

**ERASMUS UNIVERSITY ROTTERDAM**  
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**BSc Economics & Business Economics**

## **Bachelor Thesis**

### **Mergers and Acquisitions in the US Energy Industry**

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## **Abstract**

This thesis investigated the abnormal returns around the announcement day of a merger or an acquisition for firms active in the US Energy Industry in the time period of 1995 to 2017. With the use of the adjusted market model positive cumulative abnormal returns were found for the targets and the combined firms, and negative abnormal returns were found for acquirers in a 3 day time period. A positive effect was found on the abnormal returns when the target and acquirer were operating in the same industry. No supportive evidence was found that small or big firms and cash or a different payment method had any influence on the abnormal return.

**Keywords:** Mergers and Acquisitions, Event Study, Cumulative Abnormal Returns, Energy Industry

## Table of Contents

Abstract.....	2
1. Introduction .....	4
1.1 Preface .....	4
1.2 Main findings .....	5
1.3 Relevance .....	5
1.4 Structure .....	5
2. Literature Review .....	6
2.1 Mergers and Acquisitions theories .....	6
2.2 Empirical results mergers and acquisitions .....	8
2.3 Determinants of abnormal returns.....	9
2.4 M&As in the Energy and Power Industry.....	11
2.5 Supporting Research Questions.....	12
3. Data and Methods .....	14
3.1: Event Study .....	14
3.2: Regression analysis .....	16
3.2.1 Determinants .....	16
3.2.2 Application of the regression.....	18
3.3 Data.....	19
4. Results.....	21
4.1 Results of the event study .....	21
4.2 Correlation Matrices .....	23
4.3 Regression Analysis.....	23
4.4 Robustness checks .....	24
4.5 Testing the hypotheses.....	26
5. Conclusion.....	27
Bibliography .....	29
Appendix .....	31

# 1. Introduction

## 1.1 Preface

One of the most important decisions made by managers that have a large impact on the firm are Mergers and Acquisitions (M&A) (Hackbarth & Morellec, 2008). Despite being excessively researched, there is a lot of research that can be done concerning this matter. In 2018 there were over 1800 mergers and acquisitions in the United States of America alone. In the first half of 2018, a total of over \$2.5 trillion of value in mergers over the whole world (Grocer, 2018). Dodd & Ruback (1977) found that target firms on both successful and unsuccessful mergers earned a large significant abnormal return on the announcement day of 20,58% and 18,96%, respectively. Acquirer firms where the merger went through also experienced a positive, abnormal return of 2,83%, but which is quite smaller in comparison to the target firms. There was no abnormal return for acquirers after which the merger turned out not to be fulfilled.

The biggest macro sector in terms of deal value was the Energy and Power sector with \$388.67 billion. One of the biggest deals of 2018 was located in the United States of America. Marathon Petroleum Group acquired Andeavor Corporate's shares for an outstanding \$23 billion equity value and \$35.6 billion enterprise value (Benny, 2018). Combined, the company announced to create an annual \$1 billion synergy effect within three years. Marathon's shares went down with 8% and target Andeavor Corporate's stock prices went up with 13% on the announcement day.

There is a lot happening with the stock prices of both acquiring and targeted firms in times of a merger or acquisition announcement. This thesis will research the effects of this event on the stock prices. Not only how large this effect is, but also what causes this effect. The main research question is:

***To what extent do abnormal returns for both target and acquiring firms exist around the announcement day of a merger or acquisition in the United States Energy Industry?***

## **1.2 Main findings**

This research investigated the abnormal returns of stocks of bidding and target firms around the announcement of a merger of acquisition. The cumulative abnormal returns found for the targets are 16,49% and for the acquirers -3,66%. The combined firms gained a 1,62% return when adjusted to size. When both firms were operating in the same macro-industry, 5,4% positive returns are obtained for the combined firms. There is no effect found for the payment method or the size of the firm.

## **1.3 Relevance**

High abnormal returns in the event of a merger and acquisition announcement day cause investors to react differently to the stock market than usual. Most timeframes in which these abnormal returns exist, are for a few days and investors therefore have to react careful and fast to obtain any gain or do not lose too much. With this research the purpose is to gain a better insight in when these abnormal returns exist, to what extent and which factors have an impact on the abnormal returns. In special, this research concerns about the Energy and Power industry which is one of the biggest industries since the industrial revolution and will continue to be a large sector on the globe.

