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Do Mergers and Acquisitions Create Value for Acquirers?

Short- and Long-Term Event Study on the Pharmaceutical Industry of Europe

by

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Abstract

In this thesis, the short- and long-term event study methodology are applied in order to assess whether M&As, in the pharmaceutical industry, create any abnormal return for the acquirer. The majority of the previous research finds a negative abnormal return but the short-term event study seems to generate slightly positive abnormal returns outside the U.S. There is a limited amount of research on the pharmaceutical industry, thus it is important to find out how the pharmaceutical industry specific conditions and other industry factors affect the performance. In the short-term event study, the cumulative abnormal return (CAR) is applied and in the long-term the buy- and hold abnormal return (BHAR) is exercised. The aim is to connect the performance to relevant theories to be able to explain the abnormal return within both time perspectives and to evaluate and explain the difference in performance between the short- and long-term event study. The abnormal return turned out to be significantly positive in the short-term event study and insignificantly positive in the long-term event study, independent of the applied benchmark. In the short-term, the result is in line with the previous research where positive abnormal returns are usually found, but positive abnormal returns in the long-term can be seen surprising since most of the previous studies find M&As value destroying in the long run. One important explanatory factor for the difference in performance between the time perspectives may be the efficient market hypothesis (EMH). The result indicates that M&As, in the pharmaceutical industry, seem to be beneficial for the shareholders or at least not value destroying. The thesis contributes to existing literature by strengthening the empirical results found from the value creation of M&As for the acquirers and adding research on the pharmaceutical industry of Europe which is still unsearched in some extent.

Keywords: Event study, Buy- and hold abnormal return, Cumulative abnormal return, Pharmaceutical industry, Efficient market hypothesis

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1. Introduction

The term mergers and acquisitions (M&As) is used when two corporations are combined into one entity and only one of them continues to operate, and the target company goes out of existence. The deal includes two parties, acquirer and target, and the acquirer takes over the target with the ambition of creating a more competitive, efficient and profitable company (McBeath and Bacha, 2001). In the literature, the distinction between M&As is rather unclear and the two terms are often used interchangeably (Gaughan, 2011). There is often a significant bid premium that has to be paid by the acquirer and hence the M&A must create synergies in order to be advantageous for the acquirer (Agrawal and Jaffe, 2000). For the big pharmaceutical companies, such synergies can be economies of scale and scope, market dominance and strengthen R&D. Patents are very important in the industry and M&As can be used to fill the gaps in the product pipeline by getting access to external R&D (McBeath and Bacha, 2001). It is likely that these pharmaceutical industry-specific conditions will affect the profitability of the M&As in the industry.

M&As are one of the most researched topics in the financial literature and a lot of research has already been dedicated to the question whether M&As add value to the target respectively to the acquirer. It is clear that the target firms gain while the result is not explicit when it comes to the acquirers, but it evidences that the acquirers underperform and thus destroys shareholder value. The result is highly dependent on what type of company, industry and time period one looks at (Gaughan, 2011). It will be interesting to find out whether the pharmaceutical industry-specific conditions may influence the result of the M&As in any direction.

The purpose of this thesis is to evaluate and compare how the short- and long-term event study methodology perform in the pharmaceutical industry, on the European market between the years 2010-2014. This is an as recent period as possible given that the long-term event window is determined to be three years and the concentration is thereby on the period after the financial crisis in 2008. The requirement for including an M&A is that the transaction value exceeds more than one million Euros. The lower limit is set to obtain economically significant M&As. Also, the sample only includes M&As where the acquirer becomes a

majority owner in the target company after the acquisition. The short-term event study will be evaluated by using Cumulative Abnormal Return (CAR) and in the long-term event study the Buy and Hold Abnormal Return (BHAR) will be applied. This gives the opportunity to determine whether the M&As are creating abnormal returns in both the short- and long-term perspective. The objective is to connect the performance to relevant theories to be able to explain the abnormal return within both time perspectives and to evaluate and explain the difference in performance between the short- and long-term event study. The performance of M&As in the pharmaceutical industry is of interest to all affected stakeholders e.g. shareholders, managers, and the society.

There have been a limited amount of studies which assess the performance of M&As in the pharmaceutical industry and they are often done quite far back in time. The most recent used in this thesis is the research from Hassan et al. (2007) which is described more carefully in the literature review. Like Hassan et al. (2007), most of the recent researches have been concentrated on M&As of U.S. companies. This thesis, therefore, contributes to the existing research by providing updated results on the European market. Compared to previously mentioned research, this thesis also uses a different method to capture the long-term performance of M&As. The method used in this thesis is previously mentioned BHAR, while Hassan et al. (2007) uses Fama French Calendar-Time Portfolio to compute the abnormal returns.

The study continues as follows. At next, in the chapter 2 the recent literature about the value creation of M&As in a short- and long-term perspective is presented to give an indication what kind of result could be found in this research paper. In the chapter 3, introduction of the pharmaceutical industry and the most relevant theories are presented to explain and analyse the empirical result. The chapter 4 introduces the methods used to capture the abnormal returns in both time perspectives. At the chapter 5, the result of the study is interpreted and analysed, and it is followed by a conclusion of the research in the chapter 6.

The research questions which the thesis is going to answer are given as:

- Do M&As create value for acquirers in terms of short- and long-term abnormal returns in the pharmaceutical industry?
- Is there any difference in abnormal return between the short- and long-term event study?
- What theories and industry-specific conditions can be applied to explain the result?

2. Literature Review

According to previous research, the target firms receive large positive average abnormal returns from an M&As because normally the bid premium is significantly higher than the current market value of the firm. If the market is assumed to operate efficiently, it is profitable to sell above the market value for the target firm's shareholders. In contrast, the acquirer firm generally pays too much for the target firm, which consequently is value destroying for the acquirer's shareholders (Agrawal and Jaffe, 2000). In this section, recent research with a short- and long-term perspective will be presented in order to get an indication of the expected performance. One can notice that there is a limited research conducted in the pharmaceutical industry.

2.1. Short term Event study

Dutta and Saadi (2011) have compared existent studies from the short-term economic performance of acquiring and targets firms. They agree with the fact that most of the gains of M&As are received by the target's shareholders. They discuss that the performance of M&As from acquirers' perspective variates more and the result differs if the data contains only U.S. firms or non-U.S. firms. In general, for the U.S. companies, the results report negative or insignificantly positive abnormal returns. Tuch and O'Sullivan (2007) add that the results from studies carried out in the U.K. have found similar kind of results as the studies in U.S. markets, and negative abnormal returns for M&As in the U.K. can be expected. For non-U.S. and non-U.K. studies, the result is opposite and positive abnormal returns are found (Dutta & Saadi, 2011).

Sudarsanam and Mahate (2003) searched if acquirers in the U.K. experience abnormal returns in a short-term perspective. They applied BHAR method to a sample which consisted 519 M&A transactions between the years 1983 and 1995. To calculate abnormal returns, they used four different benchmarks to compare the results and avoid the problems related to each technique. The authors found out that regardless of the different benchmarks used, the sample

experiences significantly negative abnormal return approximately –1.4 percent in the bid announcement period.

Campa and Hernando (2004) studied the value generated from M&A announcements for acquirer involving companies from European Union over the period 1998-2000. They applied the cumulative abnormal return approach for 262 announcements inside the EU. Seven different measurement windows were applied to get insight about the timeframe when the abnormal returns are generated. The study didn't find any significant announcement or post-announcement effect from acquirer's perspective. Nevertheless, evidence of price run-up three or two months prior to announcement day was found. They also suggest that companies in regulated industries generate lower abnormal returns than unregulated ones.

In their research, Ben-Amar and Andre (2006) searched for the short-term announcement effect of abnormal returns in Canadian market over the 1998-2002 period. The sample consisted of 327 transactions and announcement date cumulative abnormal returns were calculated. The study found positive and significant 1.06 % CARs around the announcement day. The authors note that the result is consistent with the previous studies from Canada and Europe where positive abnormal returns are discovered. They discuss that greater ownership concentration compared to the U.S. could explain the different results in Europe and Canada where it lies in hands of individuals, families, governments, or industrial groups.

