concluding the governance of a company lead by private equity directors, it becomes obvious that these firms differentiate from the governance of public companies. Because PE-firms represent and cooperate with a limited and seemingly homogenous group of investors, sharing common interests of the risk and return profile, it becomes easier for PE-firms to execute various business strategies in order to maximise the value of the company.

### **3.3 TARGET FIRMS**

#### **3.3.1 INDUSTRY SECTORS**

The private equity firms in general tend to operate across many major sectors, it can be from financial services and industrial goods to healthcare and consumer products. While private equity funds invest in a variety of industries where they believe that value can be created, it has been shown that certain sectors have higher buyout activity than others. Sectors like consumer goods and industrial products have under a longer period of time been one of the most attractive sectors for private equity firms (Caselli, 2010), this is a pattern that is consistent with the sample in this study. The reason for this corresponds to the fact that PE-firms can execute their business strategies more easily, and because the business model is better suited in these industries, where aspects like product development and pricing strategy are more available and easy to evolve. Apart from the clustering in certain sectors there has been an increasing shift to the energy and high-tech sectors. The cause for may reflect both higher future expectations in these industries but also a reallocation of the business composition in the geographical areas where private equity operate (DePamphilis, 2012). However, the specialisation in different sectors actually occurs mostly because the background that some PE-firms have, with a long experience and close relationship in this sector. The downside of having too much exposure in one specific sector is related to the higher risk of not diversifying the portfolio companies, which can have large negative impact during fast downturns in the economy.

The three most active sectors where PE-firms had their largest exposure during 2007, combined for almost 40 %, were industrial products (14 %), consumer products (12,9 %) and communication goods (12,2 %) (Caselli, 2010).

#### **3.3.2 COMPANY SIZE**

The majority of European buyout transactions originate from the small- and mid-cap segment, which is explained by the higher number of these companies and also because the significant increase in performance, relatively to the largest firms, are generated through these markets (Caselli, 2010). Usually when PE-firms talk about firm size they divide companies in to three categories: small-cap – from €1 to 5 million, mid-cap - €5 to 20 million



and large-cap – above €20 million. Middle-sized firms as well as small-sized firms are better applicable in the PE-firms business model, because these firms have a potentially higher growth in a range of areas, such as cross-border expansion, R&D and restructuring of the governance (DePamphilis, 2012). As this is areas that PE-firms specialise in they are more able to support these companies in growth and reach higher return on their investments. But there are certain size-thresholds which most of the PE-firms tend to follow for several of reasons, most importantly are to invest in companies that comply with the risk and return profile that are shared with the limited partners. This implies that many small companies are excluded despite that they can fulfil the requirements of potentially high growth, mainly because the low amount of committed capital that is involved which prevents the deals to be profitable enough for the PE-firms, but also because the process from due diligence to restructuring is a very costly investment process. This is why small sized-deals usually do not reach the required return or the break-even (Caselli, 2010). Transactions from 2007 showed that small buyouts stood for 6, 7% of the total buyouts (€5, 5 billion). Middle-market accounted for the highest contribution with 43, 2% (€24, 6 billion) of the total buyouts, and eventually the mega buyouts i.e. large-sized buyouts these reached 17 % (€12, 4 billion) of the total amount of realised buyouts (Caselli, 2010).

### **3.4 VALUATION MODELS**

*This section will briefly explain the theoretic background that private equity firms use when valuing potential takeover targets and conclude with a summary of the most important inputs that can change the estimated value of a target.*

#### **3.4.1 DISCOUNTED CASH FLOW**

The discounted cash flow valuation method requires discount rates, projected cash flows, present values and finally the terminal values of the target business, to calculate the total value of a firm or the net present value (NPV) (DePamphilis, 2012). More intuitively the value of the firm could be expressed as the accumulated cash that would be accessible to the investors under a given timeframe in the future. By projecting the cash flows of a company this implies that factors like sales growth and operational costs need to be taken into consideration, this is of course very difficult and subjective but it can be estimated within certain degree. DCF also requires an approximation of the discount rate often referred as the CAPM e.g. cost of equity capital (Koller et al 2005). The discount rate depends on factors like the risk-free rate (usually a 10-year state bond), company's cost of capital and the systematic risk. The estimation of CAPM can sometimes be expanded by adding a small capitalisation premium, because smaller companies in general are considered as more risky investments.