## **1.4 Structure**

The remaining paper will be structured as follows. First there will be a literature review of existing literature concerning this matter in chapter two, the main findings in these papers will be mentioned and some concepts will be shortly explained. Also the hypotheses will be given to help answer the main research question. In chapter three the methods used to investigate the research questions will be described and the data used will be discussed. In chapter four the results will be given and interpreted. At last, a conclusion will be drawn in chapter five.

## 2. Literature Review

Firms have several reasons to acquire other firms, it can be to increase the value for existing shareholders. It can cause economies of scale, synergy advantages or a better position compared to the competition. On the other hand, managers can have different goals than shareholders. This can cause the stock prices to fall as a reaction to an unwanted merger or acquisition. The following chapter will first discuss theories on Mergers and Acquisitions (M&A's), followed by empirical results and what can be the cause of these abnormal returns, thereafter Mergers and Acquisitions in the Energy Market will be discussed. At last, the hypotheses will be given to help answer the main research question.

### 2.1 Mergers and Acquisitions theories

When a firm agrees to combine with another firm, it is called a merger. When a proportion of outstanding shares of a target firm are bought with specified terms on a specified date, it is called a tender offer (Halpern, 1983). In this thesis there will be no distinction between a merger or an acquisition.

The stock prices of the acquiring firm will rise when the expected net present value (NPV) of the acquisition is positive. For target firms the stock prices will ascent if the difference between the value offered and the value of the stocks under pre-acquisition circumstances is positive. Halpern (1983) also gave two classes of acquisition theories to explain why a firm decides to take over, non-value maximizing behavior and value maximizing behavior. Non-value maximizing acquisitions have no economic value to be gained and often are the cause of value destruction. With value maximization acquisitions the takeovers are treated as any other investment project, where the benefits should exceed, or be at least the same as, the costs.

#### **Value maximizing acquisitions**

When two firms become one in the form in a merger or an acquisition, the production grows if both the firms are operating in the same product group. The M&A creates a larger market of a bigger company with a bigger scale. This can reduce the producing costs per product through economies of scale (Coyle, 2000). This creates value for the firm and thus for the stockholders, but this only holds if both the companies are closely related to each other and are easily

integrated after the takeover. In fact, these economies of scale are called cost synergies. Cost synergies also occur when certain tasks can be done by one part of the firm. For example, one management board, one marketing team and one sales team, which will reduce employee costs. Also, especially in the Energy sector, there is a lot to gain in vertical integration. The company can extract an intermediary by buying a company which is upstream or downstream from the acquiring firm. Upstream companies can be discovery, extractors and researchers. Also feasibility studies, rental of machines and the extraction of chemicals are also included as upstream parties. Downstream firms now come into play. For instance, they refine crude oil in products which can be sold to the consumer. Downstream parties are refineries, logistic companies, petrochemical plants and retailers. If one firm in the production process is taken over, the profit margins of that company will reduce or even disappear which benefits the acquiring firm. All these cost reductions can be classified as cost synergies.

Besides cost synergies also revenue synergies exist. The target company can have patents which now the newly formed firm can get a hold on to improve the product of the bidder. Also the expansion to new regions or even countries can contribute to a higher demand causing higher revenues and a larger brand awareness. Through diversification of products, more different products can be bought by the same retailer. Diversification also reduces risks of external factors by hedging. For instance, an oil company benefits with higher oil prices, where a petrochemical company has a disadvantage when the oil prices rise. If both companies merge, the external factor of unexpected oil price changes is (partly) hedged and thus reduces risk (Smith, 2008).

When two firms combine, they become eligible for certain tax advantages. They can get higher loans at banks, because of the decreased probability for default. The interest payed for these loans can be deducted from the profits. With lower profits, the tax payments also go down. Also the loss of one company can be deducted from the profits of the other company, this way less corporate tax has to be transmitted.