Hassan et al. (2007) researched if M&As create shareholder wealth in U.S pharmaceutical industry in a short- or long-term perspective. Data consisted of M&A transactions from period 1984-2004 including deals in U.S. market and also cross-border mergers. In the short-term, value-weighted market index and the Fama-French three-factor model were used to examine how announcement affects short-term stock price development. In the long-term, Fama-French Calendar-Time Abnormal Returns approach was used which differs from the method used in this research. The research didn't find evidence of abnormal returns neither in the short-term or long-term when mergers and acquisitions were considered as one sample. Nevertheless, when M&As were analysed separately they found that acquisitions had significantly positive abnormal returns in a short- and long-term. The research argues that the result is logical since acquisitions are done for strategic reasons to acquire a patent, division, or a smaller biotech company. Therefore, markets react positively to shareholder value if the asset is considered value-adding for the acquiring company. For mergers, the market reaction is opposite and negative or modest positive abnormal returns are experienced. The reason is

that mergers, particularly of large companies, can include return reducing elements and they aren't efficient enough to increase a weak pipeline.

Based on the results of previous studies, introductory expectations about the sign of the abnormal returns in a short-term can be drawn. In the short-term, it can be assumed that the sample firms experience insignificantly positive or slightly negative abnormal returns. The assumption is based on the previously stated fact which argued that M&As, carried out outside of U.S. markets, have experienced positive abnormal returns in previous studies. It has to be also noticed, that pharmaceutical industry is very regulated which can lower the abnormal returns experienced. Based on the studies from Sudarsanam & Mahate and others, one can assume that it is sufficient to use one carefully selected benchmark since the studies carried out indicate similar kind of results independent on the different benchmarks used.

2.2. Long-term event study

The majority of the research concerning the financial performance of M&As has been focusing on stock price changes in a short-term (Agrawal and Jaffe, 2000). However, interest towards the performance in long-term is increasing and the literature is growing. The major part of the research measuring long-term performance has reported significantly negative abnormal returns over the event period from one to three years (Dutta & Saadi, 2011).

Gregory (1997) used all successful mergers with bids more than 10 million pounds in U.K. over the period 1984-1992 to examine long-term effects of merger announcements. The method used in the research was a standard event-study methodology, where six different models were used to calculate abnormal returns. The models used were CAPM, Dimson-Marsh risk and size adjustment model, a simple size control portfolio, a multi-index model, a value-weighted multi-index model, and Fama and French value-weighted three-factor model. Gregory found that on average U.K. companies create negative abnormal returns in the long-term. The result variated between the different models used from –8.15% to –11.25% abnormal returns in a two-year post-merger period.

Loughran and Vijh (1997) were the first ones that used Buy and Hold Abnormal Return (BHAR) methodology in research of M&A announcement effect for the acquirer (Dutta and Saadi, 2011). They used a sample of 947 firms listed in NYSE, AMEX, or NASDAQ that

made merger during 1970 and 1989 and classified the firms based on the mode of acquisition (merger or tender offer) and the form of payment (cash or stock). As a benchmark, matching firms based on market value of equity and book-to-market ratio were found from all the operating firms included earlier mentioned stock exchanges. They found that acquiring firms underperform compared to their control firms in case of a merger, and in tender offers outperform control firms. Abnormal returns for tender offers were significantly negative (-15.9 percent) for mergers and correspondingly for tender offers positive (43 percent).

Rau and Vermaelen (1998) investigated three-year post-performance of 3169 mergers and 348 tender offers between 1980 and 1991. They applied the common technique to compute abnormal returns during the event period and used size- and book-to-market-based portfolios as a benchmark. Firstly, sample firms are divided into ten portfolios based on their market capitalization. Further, these ten portfolios are divided into 50 portfolios based on their book-to-market ratio and abnormal returns are calculated as a difference between the firms return and its control portfolios return. The research found that the acquirers underperform compared to their control firms and earn significant –4 percent abnormal return. The result of tender offers is in line with the previous research and significantly positive 8.56 abnormal returns were found.

Mitchell and Stafford (2000) discuss the reliability of the measures used to estimate the long-term abnormal stock price performance. Their sample consisted of 2,193 acquisitions of CRSP-listed companies that occurred during the period 1958 – 1993. The two methods used to test the long-term effect of acquisition announcements were BHAR using size- and book-to-market balanced portfolios as a benchmark and Calendar-Time Abnormal Returns which was regressed on Fama-French three factors model. When BHAR method is used, they found no evidence of abnormal returns performance in a long-term. After accounting for cross-sectional dependence, the inference for calendar-time abnormal return is similar for BHAR and insignificantly negative abnormal returns are found. However, the authors found that CTAR has more power to identify abnormal returns in their sample and they advise to use the method over BHAR. However, the debate is ongoing and other researchers prefer BHAR since it is more realistic and express investors' behaviour better compared to other models (Dionysiou, 2015).

Andre, Kooli, and L'Her (2004) searched the long-run performance of M&As Canadian markets between 1980 and 2000. The sample consisted of 267 events which had value more

than 10 million U.S. dollars. Due to cross-correlation in BHAR method, they preferred to use calendar-time approach. When using three-year post-acquiring event window, the research found significantly negative abnormal of –0.523 percent units.

Dutta and Jog (2009) studied Canadian acquiring firms in the period 1993-2002, and the sample consisted of 1,300 M&As. It is known that the long-term event methodology potentially can distort the empirical results. To ensure robustness two methodologies were applied namely the long-term event approach and the calendar time approach. The study used three different benchmarks and was primarily focusing on matching firm benchmark since it subject to least bias and the results between different benchmarks can vary a lot. Using both of the methods and applying different benchmarks, the study didn't find any evidence of long-term underperformance for Canadian firms. The authors state that the result is in line with previous research and congruent with the market efficiency theory.

In a long-term, opposite result to short-term performance can be expected. The previous research from the field referred in this research have found negative abnormal returns and the result is expected to follow the same path also in this research. The benchmark plays more important role in the long-term than short-term and it should be more carefully chosen. To find out whether the result is reliable, there are going to be performed a number of robustness tests.

3. Theoretical Review

3.1. Background of the Pharmaceutical Industry

The pharmaceutical industry is one the most competitive and top performing sectors in Europe, and it has the highest added-value per person employed (EFPIA, 2017). The pharmaceutical companies are facing a complex business environment where they are highly dependent on the legal environment, as the government is intensely impacting the business by its legislation. The whole life cycle of pharmaceutical products from producing to the end user is legally controlled by the distributors and resellers like pharmacies (Pharmafile, 2017). M&As can consequently be seen as a necessary tool in order to adapt to the most recent market conditions. For instance, political changes like Trump's election and Brexit have a high impact on the profitability of pharmaceutical companies which also is reflected straight in the M&A activity (Pharmafile, 2017).

A common feature that pharmaceutical companies share is the high costs of research and development. Drug discovery and development are extremely expensive and only a minority of the drugs makes it to the market after clinical trials of government-appointed medical institutions which usually takes ten years (Bieri, 2018). Patents of small molecule sector (which is the biggest sector inside pharmaceutical industry) are estimated to create 54 percent of total pharmaceutical industry's revenue (Results Healthcare, 2017). Therefore, companies with a comprehensive patent portfolio of drugs which are approved to the market can have a dominant position in the industry. Expiring patents drive companies to acquire targets with innovative solutions and thus revenue potential. In most of the European countries, a patent term is usually valid for 20 years and after the expiration, it becomes a generic drug which can be produced by any party which fulfils the legal requirements (International Trade Administration, 2016; McLeod, 2016).

M&A deals in the pharmaceutical industry are mainly driven by the availability of potential targets and therefore the number of deals can vary substantially between years. The number of M&As deals executed in the industry has been increasing after the recent financial crisis in

2008. The value of transactions carried out seems to be decreasing but the pharmaceutical industry is historically one of the most important industries based on the value of M&A deals occurred (IMAA, 2018).