The CAPM will thereafter in some degree of certainty give a realistic value of the firm. The CAPM formula is expressed below:

$$CAPM = R_f + \beta (R_M - R_f) + S$$

$R_f$  = Risk-free rate

$\beta$  = Systematic risk

$(R_M - R_f)$  = Market risk premium

$S$  = Small capitalisation premium

### 3.4.2 ADJUSTED PRESENT VALUE

In the adjusted present value method (APV) we divide the value of a company's operations in two ways. First is the value of the company if it was unlevered i.e. without debt and second is the total value of the tax shield, created through the tax savings from interest (DePamphilis, 2012). After discounting these components, free cash flows and future tax savings, the total of these numbers will give the firm's adjusted present value. One of the strongest arguments in favour for this method is based on the theoretical support from Miller and Modigliani (1958; 1963), which denoted that a firms' true value is not affected by the way of how it is financed. However, more recent studies of LBOs submits the opposite, meaning that the way of financing has a great importance when we evaluate before taking investment decision (Axelson et al. 2009). This assumption implies that firms can increase the firm value by taking on more debt and increase the leverage. There is however a certain point of how much the firm can increase the leverage before the value declines (Ogden et al 2003). As the theory behind this method suggests higher leverage it causes for other trade-offs in the decision-making. Increasing leverage can indeed lead to greater tax benefits, but the consequent of higher leverage will affect the credit rating negative which is explained with a higher probability of default (DePamphilis, 2012). To make the APV method more accurate during high-levered deals it is recommended to analyse financial distress costs i.e. difficulties to repay debt in time, legal fees, employee turnover, loss of customers, loss of bargaining power against suppliers etc. By excluding financial distress costs when using the APV there becomes a risk of overestimating the firm value. The APV method of high leveraged deals can be illustrated through following formula:

$$PV_L = PV_U + PV_{TS} - PV_{FD}$$

$PV_L$  = Present Value Leveraged Transaction

$PV_U$  = Present Value Unleveraged Transaction

$PV_{TS}$  = Present Value Tax Shield

$PV_{FD}$  = Present Value Financial Distress Cost

### 3.4.3 MULTIPLES

Of all the valuation methods the traditional DCF technique are considered to estimate the best and most accurate results. The third and last valuation method in this chapter will describe the use of industry multiples, equivalent multiples between peer-companies, when financial analysts estimate the enterprise value of a company. This approach is forward looking and assumes that the enterprise value of a company is based on some industrial/market multiple of the company's earnings or book value today (Koller et al 2005). The most frequently used multiples are EV/EBIT(DA) and P/E. P/E-multiples are often used when valuating public companies which reflects the current industry average P/E-ratio and illustrates the future prospects of the industry. More explicitly this could be interpreted as if we pay a P/E-multiple of 15 times the earnings current day; it becomes possible to sell the same business for 15 times the earnings at the end of our forecast period. However, multiples is often wrongly applied because the lack of understanding for the underlying drivers in the different multiples. By just calculating the industry average EV/EBIT(DA) or P/E-ratio and multiply this to the companies EBIT(DA) or earnings will not represent a fair enterprise value, because it doesn't take additional parameters in to account which are crucial to establish a more representative valuation. Except the restriction of industrial average's we need to consider that factors like growth rates, capital structures and return on invested capital can vary in a high degree even within the industry (Koller et al 2005). On the other hand, if multiples are used correctly they can provide us with valuable information of the company and its industrial competitors. At first sight multiples are seemed to be a valuation method that is easy to apply, but if we want to use this correctly it demands more analysis and adjustments to obtain a representative enterprise vale. This is why PE-firms in many cases search for industries where the multiples are expected to increase in the end of the holding period.

## 3.5 THEORY: PART II

### 3.6 VARIABLES

*This chapter will give a brief summarization of the selected variables that are related to different takeover hypotheses and considered as significant characteristics. Furthermore, we will explain the reasons for using these variables in order to give a description over typical characteristics of a target firm.*

#### 3.6.1 INDUSTRY

The industry variable is one of the most important variable in this study much theory has already been discussed why this variable explain the probability in why a firm should be targeted.

#### 3.6.2 FIRM SIZE

Theory suggests that firm size has an impact whether they are likely to be acquired or not. Motivations for why small firms have greater likelihood of being acquired are based on the fact that larger targets generally have fewer bidders because of the higher amount of funding which big deals require. But also because of the high transaction costs size becomes a factor for PE-firms, meaning that they are rather looking for small- and medium sized companies than giant corporations, which tells us that this feature is negatively correlated to firm size. Another reason that SMEs i.e. small and medium enterprises have been the most attractive market segments for buyouts by PE-firms, except for the fact that the competitive process is less complicated and lower transaction cost, is explained by the historically high growth in these segments. SMEs accounted for 7, 6 % while large enterprises stood for 0, 2 % in EU during 2012 (ECORYS, 2012).