## **Non-value maximizing acquisitions**

Besides financial incentives to take over another company, also managerial incentives exist. The motives of managers is not always in the line of interest of the shareholders and this can be the cause of value destruction. Managers are seduced to fulfill their own, short-term interests where shareholders have a more long-term vision. This conflict of interests is often called the agent-principal problem (Jensen, 1986). Where the shareholders are the principals and the managers the agent. This problem can be reduced by monitoring the agents, but that is costly to execute and most of the time the monitoring is incomplete. Shareholders benefit when their wealth increases. Managers can be power-seeking and want to maximize the resources under their control, even when it is not in the interest of the company. Roll (1986) explains this with the hubris hypothesis, which states that managers are overconfident and arrogant. The bidders over value the target firms and are convinced they can create value with the takeover. Morck, Shleifer and Vishny (1990) can reason why bust-up takeovers are often over paid. The firm is sold in pieces to the highest bidder. In pieces the firm is valued higher than it would be if sold as an unity. Jensen (1986) investigated the free cash flow theory that states when decision makers have a lot cash to spare, will increase the chance of poor investment decisions and, consequently, value destruction.

## **2.2 Empirical results mergers and acquisitions**

A lot of evidence is found about abnormal returns around the announcement of a takeover, the next part will elaborate the most important findings.

A lot of different effects on announcements have investigated. The short term performance or the long term performance. Also the post-acquisition period have been researched. In this paper the focus is on the event window which is from ten days from and after the announcement date of the merger or acquisition. The focus of the following papers will also be around the announcement day.

Jensen and Ruback (1983) have thoroughly investigated many studies concerning corporate control and their effects on mergers and acquisitions. They found that target firm stock holders gain on corporate takeovers and acquiring firm stock holders' return is equal to zero. But this



was not caused by the increase of market power. Other studies also found positive abnormal returns for target firms and zero or slightly negative abnormal returns for acquiring firms. Jarrel & Poulsen (1989) could give two explanations. First, not all effects on wealth could be found back in the stock prices at the time of the announcement because of the relative small proportion of the bid value to the acquiring firm value. Also, because of the competition on the target firm by other, potential acquirers, the price of the bid rises. This favors the target's stock prices. Bruner (2002) summarized many studies and came to the same conclusion that target firms stockholders are gaining sizable positive returns at times of the announcement, where bidder returns are mostly zero. Nevertheless, when acquirer and target stock returns were combined, an adjusted positive return was obtained. Martynova and Renneboog (2011) did even find positive abnormal returns for acquiring firms. Concluding from these papers, almost all papers agree that target firm's stock will be significantly positive different from zero around the date of the announcement of a merger or acquisition. But there is still a lot of debate going on about abnormal returns for the bidders.

### **2.3 Determinants of abnormal returns**

To answer the research question, we want to know where these abnormal returns come from. With so called determinants we want to calculate the explanatory value of certain factors which may influence the abnormal returns around the announcement day. This section will elaborate the determinants used in this research, and earlier, empirical findings in the literature.

Earlier we already discussed cost and revenue synergies that occur when two firms merge. The expected gains from this merger can be directly be processed in the price, if the Efficient Market Hypothesis (EMH) holds. However, this is often not the case, because of information asymmetry, the gains that are expected will not be directly incorporated in the price. But still, it is not strange to expect a rise in abnormal returns when the two companies are from the same industry sector. Earlier Eckbo (1983) investigated merging firms in the same industry and compared these with non-related mergers. The abnormal returns for acquired firms in the same industry were larger comparing to cross-industry mergers.

Payment method is also found to be a deciding factor in explaining observed abnormal returns. Huang and Walkling (1987) found that cash offers have significantly higher returns in stock prices than stock offers. This is partly caused by the form of acquisition, because tender offers are often financed in cash where mergers are often financed in stock. But even after controlling for this, Huang and Walkling (1987) found higher returns for cash payments. The reason can be that shareholders demand higher value to compensate for the income tax that they have to pay. The question that is still unanswered is why the bidders want to pay this difference. Cash, rather than stock, has a more favorable announcement effect for bidders is also in line with the pecking order theory of Myers & Majluf (1984). This theory states that firms prefer internal financing first, than external financing and issuing equity is the least preferable. However, Chang (1998) found positive abnormal returns for acquiring firms when the target firms is privately held and the consideration was stock. Nonetheless, this was not the case when the payment was in cash. This may be explained by the reduced information asymmetry due increased monitoring by the shareholders. Since this research only covers publicly traded firms, the expectation is a positive effect on acquirer abnormal returns when payed in cash.