The reasons behind the M&As activities conducted in the pharmaceutical industry follows the current business practice, where a need for M&As spring from the competitiveness of the industry. To compete in the industry or to be "first-in-class" in specific therapeutic categories, companies assess that they need to create synergies for example by acquiring new technologies, customer bases and new geographical areas (Financier Worldwide, 2015). Cutting the costs when it comes to marketing and R&D may also be a rationale to execute an M&A. The recent studies show that it takes on average 2.5 billion dollars to get a novel drug into the market. When only very few products will achieve a blockbuster status of one billion dollars in annual sales, the research base can be said to be very costly for most of the companies (Fisher & Liebman, 2015). In addition to uncertain payback of the product, companies also have had major difficulties to increase the productivity of their drug discovery programmes despite large investments in their research and development (Neild & Alcraft, 2001).

In recent years, pharmaceutical companies have been acquiring assets even in the earlier stages of development. The reason behind this phenomenon lies in the fact that the most of the late-stage targets have already been acquired which drives companies to acquire candidates earlier in the pipeline. When targets are acquired in the early stages, acquirers can pay less for the deals but the downside is that the development risk is higher. When acquiring at a later stage, companies will pay more but the entailed risk is lower (Vitez & Harrison, 2016). In summary, the short- and long-term abnormal return will be highly affected by industry-specific conditions. The result will also be affected by more general theories applied to M&As which will be presented next.

3.2. Theory

The aim of this section is to present relevant theories that can be used to explain and analyse the empirical result. What drives the abnormal return in the short- and long-term event study? How can the difference in abnormal return between the short- and long-term event study be

explained? In addition to the theory, the pharmaceutical industry-specific conditions which were presented before can be used to explain and analyse the empirical result. The theories will not be empirically tested, instead the theories are rather presented to give an overview of what factors that historically have been found to drive the performance of M&As. The abnormal returns can give an indication of what factors which are most influential in our study.

3.2.1. Efficient Market Hypothesis

The efficient market hypothesis (EMH) suggests that all available information on the market will be directly incorporated in the security price such that no arbitrage profits can be made by investors (Fama, 1970). This implies that technical and fundamental analysis are fruitless as it doesn't generate any excess return over the market index. Fama (1970) divides the EMH into three categories based on what extent the market is efficient. The strong form efficiency assumes that no market participants are in a monopolistic information advantage which would influence the current security price in a given direction if known by the market. If the market has a semi-strong efficiency all the available public information is incorporated into the security price. The weakest form of market efficiency assumes a full incorporation of the historical prices in the current security price. The weak form of market efficiency is fully supported, and the semi-strong form has also been prevalent in most of the research. The strong form efficiency is probably not supported. It is, for example, likely that insiders and market makers have superior information comparing to a regular investor (Fama, 1970).

The efficient market hypothesis is the most fundamental assumption made in the event study methodology because if the correct effect of the event is going to be observable in the short-term event window it has to be visible directly in relation to the event (McWilliams and Siegel, 1997). The long-term event study can capture delayed effects from the event, which is reasonable to use if the market is inefficient or less efficient. Fama (1998) is aware of the fact that market anomalies have been observed in the long-term event studies but comes up with two main arguments for why the market should be perceived as efficient anyway. Firstly, if the anomalies are evenly distributed between under- and overreactions, it can be attributed to chance and hence the market must be considered to be efficient. Secondly, if one gets large and evenly distributed anomalies then it is unlikely that the anomalies can be attributed to chance. The second situation can be interpreted as a "pyrrhic victory" for the efficient market

hypothesis, although the anomalies tend to disappear if the model gets well specified (Fama, 1998). The results generated by the event study methodology must be carefully interpreted in relation to the efficient market hypothesis.

To make sure the entire announcement effect is captured in the short-term event study, the event window can be prolonged forward and backward. Days can be added to enable delayed effects of the event to be captured as it might take some time for the market to analyse the newly publicly available information. The event window can also go back a few days to capture potential effects which occurred prior to the announcement day. The effect of the upcoming event might be observable prior the event, for instance, due to a leak of information or because insiders utilize undisclosed information (MacKinlay, 1997).

3.2.2. Agency Problem and Financing decision

There is an agency conflict between the manager and the shareholders since they in some respects have conflicting interests. The manager has incentives to invest in negative net present value projects, based on the relevant discount rate of cost of capital, as a larger firm in general will imply a higher compensation for the manager. There is thus an expected cost of free cash flow in the firm from the shareholders' perspective. The free cash flow is defined as the cash left when all positive net present value projects have been financed. To reduce the cost of free cash flow it is advantageous to create cash-flow obligations, which will keep down the free cash flow in the firm. Such a control mechanism can be obtained by a high dividend or significant interest rate obligations (Jensen, 1986).

Cash is nevertheless highly important for a firm as the cash is used to finance the daily operations and can be used to make positive net present value investments. The company should focus on assessing what a reasonable cash balance is for the firm (Harford, 1999). Harford (1999) notices that cash-rich firms are more likely to participate in M&A activities. The study finds some evidence that a low managerial stock ownership, a proxy for being more likely to have agency problems, in combination with cash abundance will result in value-destroying acquisitions. The performance was measured by the market reaction to the M&A announcements and the post-announcement operational performance (Harford, 1999).

Previous research suggests that a cash payment signals that the acquirer perceives the target firm to be undervalued while a stock payment signals the target firm is overvalued (Yook,

2003). The cash payment affects the agency cost of free cash flow as the cash payment increases the debt ratio and gives less resources at the manager's discretion to make value-destroying acquisitions. It is not fully compatible that the agency free cash flow on average results in value-destroying investments and the empirical finding that cash payment is an indication that the target firm is perceived as undervalued.

It is also possible to finance an acquisition using stock payment. The market timing theory suggests that a stock financed acquisition benefits the acquirer's long-term shareholders, given the market value of their equity exceeds the true fundamental value. Because the acquisition will transform overvalued equity into less overvalued hard assets received from the target firm. A stock financed acquisition announcement is going to signal that the acquirer firm's decision makers perceive their own stock as overvalued and thus an immediate drop in the share price is expected (Savor and Lu, 2009). Savor and Lu (2009) confirmed this hypothesis by showing that successful bidders outperform the unsuccessful in the long run. The result was increasingly significant as the time horizon increased. The abnormal return may thereby differ between the short-term and long-term event study.

In line with Savor and Lu (2009), Shleifer and Vishny (2003) argue that it is essential for a firm's future survival to try to increase the stock price to justify acquisitions which enable growth. Conversely, the higher the undervaluation of a firm is, the higher the likelihood of becoming a target firm (Shleifer and Vishny, 2003). The acquirer's management consequently has incentives to artificially increase the market capitalization of the company, especially prior to an acquisition. Erickson and Wang (1999) studied M&As between 1985-1990 and showed that acquirers try to manipulate their result prior an acquisition. The relative size of the acquisition was measured as the deal value divided by the acquirer's market value. They were able to find a positive relationship between the relative deal size and the exertion of earnings manipulation.

3.2.3. Valuation of the target firm

The winner's curse states that an acquirer unknowingly overestimates the value of a target firm. The magnitude of the winner's curse is defined as the premium paid by the winning bidding firm less the conditional premium estimated by the market. The conditional premium estimated by the capital market is based on the assumption of a semi-strong capital market.

The magnitude of the winner's curse goes up if the potential acquirers have diverse estimates regarding the takeover gains. Secondly, a more competitive bid for the control of the target will generate a higher winner's curse. Thirdly, there is also a positive relationship between the size of the winner's curse and the profitability of the target firm prior to the takeover. In 67% of the cases, the winning bid premium exceeds the market's estimation of the takeover gains (Varaiya, 1988). Roll (1986) also found that an acquirer, on average, pays too much for the target firm in their sample. This can be explained by the hubris hypothesis, which assumes the acquirer's decision makers overvalue the benefits of having a combined firm. The hubris hypothesis can be seen as a special case of the winning curse (Varaiya, 1988).

A negative abnormal return is compatible with Roll's (1986) hubris hypothesis (and the winner's curse), which states the acquirer's management is not acting in the firm's best interest due to hubris (Roll, 1986). Managers' hubris seems to be enhanced if the market performance is strong as the managers get higher self-confidence from previous decisions (Tuck and O'sullivan, 2007). As mentioned, Gregory (1997) found that U.K. bidder companies unambiguously get significantly negative returns on average in the long-term event study. Limmack (1997) presents three possible explanations for the findings. Firstly, the market doesn't on average reward takeovers from the bidder company's standpoint. Secondly, the result may be isolated to the selected period and sample applied in the study. Thirdly, the model could be misspecified and hence give unreliable results (Limmack, 1997).