Many of the earlier studies in this area have shown that firm size had a significant effect when predicting takeover targets. This variable has been expressed in many different ways by previous researchers, such as: book value of assets (Palepu, 1986), total assets (Chen & Su, 1997), log total assets (Powell, 1997). Furthermore, while the definitions above is more applicable to capital intensive industries, other measurements like numbers employed are a more effective alternative when approximating the size of companies in the service industry that driven by knowledge and the manpower. This study will focus on more capital-intensive industries rather than knowledge intensive industry (See Table 10). That is why size in this study is typified by market capitalisation, which has been used as a predictive variable in Barnes (2000) study. In order to use the market capitalisation in the logistical regression model we use the natural log of these values, this is in other words done for econometric reasons. The firm size variable used in the model is defined below:

$$FS = \text{Market Capitalisation}$$

### 3.6.3 FREE CASH FLOW

Free cash flow can be defined as the excess cash in a firm that is left after all the required capital of running and expand the business. Firms can use the free cash flow in different ways, most commonly by repaying debt, dividend payments and growing the business. Firms that are able to generate stable cash flows are therefore attractive takeover targets. Jensen (1987) stated that firms with high amount of retained cash will have an increasing agency cost of the cash, meaning that such a firm's value will dilute and be more attractive for takeover. This implies that the properties of an LBO will give the managers incentive to be more efficient with the use of excess cash in order to create value (Jensen, 1989); this theory has been supported by Palepu (1986) in his empirical finding. PE-firms often use high leveraged acquisition strategies through LBOs, which implies that they are required to finance the high amount of debt of interest payments and amortisation, with cash flows from the operations (EVCA, 2010). The cash flow generated through the operations therefore need to show a consistent growth, not only to secure the debt payments and new investments, but also to achieve the expected returns of its investment by showing that the firm has been under a substantial turnaround, which will lead to a higher enterprise value and eventually a higher exit premium.

The general definition of free cash flow is represented by the excess cash that the firm is able to generate through its operations reduced by the financing and investments of the operations (Berk et al 2002). Free cash flow can be used as dividends to the shareholders or as retained earnings in the business. Researchers like Palepu (1986) and Powell (1997) have been able to find correlations between predicting takeover targets and the free cash flow. This study will use the EBITDA over total assets; because this ratio captures the relation of how effectively a firm use its total assets to generate cash. By using firms EBITDA value we add back costs like depreciation and finance, which allows for a more intuitive comparison between factors like capital structure and geographical locations. When PE-firms screen the market for potential targets they analyse these targets closely through different valuation models, usually with the firm's cash flow as foundation in the valuation techniques (DePamphilis, 2012). This is why this variable gives a more comprehensive representation and is defined as:

$$FCF = \frac{EBITDA}{Total\ Assets}$$

### 3.6.4 GROWTH

Target firms that have great growth potential, whether it is sales-, cash flow-, technical growth or combined in some way, will become a natural target for any acquirers. Financial acquirers like PE-firms usually invest in mature companies where they can identify growth potential in a whole company or just a business unit (Stowell, 2010). The value creating process typically combines many different aspects to maximize the value when the PE-firm decides to make an exit. When PE-firms aim for higher growth they can restructure the operations by getting rid of redundancies and make the firm more cost efficient and eventually expand the business by entering new markets (Stowell, 2010).

In general M&A context growing firms' are considered as attractive targets to an acquiring company. But in many cases PE-firms are looking for inefficient firms with the potential of reaching strong growth, meaning that historical growth numbers not necessarily are ground to their investment decisions, which contradicts traditional M&A theory. This was something that Palepu (1986) could prove in his findings, when predicting takeover targets, searching for different target characterisations. The variable will take a look at the revenue growth, which becomes interesting because it motivates the PE-firms to see if the potential target can pursue the growth after a takeover. This study will use the three-year average revenue growth prior to the buyouts:

$$RG = \frac{Revenue_{t-2} + Revenue_{t-1} + Revenue_t}{N}$$

### 3.6.5 UNDERVALUATION

When we use the term buying "cheap" in investment theory we usually relate this to undervaluation in general. More fundamentally it means that we can identify differences in the firms' market- and book values. Undervaluation of a company implies that the market value is lower than the book value of the firm; typically the undervaluation reflects the value of its assets. Example of situations where undervaluation can appear is in cyclical industries. When they reach the bottom of a cycle the assets often becomes undervalued. This means that investors such as PE-firms that have access to good information and are capable to recognize assets with higher potential, can utilize the benefits of buying assets "cheap" and sell them "high". This is why the likelihood of being acquired is greater when undervaluation occurs.