Barney (1988) claims two aspects will determine whether an acquisition turns out to be successful from the acquirer's perspective. Firstly, it is important for the acquirer to be able to estimate a correct value of the target firm because a negative abnormal return is caused by an overvaluation of the target firm. Secondly, the competitive bidders' valuation of the target firm must also be taken into account. If the competitive bidders end up with the same valuation of the target firm, the market will be perfectly competitive and the winning bidder can't expect any abnormal return. To be able to receive an abnormal return the acquirer got to have a lower valuation of the target company comparing to the competitive bidders as it enables the acquirer to buy at a discount based on to their estimation of the fundamental value of a combined firm (Barney, 1988).

Manne (1965) analyses the market for corporate control. He argues that the motive behind M&As can be seen in the market reaction of the share price of the acquirer and target. M&As can be interpreted in two ways by the market, namely as just a way of obtaining corporate

control or a way to increase the market power by replacing the current management to enable for instance different kinds of synergies. There is a significant control premium to be paid in M&As, which requires synergies if the M&A is going to be profitable. Particularly, if the market is considered to be efficient. An M&A motivated by just corporate control will thus entail a positive reaction for the target firm and negatively reaction for the acquirer. If the acquisition is motivated by synergies the market should react positively both when it comes to the acquirer and the target firm. Empirical research of the market reaction seems to indicate that the synergies are not significant enough to compensate for the control premium (Manne 1965).

3.2.4. Synergies and Learning hypothesis

The learning hypothesis assumes that companies learn how to effectively perform acquisitions by gaining experience. A serial acquirer gets better at selecting an advantageous target firm, negotiate the deal and implementing the post-merger strategy. The organization will likely also be more prepared for example when it comes to adapting the firm's systems, structures, processes, culture and internal politics (Hitt, Harrison, and Ireland, 2001). Conversely, previous research indicates acquirers' CARs decline from deal to deal (Aktas, Bodt, and Roll, 2010). Aktas, Bodt, and Roll (2010) tested the learning hypothesis on public U.S. targets of significance size by conditioning the bid premium in the current bid on the previous bid premium, investors reaction on the previous bid and the interaction between the variables. The result showed that the company learned from previous acquisitions independent of if it was a rational and hubristic CEO (Aktas, Bodt and Roll, 2010).

The Net Acquisition Value (NAV) is determined by the following formula:

$$NAV = V_{AB} - [V_A + V_B] - P - E \quad \text{[Eq.1]}$$

Where:

V_{AB} = The combined value of two firms.

V_A = The value of firm A.

V_B = The value of firm B.

P = Premium paid for B.

E = Expenses of the acquisition process

(Gaughan, 2011)

To get a positive effect from an acquisition, the value of a combined firm must be higher than the individual entities, the paid premium and the expenses related to the acquisition. This means that the acquirer must create significant synergies in order to cover for the premium and the expenses related to the acquisitions.

There are two types of operational synergies namely economies of scale and economies of scope. Economies of scale are obtained when a given fixed cost is spread out on more units, which enables the company to produce a lower cost per unit. Economies of scope are released if the company is able to apply its current knowledge on another related product line and thereby increase the profitability of the company (Depamphilis, 2011). Financial synergies are related to a lower cost of capital for the newly formed company (Gaughan, 2011). A lower cost of capital implies that shareholders and lender require a lower return in order to buy the stock or to lend to the company (Depamphilis, 2011).

Berkovitch and Narayanan (1993) claim that there are three kinds of explanations to acquisitions namely synergies, agency and hubris. They try to separate between them by looking at the correlation between gains for the target's shareholder, gains for the acquirer's shareholders and total gains. In theory, M&As will only take place if synergies are created for both the target's shareholders and acquirer's shareholders. It results in that both the acquirer and the target firm got to have bargaining power, which creates a positive correlation between total gains and gains for both the target and acquirer. By interpreting the correlation in an equal way for agency and hubris, they reach the conclusion that synergy is the main reason but agency and hubris are very significant explanatory factors as well, where the agency is the most significant of them (Berkovitch and Narayanan, 1993).

Danzon, Epstein, and Nicholson (2004) state that among large firms a low Tobin's q (low market-to-book) implies a higher propensity of conducting M&As. A low Tobin's q is an indication of low expected growth opportunities, thus there is a negative relation between Tobin's q and the propensity to M&As. This relationship becomes insignificant if one control for the percentage of the patents which are approaching expiration. The purpose of M&As among large firms can therefore be seen as a way to utilize expected excess capacity when the need can't be met by internal R&D. In other words, the M&As are partly a way to sustain economies of scale and M&A activities can hence be seen as an indication of distress. They

showed acquisitions had no effect on enterprise value three years following a M&A (Danzon, Epstein and Nicholson, 2004)

4. Methodology

4.1. Data

To be able to perform the short- and long-term event study the first step was to collect data. This thesis will focus on the period between 2010-01-01 to 2014-12-31. The data was collected from Capital IQ, Eikon, and Datastream. Capital IQ and Eikon were mainly used to obtain information and data regarding the M&As, as one was able to apply good filters on the data, whereas Datastream was used to obtain firm-specific data. The most important criteria in the selection of M&As were (for a complete list see Appendix A, Table 6):

1. The M&A took place in the pharmaceutical industry.
2. The acquirer was situated in Europe
3. The acquirer acquired a majority stake in the target firm.
4. The transaction exceeded more than 1 million Euros.

The main reason for looking at M&As larger than 1 million Euros is that those are the most economically significant for the acquirer firms and thus more meaningful and interesting to study (detailed information about the transaction values can be seen in Appendix A, Tables 7 and 8). Small M&As can create a problem with external noise which is reduced if larger M&As are studied (Gregory, 1997). To further raise the probability that the M&As create a significant economic impact on the acquirer firms, it is required that the acquirer has a majority stake in the target firm after the transaction.

To calculate the return of the firms the total return index was used as it takes into account all aspects of the return, for example the dividend is included. The expected return of the event firm, the return given that the event wouldn't have taken place, is represented by a benchmark. In the short- and long-term event study the MSCI Europe Pharmaceuticals index is used to represent the development of the market. The MSCI Europe Pharmaceuticals index is applied as it is expected to be the most accurate benchmark given the focus on European acquirers. In the long-term event study, the control firm approach is also applied. Each of the sample firms is given a control firm based on market capitalization (size) and book-to-market ratio.

Datastream only provides market-to-book, so in order to get the book-to-market one can take the inverse of the market-to-book. The market capitalization is also collected from Datastream.

Approximately 2,700 companies were downloaded from Thomson Reuters Eikon in order to get potential control firms. The sample consisted of the largest companies in the pharmaceutical and biotechnological industry. The biotechnological companies were primarily included to get a better matching to the largest firms in the pharmaceutical industry as there are a few companies that are much larger than their competitors. The biotechnological industry was chosen as it was assessed to be the most similar to the pharmaceutical industry. All large M&As in the pharmaceutical and biotechnological industry between 2010 and 2014 were downloaded from Capital IQ, if a control firm had conducted any M&As in the timeframe then the company was deleted from the sample of potential control firms.

To determine the reliability of the result some robustness tests were made on the data. Using both the short- and long-term event study one tests whether the result is dependent on the chosen time perspective. Both the MSCI Europe Pharmaceuticals index and control firm approach were used in the long-term event study to make sure that the result is independent of the selected benchmark, as mentioned before, the result in the short-term event study seems to be robust independent of the selected benchmark. The event window was altered in both the short- and long-term event study to find out how it affects the result. The –1, +3 event window was used in the short-term event study, and robustness tests were made by adding -3, +3 and -1, +1. In the long-term event study, a 3-years event window subsequent to the closing date was applied and robustness tests were made by adding a 1-year and 2-years event window. The performance of the top median, with regard to the transaction value of the M&As, was tested and compared to the original minimum transaction value of 1 million Euros. The abnormal return was also calculated for each year separately.

Multiple announcements of events from the same company sometimes resulted in overlapping event windows which makes the individual effect from each event inseparable. Huang (2012) notices that overlapping event windows result in cross-sectional dependence which can entail unreliable test statistics. In those cases, the last announcement of an event was deleted. Overlapping event windows are mainly a problem in the long-term event study, where the longest event window applied was three-year. Excluding the last announcement of an event doesn't mean the problem regarding cross-sectional dependence will disappear. In the short-

term event study, 153 M&As were used while in the long-term event study 61 M&As were used. One M&A, where the acquirer was Zogenix, was deleted in the long-term event study as the abnormal return was unreasonable high and clearly not caused by the M&A. If the outlier would have been kept, the result would have been distorted and less generalizable.

4.2. Short-Term Event Study

An event study is about separating the impact of an event from other unrelated movements in the stock price, which would have taken place anyway. The return caused due to the event is called abnormal return and is obtained by taking the actual return minus the expected (normal) return of a given stock price.

$$AR_{it} = R_{it} - E[R_{it}] \quad \text{[Eq.2]}$$

Where:

ARit = Abnormal Return for firm *i* at time *t.*

Rit = Actual Return for firm *i* at time *t*.

E[Rit] = Expected (normal) return for firm *i* at time *t*.

(Brooks, 2014).

The log returns of the stocks and the market portfolio are calculated in the following way:

$$R_{it} = \ln(P_{i,t}/P_{i,t-1}) \quad \text{[Eq.3]}$$

Where:

R_{it} = Return of firm *i* at time *t.*

$P_{i,t}$ = The stock price of firm *i* at time *t.*

$P_{i,t-1}$ = The stock price of firm *i* at one period back in time.

(Lusyana & Sherif, 2016)

To calculate the expected return, two main approaches can be used namely statistical and economical. The statistical approach is based on solely statistical assumptions while the economical approach also considers economic arguments like investors' behaviour. In this

thesis, the statistical market model will be used. The market model is a simple time series regression where the dependent variable is the security return and the explanatory variable is a broad market index (Campbell, Lo & McKinlay). In the long-time event study, the explanatory variable is also going to be represented by the return of an assigned control firm.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad \text{[Eq.4]}$$

Where:

R_{it} = Return of firm *i* at time *t*.

α_i = The intercept for firm *i*.

β_i = Slope coefficient/Market sensitivity for firm *i*.

R_{mt}= Return of Market index/Control firm *m* at time *t*.

ε_{it}= Error term for firm *i* at time *t*.

(Campbell, Lo & McKinlay, 1997)

By deducting the right-hand side from the left-hand side, the abnormal return is received:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad \text{[Eq.5]}$$

(Campbell, Lo & McKinlay, 1997)

The market model is a one factor model as the model only uses the market index as an explanatory factor. A multifactor model (e.g. Fama French three-factor model) takes more than one factor into account but the marginal gain from including more factors is in general limited (MacKinlay, 1997). Fama (1998) argues that the market model will reduce the bad model problem as the model takes firm-specific information into account. One drawback of the model is when one has pre-event abnormal returns as the out of sample estimation of the sample parameters will be less reliable (Fama,1998).

Given that the abnormal returns are independent across firms the average abnormal return (AAR) of every firm can be calculated using the arithmetic average.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \text{[Eq.6]}$$

Where:

AAR_t= Average Abnormal Return at time *t*.

AR_{it}= Abnormal Return for firm *i* at time *t.*

N = Number of observations.

(Lusyana & Sherif, 2016)

The same reasoning can be applied when the CAR of the sample is calculated. To get the cumulative abnormal return one needs to sum up all the abnormal returns in the event window.

$$CAR_{i\tau} = \sum_{t=1}^{\tau} AR_{it} \text{[Eq.7]}$$

Where:

$CAR_{i\tau}$= Cumulative Abnormal Return for firm *i* at time τ.

AR_{it}= Abnormal Return for firm *i* at time *t.*

(Barber & Lyon, 1997)

In this study, the estimation and the event window are expressed with daily data which is in line with what McKinlay (1997) uses. The estimation window is also situated prior to the event window in this study (McKinlay, 1997) and is set to be one year both for the short- and long-term event study. The advantage of having a longer estimation window is that the estimation of the coefficients is based on more data. The disadvantage is that a longer estimation window increases the risk of influence from other external events which create statistical problems and thus a less reliable result (Dutta & Jog, 2009). The event window is determined to go before and after the event day to make sure that the entire effect of the event is captured.

To test whether the cumulative average abnormal return (CAAR) is significantly different from zero one needs to calculate the test statistics and compare to the critical value for a given significance level. The formula for the test statistics:

$$t_{CAAR} = \frac{CAAR_{T_1T_2}}{\hat{\sigma}_{CAAR_{T_1T_2}}/\sqrt{N}} \text{[Eq.8]}$$

Where:

t_{CAAR} = Test statistics for the Cumulative Average Abnormal Return.

$CAAR_{T_1T_2}$= Cumulative Average Abnormal Return between T_1 and T_2.

$\hat{\sigma}_{CAAR_{T_1T_2}}$= Estimated standard deviation of Cumulative Average Abnormal Return between T_1 and T_2.

N = Number of observations.

(Rani, Yadav & Jain, 2016)

One takes the square root of this formula, the variance, and insert in the formula above:

$$\hat{\sigma}^2_{CAAR_{T_1T_2}} = \frac{1}{N-1}\sum_{i=1}^{N}(\,CAAR_{i\,T_1T_2} - \frac{1}{N}\sum_{i=1}^{N} CAAR_{i,T_1T_2})^2 \text{ [Eq.9]}$$

Where:

$\hat{\sigma}^2_{CAAR_{T_1T_2}}$= Estimated variance of Cumulative Average Abnormal Return between T_1 and T_2.

$CAAR_{i\,T_1T_2}$= Cumulative Average Abnormal Return for firm *i* between T_1 and T_2.

N = Number of observations.

(Rani, Yadav & Jain, 2016)

4.3. Long-Term Event Study

Buy- and Hold Abnormal Return (BHAR) is calculated by taking the compounded return of an event firm less the compounded expected return of an appropriate benchmark (Barber & Lyon, 1997). When CAR was applied in the short-term event window, the abnormal returns were summed up, but when BHAR is used in the long-term event study one calculates the product of all the abnormal returns for each cross-sectional unit instead. The estimation window will still be 1-year and the event window will be 3-years. Robustness tests will be conducted for a 1-year and 2-years event window.

$$BHAR_{i\tau} = \prod_{t=1}^{\tau}\,[\,1 + R_{it}] - \prod_{t=1}^{\tau}[1 + E(R_{it})] \text{ [Eq.10]}$$

Where:

$BHAR_{i\tau}$= Buy- and hold Abnormal Return for firm *i* at time τ

R_{it} = Return of firm *i* at time *t.*

$E(R_{it})$ = Expected return of firm *i* at time *t.*

(Barber & Lyon, 1997)

The BHAR can be interpreted as the difference in return over the holding period between investing in a firm that has completed the event, comparing to investing in an otherwise similar non-event firm (Mitchell and Stafford, 2000). The BHAR methodology captures the investors' true experience over the holding period and is therefore preferred by Barber and

Lyon (1997). Mitchell and Stafford (2000) don't think this is an argument for using the BHAR methodology. First of all, because there are other strategies that capture the investors experience equally well for example periodic portfolio rebalancing. Secondly, since the model uses compounded returns to calculate the BHAR the effect will persist over the entire holding period, independent if the true effect took place merely in the beginning. Finally, the most severe disadvantage regarding the BHAR methodology is the serious statistical problems, which may cause an unreliable result (Mitchell and Stafford, 2000).

To choose a reasonable benchmark, to the sample firms, is highly important as it will affect the BHAR. If a weighted market index is used, the result is going to be subject to new listing bias, rebalancing bias and skewness problem. The new listing bias (survivor bias) arises as firms often are included or excluded from the market index subsequent to the announcement day, whereas sample firms are kept over the entire event window. Secondly, MSCI will frequently be rebalanced, unlike the sample firms that will be compounded without any rebalancing, consequently the result will be exposed to the rebalancing bias. The skewness bias exists due to the empirical findings that long-term abnormal returns are positively skewed, which will bias the test statistics (Lyon, Barber and Tsai 1999). Mitchell and Stafford (2000) argue that an overlapping of events create cross-sectional dependence, which will bias the test statistic upwards.