A commonly used measurement to describe whether a firm is over- or undervalued is the price-to-book-ratio, which has been explained by Powell (2004) as a significant predictor when he predicted takeover targets. The intuition in this measurement is that we compare the market price of the firms stock with the book value. The stock price is easily observable while the book value can be interpreted and valued in different ways. Such valuations to obtain the book value could either be the liquidation value, where the book value is defined as the total value of the business assets that are received by the shareholders after liquidation, or the initial value of the firm's assets which can be the valuation of the assets in the beginning of the year. This study will take the price over a book value that is based on each firm's total assets subtracted by the intangible assets and liabilities. This variable will be defined as P/BV in the study and calculated as followed:

$$MVBV = \frac{\text{Market Price Per Share}}{\text{Book Value Per Share}}$$

### 3.6.6 LEVERAGE

PE-theory and earlier studies in this area has described the importance of target firms with low leverage due to the high debt requirements of LBOs. A target firm with low leverage allows PE-firms to finance the transaction with higher amounts of borrowed funds, using the target firms' assets as security for the deal this will increase the debt capacity for the PE-firm. This is why potential targets with higher leverage become less attractive than low-levered targets. Another important aspect of being able to utilize the high leverage is because it gives PE-firms beneficial tax savings in the future, this appears through the interest payments and their deductibility, also called the tax-shield (Stowell, 2010).

From a theoretical perspective it is well known that a target firm capital structure influence the investors (buyers) decision in M&A deals (Ogden et al 2002). Main reasons for acquiring a company with low debt is because it allows the buying firm to use higher leverage, through a high amount of borrowed capital, and potentially increase the return of the investment. High leverage is also beneficial for tax reasons. Companies that operate with debt through bank loans are allowed to deduct the interest of the loans and lower the firms' tax costs, this is because almost all interest payments that a firm pays are tax deductible. This study will use long-term debt over equity as a measurement of a firm's capital structure, defined as:

$$LEV = \frac{\text{Long Term Debt}}{\text{Equity}}$$

### 3.6.7 FIXED ASSET RATIO

Transactions that PE-firms are involved in are highly levered which implies that the financing structure in such deals becomes important for the PE-firms. We have mentioned commonly used acquiring methods like LBOs, where PE-firms mainly use borrowed funds to finance the deals. The structuring of the financing usually is allocated with 80 % debt and 20 % equity and sometimes even higher (DePamphilis, 2012). Financing structures like this obviously require a great portion of collateral. This is why PE-firms typically acquire firms with a high amount of tangible assets that can be used as security to secure bank loans and other sources of senior debt financing, something that intangible assets cannot do. Due to the high leverage approach it becomes important to make quality controls of the acquired firms fixed assets to avoid high CAPEX in the future, implying that the firm would need new investments to replace existing assets because of low quality. High quality assets are also easier to be provided as collateral for bank loans (Stowell, 2010). The theory therefore suggests that a potential target with poorly managed tangible assets, which are considered with high quality, influence PE-firms decision making in the investment process. Powell (2004) also suggests that PE-firms decide to acquire targets with a high portion of tangible assets with the purpose of performing a so called “asset stripping”, where the target company is divided in to smaller units and sold for higher profits. A successful “asset stripper” usually generates higher profits by separating the assets rather than selling a corporation and the assets as a whole (Ogden et al 2002).

When PE-firms take on investments, commonly through LBO's, they are able to use different alternatives of debt: senior debt, where the banks secure the loans by taking the target firm assets as collateral, and subordinated debt, which is represented by a unsecured debt and usually raised in the capital markets. Powell (1997) could prove that real property i.e. fixed assets had significance when predicting takeover targets. As this study looks at capital-intensive industries, NPP becomes an important factor when PE-firms search for targets that have sufficient resources of fixed assets, which can be used as collateral. This study will define this variable according to the formula below:

$$NPPTA = \frac{\textit{Property, Plant \& Equipment}}{\textit{Total Assets}}$$



### 3.6.8 LOGISTICAL REGRESSION

One of the statistical techniques that will be applied in this study is the logistical regression, as it has been commonly used in earlier studies because of its dynamic aspects. Logistical or logit regressions are very useful and effective models, especially when it comes to quantify takeover predictions to measure the statistical connection with the chosen variables during a given time period. But this approach is also commonly used in other subjects and areas that consider prediction probability (Spicer, 2005). Logical regression models are related to basic linear and multiple regression processes. The most crucial distinction between basic linear regression and logical regression is the limitations of basic linear regression of not being able to handle the dependent variables that are dichotomous and categorical. Dichotomous variables are widely used when we focus on two outcomes: for example, if a product will pass or fail quality control, consumers will buy or not buy, a firm will be acquired or not – referring to what this study will measure (Liao T. F., 2011). Furthermore, these two options or categories are coded as 0 and 1 within the model where 0 usually represent “no” and 1 as “yes”, making the predicted probability limited in this range. This implies that logit regression models have the advantage of only generating positive prediction probabilities. Because of its flexibility, logit regression models are among the most common models in economics and other areas. We have seen many researchers apply this binary model for takeover predictions, such as Palepu (1986), Powell (1997) and Barnes (2000).

#### **Important aspect of the logistical regression model:**

- *Demands dichotomy dependent variables (categorical with two options)*
- *Non-linear relationship between dependent and independent variables*
- *Independent variable can't be: normally distributed, linearly related or an interval*
- *Categories must be mutually exclusive*
- *Need large samples – 50 observations for each predictor is recommended*

Table 6: Summarisation of logistical regression

Source: Liao, 2011

The study will be performed through SPSS, where the logit model is used to calculate the log of the likelihood ratio to see if the dependent variable is 1. The mathematical interpretation of the log distribution is defined as:

$$\text{logit}(p) = \log \left[ \frac{p}{(1-p)} \right] = \ln \left[ \frac{p}{(1-p)} \right]$$

The  $p$  in a logit equation can only take on values between the interval of 0 and 1 (Demaris, 1992).

The formula below explains the relationship between the traditional linear regression and the logistical regression. Similar to linear regression, logistic regression are able to find best possible fit in the model through maximum likelihood. The logistical regression will in this study quantify takeover likelihood by using financial ratios as underlying values. But there are differences in the output compared to linear regression, goodness of fit and general significance levels are part of the main differences due to this binominal regression model (Spicer, 2005).

The relationship between linear regression and logistic regression is shown as:

$$\text{logit}[p(x)] = \log \left[ \frac{p(x)}{(1-p(x))} \right] = a + b_1x_1 + b_2x_2 \dots$$

To obtain the  $p$  following formula is used:

$$p = \frac{\exp(a+b_1x_1 + b_2x_2 \dots)}{1 + \exp(a+b_1x_1 + b_2x_2 \dots)}$$

When performing the logistical regression to predict the outcomes the cumulative probability curve is illustrating an s-shaped curve two possible probabilities, the conditions can either be 1 or 0 (Demaris,1992):

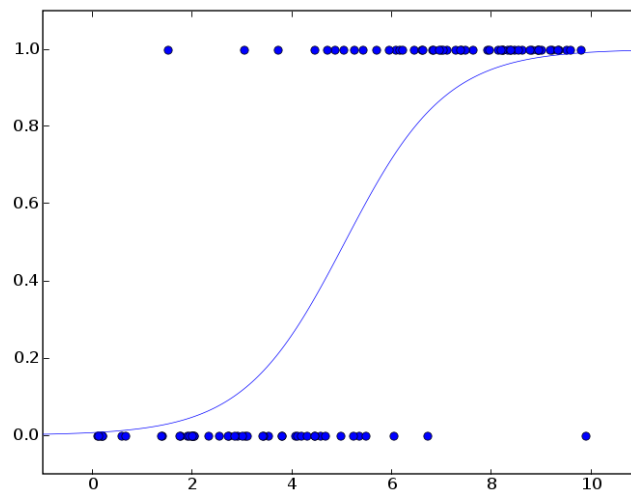


Figure 3: Illustrates the distribution over the predicted (two) outcomes, defined as 0 and 1.