Fama (1998) discusses the underlying causes and the effects of the bad model problem. He argues that the expected return can never be perfectly estimated as a model is always based on assumptions that can't perfectly capture a complex reality. This will to some extent result in spurious abnormal returns which distort the result by affecting the statistical inference. Even if it would have been possible to perfectly capture the reality, it would have been impossible to get a universal model that explains all kinds of situations. The selection of a specific sample and sample period will inevitably create some error in the model. This can be seen as a spurious anomaly and can therefore not be used as an argument for rejecting the efficient market hypothesis.

This thesis will also use the control firm approach. The three misspecification problems disappear if the control firm approach is used as the sample firms and control firms are treated in the same way. Every sample firm is matched to a control firm based on methodology presented by Barber and Lyon's (1997). Firstly, all potential control firms that are in a 70-130 percent interval with regard to market capitalizations are selected for every sample firm. Out

of those companies, the company with the closest book-to-market value is selected as the control firm. This approach yields well-specified test statistics (Barber & Lyon, 1997). One contributing reason for the use of size and book-to-market in the control firm approach sorting is that Fama and French (1992) found evidence of market anomalies for these, but they also underlined that these anomalies were not enough to fully explain the abnormal return (Fama & French, 1992). One disadvantage regarding the control firm approach is that it does not capture all the cross-sectional variation in expected return (Fama, 1998).

To find out if the M&As yield any abnormal return for the acquirer's shareholders, one is interested in whether the average BHAR is different from zero. The test-statistics is given by the following formula:

$$t_{BHAR} = \frac{\overline{BHAR}}{\sigma(BHAR_{T1T2})/\sqrt{N}} \text{ [Eq.11]}$$

Where:

t_{BHAR} = Test statistics for the Buy- and Hold Abnormal Return.

$\overline{BHAR}$ = Average Buy- and Hold Abnormal Return.

$\sigma(BHAR_H)$ = Estimated standard deviation of Buy- and Hold Abnormal Return between T_1 and T_2.

N = Number of observations.

(Rani, Yadav & Jain, 2016)

One takes the square root of this formula, the variance, and insert in the formula above:

$$\hat{\sigma}^2_{BHAR_{T_1T_2}} = \frac{1}{N-1}\sum_{i=1}^{N}(BHAR_{i\,T_1T_2} - \frac{1}{N}\sum_{i=1}^{N} BHAR_{i\,T_1T_2})^2 \text{[Eq.12]}$$

Where:

$\hat{\sigma}^2_{BHAR_{T_1T_2}}$ = Estimated variance of Buy- and Hold Abnormal Return between T_1 and T_2.

$BHAR_{i\,T_1T_2}$ = Buy- and Hold Abnormal Return of firm *i* between T_1 and T_2.

N = Number of observations.

(Rani, Yadav & Jain, 2016)

5. Analysis

The result in the short-term event study gives a significantly positive abnormal return at a 1% significance level when the MSCI Europe Pharmaceuticals index is used and the minimum transaction value is set to be 1 million Euros. The result is stable independent if the event window is determined to five (–1, +3), three (-1, +1) or seven days (–3, +3). The results of the two-last mentioned is in Appendix A, Table 9. If only the M&As whose transaction value exceeds the median transaction value of 109,3 million Euros are used, the abnormal return remains positive but insignificant. The abnormal returns are positive for all the individual years and significantly positive at 5% in 2011 and at 10% in 2013 and 2014. The results are not robust with regard to the significance of the positive abnormal returns, but the abnormal returns remain positive in all the tests. The positive short-term abnormal return is in line with M&As carried out outside the U.S. but this thesis generated more significant results compared to previous research, even though the significance went down in some of the robustness tests. The M&As seem to be value creating or at least not value destroying.

Table 1. CAAR and t-statistics.

CAR	*CAAR*	*Standard deviation*	*t-Value*	*P-Value*	*Rejected*
MSCI Europe Pharmaceuticals index, -1,+3	0.0188	0.0705	3.2970	0.0012***	Rejected
Top median (109, 3 Mn €)	0.0094	0.0635	1.2864	0.2022	*Not Rejected*

***, ** and * indicates statistical significance at 1%, 5% and 10% levels respectively

Table 2. CAAR and t-statistics for individual years.

CAR Yearly	*Observations*	*CAAR*	*Standard deviation*	*t-Value*	*P-Value*	*Rejected*
2014	34	0.0195	0.0635	1.7919	0.0823*	Not Rejected
2013	33	0.0358	0.1120	1.8369	0.0755*	Not Rejected
2012	33	0.0054	0.0560	0.5588	0.5801	Not Rejected
2011	20	0.0222	0.0413	2.3998	0.0268**	Not Rejected
2010	33	0.0122	0.0467	1.5051	0.1420	Not Rejected

***, ** and * indicates statistical significance at 1%, 5% and 10% levels respectively

The long-term event study with a 3-years event window generated insignificantly positive abnormal returns for both the MSCI Europe Pharmaceuticals index and the control firm approach when the minimum transaction value was set to be 1 million Euros. The abnormal return was negative both when a 1-year and 2-years event window were used, independent of the benchmark. The abnormal return was lower and more significant in the 1-year event window comparing to the 2-years event window, and the result was robust across the benchmarks (see Appendix A, Table 10 for all results). This suggests that the length of the event window affects the result to a high extent. If only the M&As whose transaction value transcends the median transaction value of 93 million Euros were used, one gets insignificantly negative abnormal returns.

Table 3. Average-BHAR and t-statistics, with a three years event window.

BHAR	*Average-BHAR*	*Standard deviation*	*t-Value*	*P-Value*	*Rejected*
MSCI Europe Pharmaceuticals index.	0.1259	1.0454	0.9407	0.3506	*Not Rejected*
Control Firm Approach.	0.1079	1.1159	0.7493	0.4567	*Not Rejected*
Top median Pharma index (93 Mn €)	-0.0109	0.7791	-0.0768	0.9393	*Not Rejected*
Top median Control Firm (93 Mn €)	-0.0420	0.9443	-0.2397	0.8122	*Not Rejected*

***, ** and * indicates statistical significance at 1%, 5% and 10% levels respectively

Most research on the long-term event study indicates significantly negative abnormal returns. In this study, insignificantly negative abnormal returns were received for the top median and for shorter lengths of the event window. Reversely, the result was insignificantly positive if the entire sample of M&As with 3-years event window were applied. For the individual years with the MSCI Europe Pharmaceuticals index, the abnormal returns got insignificantly positive for all years except 2010 where the return was insignificantly negative. The control firm approach generated insignificantly positive abnormal returns for 2011, 2012 and 2014 whereas the return was insignificantly negative for 2010 and 2013. It is noteworthy that the abnormal return in 2011, for both benchmarks, was much higher and more significant compared to the result of the entire sample. The result seems to be relatively robust for the individual years.

Table 4. BHAR MSCI Europe Pharmaceuticals index and t-statistics for individual years.

BHAR	*N*	*Average-BHAR*	*Standard deviation*	*t-Value*	*P-Value*	*Rejected*
2014	13	0.3015	1.4487	0.7503	0.4675	*Not Rejected*
2013	13	0.0494	1.0495	0.1699	0.8679	*Not Rejected*
2012	7	0.0189	1.0414	0.0479	0.9633	*Not Rejected*
2011	10	0.5630	1.2936	1.3763	0.2019	*Not Rejected*
2010	18	-0.1469	0.6636	-0.9389	0.3609	*Not Rejected*

***, ** and * indicates statistical significance at 1%, 5% and 10% levels respectively

Table 5. BHAR control firms and t-statistics for individual years.

BHAR	*N*	*Average-BHAR*	*Standard deviation*	*t-Value*	*P-Value*	*Rejected*
2014	13	0.0009	1.2324	0.0026	0.9979	*Not Rejected*
2013	13	-0.0787	1.0380	-0.2731	0.7893	*Not Rejected*
2012	7	0.2042	1.2073	0.4143	0.6957	*Not Rejected*
2011	10	0.8597	1.8277	1.4873	0.1422	*Not Rejected*
2010	18	-0.1297	0.5760	-0.9554	0.3527	*Not Rejected*

***, ** and * indicates statistical significance at 1%, 5% and 10% levels respectively

Overall, the return in long-term event study seems to be higher than the significantly negative abnormal return found in the previous research, but it is hard to draw a general conclusion whether M&As are beneficial to the shareholders based on the result in this thesis. One can also note that the performance isn't robust between the short- and long-term event study, this is congruous with the expectations based on the previous research. In summary, the abnormal return is higher than expected, based on previous research, in both the short- and long-term event study.

Fama (1970) argues that the market can be assumed to have a semi-strong market efficiency. This entails that the entire effect of the M&A will be directly incorporated in the stock price

such that no arbitrage profit can be made, thus it is enough to use a short-term event window. The short-term event window seems to be able to capture a large part of the effect of the event, even though the positive abnormal return seems to decline in the long-term study. It can be an indication of an initial overreaction from the market or it can be attributed to external noise in the long-term event window. It is important to notice that the short-term abnormal return is the expected effect based on the current information and that the abnormal return can change if new information is released. However, it is reasonable to assume that the abnormal return from the short-term event should, on average, persist in the long-term if the market is efficient i.e. no systematic anomalies (Fama, 1998). It is hence hard to draw the conclusion that the market is efficient based on the obtained result, which can explain the difference between the short- and long-term event study. The result can be affected by the specific sample and time period studied. The long-term event study should be used if the market is assumed to be inefficient as the effect then can be accounted for later in time. The long-term event seems to add information in our study, as the short- and long-term event do not provide aligned results.

There are many theories that try to explain the abnormal return by providing a theory that predicts the performance in a given direction. It is hard to separate the importance of every theory, especially if it is not measurable in an easy way, but the total effect can be seen in the obtained result. From the "Net Acquisition Value" (NAV) formula one can notice that a positive abnormal return requires significant synergies. It is therefore reasonable to assume that the M&As in our study release economies of scale and economies of scope. One main motive behind M&As is to replace expiring patents by getting access to innovative solutions which can generate growth i.e. get access to external R&D (International Trade Administration, 2016; McLeod, 2016). Danzon, Epstein, and Nicholson (2004) argue that M&As can be seen as a response to an inability to utilizing expected excess capacity and the M&As are thereby an indication of distress. Nonetheless, the result indicates a positive abnormal return even though the abnormal return was insignificant in the long run, which is in line with Danzon, Epstein, and Nicholson (2004) result. Economies of scale can be released as M&As result in that excess capacity gets utilized which implies that the cost per unit goes down. Economies of scope can be released as the company gets access to "innovative products" which often can be produced by using existing know-how in the company.

Another common reason for a positive abnormal return can be attributed to the learning hypothesis as the firm is assumed to create better systems, structures, processes, culture and internal politics (Hitt, Harrison & Ireland, 2001). Aktas, Bodt, and Roll (2010) argue that previous research indicates acquirers' CARs decline from deal to deal but they found on the contrary evidence for the learning hypothesis. In this thesis, the acquirers seem to have learned enough from previous M&As to be able to create positive abnormal returns and it is probably uncontroversial to assume that the acquirers' learning contributes positively to the performance. The big pharmaceutical companies perform noticeably better compared to what to expect based on the previous research. M&As are conducted relatively often by the big pharma companies, which was confirmed as there were quite many overlapping long-term event windows. It is both plausible to assume that serial acquirers get better at analysing potential target firms and that repeated significantly negative abnormal returns would be unacceptable to the shareholders. Conversely, M&As seem to continually take place in the economy despite many indications of value destruction.

The market timing hypothesis claims that looking at the short-term abnormal return may not be enough to evaluate the performance. Even a negative abnormal return, perceived value destruction, can be compatible with a positive long-term effect. The idea is that the overvalued stock price can be used to acquire less overvalued hard assets. They showed that successful bidders outperform the unsuccessful in the long run (Savor and Lu, 2009). This doesn't seem to be the case in our study, as there is a positive short-term abnormal return and as the long-term abnormal return is lower. The decision makers may have a problem to time the M&As if other underlying factors are more important in the decision making, such as unutilized excess capacity. The systematically higher short-term abnormal can also be obtained if the company is able to market the M&A in a good way and if the media cover the event in a positive way. This is only possible if the market is inefficient or if the market has a problem with undisclosed information.

There are some theories that affect the result in a negative direction which the synergies must compensate for. Berkovitch and Narayanan (1993) tried to separate the effect from synergies, agency problems, and hubris. They also found the strongest evidence for synergies but they discovered problems with conflicting agency interests and hubris, in that order. One common explanation of value destruction is the agency problem of Jensen's free cash flow, in which the manager uses free cash flow to invest in value-destructive investments for self-serving

reasons (Jensen, 1986). It is nonetheless important to have cash available to positive net present value investments as a cash payment signals that the acquirer perceives the target as undervalued and hence often generates a positive market reaction (Yook, 2003). The conclusion one can draw from the result of this thesis is that it is beneficial to do M&As, at least not value destroying, but it may have been even more profitable if one would have been able to alleviate the agency problem even more by increasing the dividend or the loans. The disadvantage is that the companies need money to conduct the positive net present value investments, as mentioned. A cash payment is congruent with a positive short-term abnormal return which was received in this thesis.

Another common explanation for a negative abnormal return is the winner's curse, in which the acquirer overestimates the value of target firm due to lack of information. This occurs when the winning bid premium exceeds the market's estimation of the takeover gains (Varaiya, 1988). The pharmaceutical M&As in this thesis doesn't, on average, seem to be subject to the winner's curse as the M&As generate a positive abnormal return in both the short- and long-term event study. Thereby, the acquirers generally seem to be able to make an accurate valuation. Barney (1988) argues that if the bidders end up with the same valuation of the target company then the market will be perfectly competitive and any abnormal return can't be expected. The acquirer can only experience an abnormal return if their valuation of the target firm exceeds the competitive bidders as this gives the opportunity to buy the company at a discount. This theory seems to be applicable to this thesis as the acquirer is experiencing a positive abnormal return. The difference in valuation of the target firm may be related to the specific company's ability to generate synergies i.e. even if the companies end up with the same estimation of the fundamental value of the target firm, they can get different valuations of a combined firm. But the acquirer got to be careful as a higher valuation can also be an indication of a more severe winner's curse.

Manne (1965) argues that the underlying reason for conducting M&As can be interpreted from the market reaction, in other words, the market reaction is a way to distinguish what the valuation of the target company is based on. A positive reaction for both the acquirer and target is an indication that the M&A is motivated by synergies, if the M&A is to a high extent motivated by just taking control, the acquirer's stock price reaction should be negative as the control premium is significant in most cases (Manne, 1965). The M&As in this thesis should thereby be motivated by synergies. Even though it is still possible to assume that the M&As

are primarily motivated by the expansion of the own firm, as the acquirer's decision makers probably prefer to combine the control with increased synergies. This is at least the conclusion that should be drawn based on the negative performance in the previous research.

The result differs from what Hassan et al (2007) found in their earlier study concerning the economic performance of M&As in the pharmaceutical industry. While Hassan et al (2007) found negative abnormal returns and discussed if it is reasonable for pharmaceutical companies to continue merging, the result in this research implies that companies can benefit from M&As both in short- and long-term. There are two differences which can explain the different results: the data sets that the studies were using and methods that the two studies were applying. The positive abnormal returns found in this research is in line with the previous studies performed in European markets which are usually explained by differences in corporate cultures compared to companies in the U.S. Also, the sample size and time period when the two studies were carried out can make the result different between the studies. Another fact is that Hassan et al (2007) applied CTAR method to calculate abnormal returns when in this research BHAR was used. Like earlier discussed the results between two models can vary and make this research comparable both of the methods could be applied. In addition, Hassan et al (2007) calculate abnormal returns separately for mergers and acquisitions which is not done in this research. If the allocation between the two different event characteristics would have been implemented in this research, results between the events could have been compared and conclusions about the nature of the event could have been drawn.