# 4. EMPIRICAL RESULTS

## 4.1 PORTFOLIO PERFORMANCE

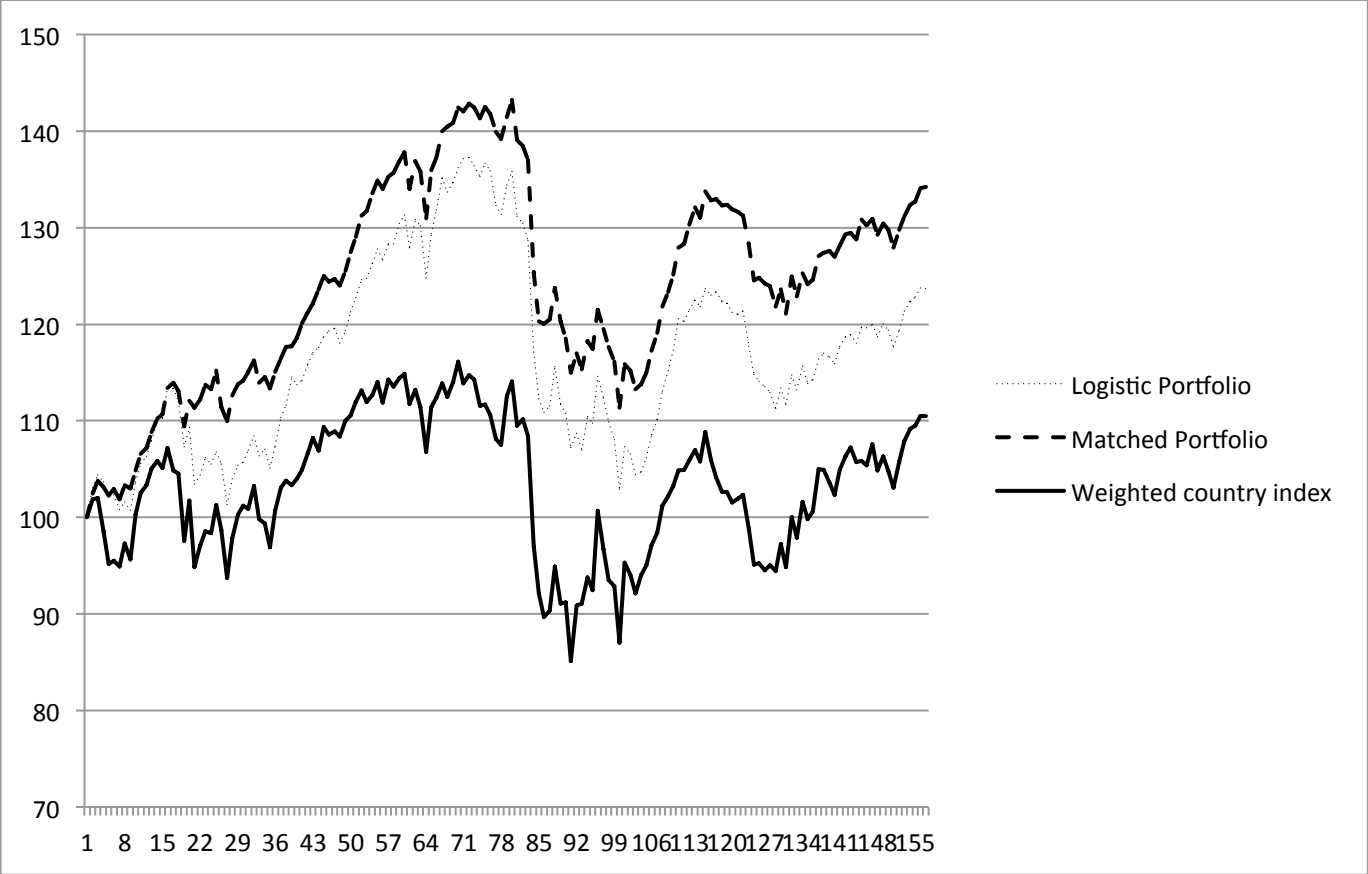


Figure 4: Portfolio indices and the benchmark between 2010-01-01 and 2012-12-31

The first result we present is the figure that shows our portfolios index compared to our weighted country index (market index). As we can see our portfolios has clearly outperformed the market index but as it seems the movements are correlated, meaning that when the market goes down our stocks will follow this movement. However if we look at the actual returns we can see that not only does our portfolio gain more than the market portfolio but it also loses less when the market is going down.

	2010	2011	2012	Holding Period
<b>Logistic</b>	21,01% (11,14%)	-14,90% (0,16%)	16,48% (0,23%)	23,66% (13,15%)
<b>Matched</b>	28,53% (18,65%)	-12,68% (2,38%)	16,70% (0,45%)	34,23% (23,72%)
<b>Benchmark</b>	9,88%	-15,06%	16,25%	10,51%

Table 7: Annual performance of the portfolios and benchmark – excess return in parenthesis

We also present the annual returns from each portfolio and the excess return compared to the benchmark for the portfolios and as we can see our portfolios have performed significantly better than the markets portfolio.

Now, before we can draw any conclusions out of these results we need to look at the risk in the portfolios, because if it turns out that the risk in our portfolios is a lot higher than in the market portfolio we cannot really determine if our portfolios are better.

In the table below we present the portfolio variance and volatility.