6. Conclusion

A positive abnormal return is obtained in both the short- and long-term event study. The positive abnormal return is significant at a 1% level in the short-term event study whereas the positive abnormal return in long-term event study with a 3-years event window is insignificant, independent if the MSCI Europe Pharmaceuticals index or the control firm benchmark was used. In the short-term event study, the abnormal return is stable independent of the applied event window whereas the abnormal return becomes insignificantly negative if the event window is shorter in long-term event study. The performance of M&As in the top median is worse independent of the time perspective and the applied benchmark. The significance of the abnormal returns systematically decreased in both the short- and long-term event study for the individual years, if compared to the result of the entire sample of M&As. It was only in 2011 in the long-term event study, for both benchmarks, that the abnormal returns were much higher and more significant.

The systematic decrease of the positive abnormal return from the short-term event study to the long-term event study can indicate that the market has a problem to correctly evaluate the value of the M&As. One underlying explanation of this anomaly may be an inefficient market i.e. a market that is not able to interpret and incorporate all available information. The difference can also be attributed to the specific event period and the selected sample, or to a misspecified model.

The positive abnormal return may occur, for instance, due to economy of scale, economy of scope, the learning hypothesis, market power and other industry-specific advantages, like the importance of incorporating external R&D. The abnormal return may have been even higher if the acquirers were able to alleviate agency problems, the winner's curse, the hubris hypothesis and be better at correctly valuing the target firm. The result is contrary to most of the previous research made on M&As, which may be partly attributed to industry-specific conditions. The majority of the previous research has found a negative abnormal return for acquirers, even though the short-term abnormal return outside the U.S. has been slightly positive.

The result indicates that the big pharmaceutical companies in Europe should continue to undertake M&As as it seems to contribute significantly to the value creation in the short-term and insignificantly in the long-term with a 3-years event window. The shareholders shouldn't be concerned over value destruction, which has been more prevalent in the previous research, based on the result in this thesis. The M&As can probably be even more profitable by increasing the understanding of how to evaluate potential target firms. To increase the abnormal return, it is still important for the stakeholders and board to hold the manager accountable in order to avoid that wrong underlying reasons are governing the decision making, for example, self-serving motives and hubris.

It is of course not possible to draw a general conclusion for the entire pharmaceutical industry based on one this thesis. It would therefore be interesting to find out how the short- and long-term event study perform in the pharmaceutical industry if the time period and sample of companies were changed. Such robustness tests would enable more reliable conclusions. The performance of the event study method can also be compared to other methods, for instance the calendar time approach. If it turns out that M&As have positive abnormal returns most of the times, unlike previous research, it would be interesting to go more in-depth on the industry-specific conditions and identify what the acquirers may do differently compared to acquirers in other industries. It would also be interesting to see if the difference in reaction between short- and long-term event study remains the same. Future research can also use other benchmarks in the long-term event study, for example, Fama-French three-factor model or Carhart four-factor model.

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Capital IQ [Data Collected between 15-20 April 2018]

Appendix A

Table 6. Criteria applied in the Selection of M&As.

Criterion applied in the Selection of M&As	
Acquisition of majority stake	**Cash merger**
Stock merger	**Cross border**
Earnout payments	**Corporate Divestiture**
Tender offer	**Family succession**
Minority shareholder increasing ownership stake	**Shareholder increasing ownership stake**
Minority shareholder purchasing remaining shares	**Pharmaceutical industry.**
European Acquirer	**Minimum deal size equal to one million**

Table 7. Description of M&A transactions used in short-term event-study.

Year	Number of Deals	Total Transaction Value (In Millions of Euros)	Average Transaction Value (In Millions of Euros)
2014	34	140 402	6 528
2013	29	24 287	837
2012	33	7 621	303
2011	24	5 680	236
2010	33	47 651	1 443
Total	153	225 643	1 474

Table 8. Description of M&A transactions used in long-term event-study.

Year	Number of Deals	Total Transaction Value (In Millions of Euros)	Average Transaction Value (In Millions of Euros)
2014	15	14 563	970
2013	13	2 151	165
2012	8	2 472	309
2011	10	1 006	100
2010	18	10 080	560
Total	64	30 274	473

Table 9. CAAR and t-statistics for an event window of –1, +1 and –3, +3.

CAR	CAAR	*Standard deviation*	*t-Value*	*P-Value*	*Rejected*
-3, +3	0.0196	0.0760	3.2031	0.0016	*Rejected*
-1,+1	0.0151	0.0521	3.6036	0.0004	*Rejected*

***, ** and * indicates statistical significance at 1%, 5% and 10% levels respectively

Table 10. BHAR and t-statistics for an event window of 1 year and 2 years.

BHAR	Average BHAR	*Standard deviation*	*t-Value*	*P-Value*	*Rejected*
1 years Pharma Index	-0.0701	0.3702	-1.4798	0.1441	*Not Rejected*
2 years Pharma Index	-0.0189	0.6646	-0.2230	0.8242	*Not Rejected*
1 years Control Firms	-0.0613	0.3723	-1.2754	0.2071	*Not Rejected*
2 years Control Firms	-0.0194	0.7086	-0.2120	0.8327	*Not Rejected*

***, ** and * indicates statistical significance at 1%, 5% and 10% levels respectively

Appendix B

Table 11. The result of the the market model.

Market Model	Average Alpha	Average Beta	Standard Error	R-Square
Short-term Pharma Index	0.00023	0.58080	0.01882	0.17063
Long-term Pharma index	0.00052	0.56007	0.02046	0.13893
Long-term Control firm	0.00090	0.10068	0.02122	0.01920

Firms used in short-term event study

ALLERGAN
ALLIANCE PHARMA
ALMIRALL
GRINDEKS
ASTRAZENECA
AVADEL PHARMS.
BAYER AKTGSF.EACH
BTG
COSMO PHARMACEUTICALS
DECHRA PHARMACEUTICALS
DR.REDDY'S LABS
ENDO INTERNATIONAL
ENDO INTL.
FAGRON
FOREST LABS.
FRESENIUS
GILEAD SCIENCES
GLAXOSMITHKLINE
HIKMA PHARMACEUTICALS
HORIZON PHARMA
IPSEN
JAZZ PHARMS
PHARMSTANDARD GDR IND
LABORATORIO REIG JOFRE
LBOS.FARMACEUTICOS ROVI

MEDA 'A'
MERCK
MOBERG PHARMA
NEWRON PHARMACEUTICALS
NOVARTIS
NOVO NORDISK 'B'
OMEGA PHARMA
OPUS GLOBAL
PERRIGO
PHARMSTANDARD GDR IND
RECORDATI INDUA.CHIMICA
RICHTER GEDEON
ROCHE HOLDING PAR
SANOCHEMIA PHARMAZEUTIKA
SANOFI
SHIRE
SINCLAIR PHARMA
SOPHARMA
STADA ARZNEIMITTEL
TAKEDA PHARM.
VECTURA GROUP
WEIFA
VETOQUINOL
VIRBAC
ZOGENIX

Firms used in long-term event study

ALK-ABELLO
ALLERGAN
ALLIANCE PHARMA
ALMIRALL
AS GRINDEKS
ASTRA ZENECA
AVADEL PHARMACEUTICALS
BAYER AKTIENGESELLSCHAFT
BTG
COSMO PHARMACEUTICALS
DECHRA PHARMACEUTICALS
DR. REDDY'S LABORATORIES
ENDO INTERNATIONAL
FAGRON GROUP
FOREST LABORATORIES
FRESENIUS KABI
GILEAD SCIENCES
GLAXO-SMITH-KLINE

H. LUNDBECK
HIKMA PHARMACEUTICALS
HORIZON PHARMA
IPSEN
JAZZ PHARMACEUTICALS
JOINT STOCK COMPANY PHARMSTANDARD
LABORATORIE REIG JOFRE,
LABORATORIOS DIAFRAM
MEDA AB
MERCK
NEWRON PHARMACEUTICALS
NOVARTIS
NOVO NORDISK
OPUS GLOBAL
PERRIGO
RECORDATI
RICHTER GEDEON
ROCHE HOLDING
SANOCHEMIA PHARMAZEUTIKA
SANOFI
SHIRE PHARMACEUTICAL
SINCLAIR PHARMA
STADA ARZNEIMITTEL AKTIENGESELLSCHAFT
TAKEDA PHARMACEUTICALS
VECTURA GROUP
WEIFA
VETOQUINOL
VIRBAC