	2010	2011	2012
<b>Logistic</b>	12,70 %	15,11 %	12,63 %
<b>Matched</b>	15,73 %	11,02 %	11,02 %
<b>Benchmark</b>	19,96 %	30,01 %	17,09 %

Table 8: Yearly Portfolio volatility calculated with 52 weeks historical standard deviation

Since we do not know the exact composition of stocks in our benchmark we cannot calculate the volatility in our benchmark portfolio. Instead we have looked at the volatility index of the German DAX volatility index<sup>4</sup> we can see that our portfolios are still much lower.

The article in footnote 1 also show that the European markets are indeed very correlated and the sector differentiation in our investigated countries are about the same, this means that the volatility in our portfolios are significantly lower than the market index.

So if we think in terms of risk adjusted returns we can easily say that our portfolios has indeed been a very good investment over the last three years.

<sup>4</sup> The DAX index was the only volatility measure we could find; luckily it has had a 91% correlation with the European volatility index during this period. <http://www.spvixviews.com/2012/01/07/volatility-benchmarks-in-europe/>

## 4.2 RESULT DISCUSSION

With the results shown in the previous section we can draw some interesting conclusions. First it seems that private equity firms have found a good model to use when they select their investments. This means that if they were to only buy these companies and continue as passive investors they could still make profits, but the profits are not nearly as high as private equity firms tell the world they have, we already knew that the reported earnings from private equity firms (as an industry) are exaggerated and that research has shown that they are not performing as well as they say. With these results the private equity concept as a whole should be rendered utterly redundant since investors can instead invest with our model and receive a higher return.

However, we also know that some private equity firms consistently outperform both the market index and the performance in our portfolios, so if we assume that both good and bad private equity fund managers buy public firms in the same way, this study can indirectly show that the input made by competent PE managers are indeed of much value.

The theory that private equity firms buy undervalued companies and try to make the market realise the true value before they sell, can also to some extent be disproven by this essay, because if the private equity firms bought undervalued firms then all other resembling companies should not increase its value. The alternate hypothesis on this theory that PE firms buy companies in market sectors in which they believe the demand for its products will go up, is instead gaining some evidence in this study but too little focus on this aspect has been done to make any statements. In order to show any proof of that theory holding we would need to focus more on industries and markets and cross examine these further than what has been done in this essay.

The empirical result of this study cannot support the theory that the change in ownership will influence the performance with a positive impact since by only buying the types of companies PE funds buy they will have returns better than the market index, but as with most Private Equity research the standard result implies here as well: "some PE managers could succeed in doing this." But on an average scale this study disproves the theory. If our returns had been significantly lower compared to the market index we could have said that most PE funds succeed in creating value.

The results also show that not only are private equity funds good at picking firms that will increase in value but that they also pick stocks with low historical volatility, this is probably the strongest result we have, strengthening the theory that the private equity firms want to buy mature companies with low risk and great room for improvement.

## 5. CONCLUSION

The purpose of our study was to measure the performance of the private equity firms' and to test where the biggest part of the value increase in a private equity investment comes from. This by building a predictive takeover model based on actual buyout targets and specific accounting values as the underlying driver, which were represented by seven different variables.

We have answered three research questions:

- 1) Have the stocks of companies that resemble Private Equity targets been able to outperform the market index?
- 2) Can we based on this draw conclusions of what contributes to the value adding activities Private Equity Managers perform?
- 3) Have we found a way for other investors in the market to outperform the index?

We have shown, that by investing in the same types of companies, as the private equity industries tend to invest in, you can achieve substantial excess returns compared to the market index.

This study has not recognised the explanatory power of the individual variables and their direct relation to the returns of private equity firms. The model has instead generated results that already assumed a high degree of significance, according to the theory of the selected characteristics.

The research have provided evidence that private equity firms are able to pick investments that will outperform the benchmark. This can be explained by their accurate way of screening the market and selecting targets where they can execute different business strategies and successfully create higher value.

By ruling out that Private Equity on an aggregated level can create value in public buyouts, we support the previous findings that experienced fund managers are what creates value in Private Equity transactions and not the strategy itself.

## 5.1 Suggestions for further studies

The results found in this study arise cause for some interesting further research, we have clearly showed that researchers in a simple way by running a logistic regression can find likely takeover targets that will perform better than the market, by using the regression the researcher can easily experiment with different variables in order to find the best portfolio strategy in order to maximise profits. Other interesting studies that can follow this study is the further examination of industry relevance by grouping the sample portfolios more according to industry and by how many Private Equity buyouts that has been performed in the group, researchers could then be able to find more accurate proof of what industries that are targeted by the Private Equity and test if the returns and interest in these sectors vary over different market conditions and between countries.

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## 6.1 APPENDIX A

**Case Processing Summary**

Unweighted Cases <sup>a</sup>		N	Percent
	Included in Analysis	328	100,0
Selected Cases	Missing Cases	0	,0
	Total	328	100,0
Unselected Cases		0	,0
Total		328	100,0

a. If weight is in effect, see classification table for the total number of cases.

**Omnibus Tests of Model Coefficients**

	Chi-square	df	Sig.
Step	37,333	7	,000
Step 1	Block	7	,000
	Model	7	,000

**Model Summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	417,372 <sup>a</sup>	,108	,143

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than ,001.

**Variables in the Equation**

	B	S.E.	Wald	df	Sig.	Exp(B)	
EBITDAMCAP	-1,628	,648	6,315	1	,012	,196	
NPPTA	-1,346	,643	4,383	1	,036	,260	
DE	,002	,001	4,940	1	,026	1,002	
PBV	-,414	,147	7,986	1	,005	,661	
Step 1 <sup>a</sup>	Growth	,000	,004	,008	1	,930	1,000
	Mcap	,000	,000	1,871	1	,171	1,000
	industry	,071	,238	,088	1	,766	1,073
	Constant	,568	,261	4,731	1	,030	1,766

## 6.2 APPENDIX B

### Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	INDUSTRY	,197	,222	,787	1	,375	1,218
	Constant	-,089	,149	,355	1	,551	,915

a. Variable(s) entered on step 1: INDUSTRY.

Table 7: Logistical regression output of the INDUSTRY variable

### Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	MCAP	,000	,000	1,837	1	,175	1,000
	Constant	-,052	,116	,199	1	,655	,949

a. Variable(s) entered on step 1: MCAP.

Table 8: Logistical regression output of the MCAP variable

### Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	EBITDAMCAP	-1,192	,521	5,239	1	,022	,304
	Constant	,165	,133	1,553	1	,213	1,180

a. Variable(s) entered on step 1: EBITDAMCAP.

Table 9: Logistical regression output of the EBITDAMCAP variable

### Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	GROWTH	-,004	,004	1,146	1	,284	,996
	Constant	,032	,114	,080	1	,778	1,033

a. Variable(s) entered on step 1: GROWTH.

Table 10: Logistical regression output of the GROWTH variable

### Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	MTBV	-,052	,061	,745	1	,388	,949
	Constant	,057	,128	,198	1	,657	1,059

a. Variable(s) entered on step 1: MTBV.

Table 11: Logistical regression output of the MTBV variable

### Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	DE	,002	,001	3,340	1	,068	1,002
	Constant	-,172	,132	1,692	1	,193	,842

a. Variable(s) entered on step 1: DE.

Table 12: Logistical regression output of the DE variable

**Variables in the Equation**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	NPPTA	-1,068	,571	3,499	1	,061	,344
	Constant	,171	,143	1,436	1	,231	1,187

a. Variable(s) entered on step 1: NPPTA.

*Table 13: Logistical regression output of the NPPTA variable*

Through one combined and eight separate trials the logistical regression model where applied in SPSS and generating statistical significant models in majority of the cases. This could be proven by the “Omnibus Tests of Model Coefficients” which explains if the model performs well or not, it also interpreted as a “goodness of fit” test. The model indicated significance as these values where less than 0, 05 (Appendix A).

The table above provides us with the most interesting answers about the variables used in this study. Beginning with the first column the “B” value shows us in what direction the relationship between different characteristics and becoming a takeover target goes. The first test showed that EBITDA/M.CAP and NPP/TA had the largest “B” values, which implies that they have strongest effect in this relationship, also meaning an increasing likelihood of being a takeover target.

The Wald values tell us how much a variable contributes to the models explanatory power, where higher values indicates higher contribution to the explanatory power of the model. Wald statistics is more important when we combine multiple variables in the same model. EBITDA/MCAP and NPP/TA is obviously representing the highest values here. The significance value should be as low as possible, preferably less than 0, 05 to be statistical significant. Only EBITDA/MCAP showed values less than 0, 05 and weak significance for the rest variables.

The last and maybe the most useful value when predicting takeover targets through logistical regression is the “Exp (B)” value, which give us information about the odds ratios for each variable. Tabachnick and Fidell (2007) define the odds ratios as “the change in odds of being in one of the categories of outcome when the value of a predictor increases by one unit”. The results show that the odds of becoming a takeover target are 1,218 higher for firms within a certain industry, in relations to each increasing unit of the exposure. The opposite occurs for firms with high EBITDA/MCAP values, meaning lower likelihood of being a takeover target with high EBITDA/MCAP.