A third important factor in explaining abnormal returns seems to be the relative firm size of both the acquirer and the target. Moeller, Schlingemann & Stulz (2004) found that small bidding firms have better abnormal returns when the merger is announced in comparison to larger acquirers. Where the small bidders gained a positive return on stocks returns, the larger firms experienced wealth loss for their shareholders, irrespective of payment method. Also the size of the target can play a role (or not). Jarrel & Poulsen (1989) concluded in their paper that the relative small size of the target in comparison to the acquirer's full wealth, can delude the observed effect of the merger.

Not only these determinants, but also others can play a role in explaining abnormal returns at the announcement of a merger or acquisition. The determinants discussed above are the ones with the most concrete results, but in this research we will also look at other explanatories which will be briefly explained in the Data & Methods section.

## 2.4 M&As in the Energy and Power Industry

This part will evaluate earlier literature on energy and power, and especially mergers and acquisitions in the energy sector. The Energy and Power sector consists of smaller mid-industries. The two largest mid-industries are Power (or electric utilities) and Oil & Gas, and the smaller are Petrochemicals, Pipelines, Water and Other Energy & Power.

Crude oil is the most important and most influential commodity of the past decades. It is used in many products such as fuel, plastics and Sulphur. Fluctuation in oil prices does not only affect the Energy sector but other sectors as well. The oil and gas market accounts for over 10% of all the trade in commodities. With companies like Sinopec, Royal Dutch Shell and Exxon Mobile, which have revenues as big as small countries, the oil and gas market is gigantic. This market diversifies itself from other markets in several ways. With the Organization of Oil Exporting Countries (OPEC), which has a significant influence on the oil market, often politics come in to play in pricing the oil. Also environmental legislations which are very costly, separates this industry from other industries.

Mergers and acquisitions in the Energy sector are motivated by governments which want to stay a big player as a country in big industries like energy. This is done by blocking foreign players entering the national markets and the backing the formation of bigger, native firms (Verde, 2008). Also the vertical reintegration of energy firms place a role after the earlier vertical separation. As told earlier, it reduces cost to remove intermediaries out of the production process and thus creates value. Verde (2008) also gives synergy effects and better quality for consumers at a retail level as a reason for the mergers. Especially for companies in the Oil & Gas mid-industry, vertical integration is a big driver because of the long production process. For instance, oil refining has low margins on revenues and has to continuously obtain crude oil to continue the refinery processes. A brief shortage of materials to process can be very costly and this is countered by a fully vertical integrated company in the oil business. Also the risks of oil price volatilities can be an incentive of vertical mergers. Likewise, technological improvement, deregulation and globalization has led to an increase in Mergers and Acquisitions in the Petroleum industry (Weston, Johnson, & Siu, 1999).

Fraquelli, Piacenza & Vannozi (2005) investigated electricity sector mergers in Italy and found cost reduction in vertical integration and increase of economies of scale. However, they note that competition is also reduced with less players in the market, which reduces the necessity for efficiency. They also state that their findings are not globally applicable. Kwoka and Pollit (2010) researched M&As in the US electricity sector and found that often underperforming acquirers acquired over performing targets which caused efficiency loss for the targets, which is not or only compensated a little in the efficiency gains for the acquiring firm. These mergers are driven by non-value maximizing motives rather than value-maximizing, which is consistent with the hubris hypothesis from Roll (1986).

## 2.5 Supporting Research Questions

The main research question for this thesis is:

***To what extent do abnormal returns for both target and acquiring firms exist around the announcement day of a merger or acquisition in the United States Energy Industry?***

This thesis will try to answer this question with three hypothesis, which will both help to answer the research question, do abnormal returns at the announcement of a M&A exist, and what factors can explain these abnormal returns.

*H1: M&A's in the same industry will experience higher abnormal returns than unrelated M&A's.*

As seen in earlier studies, both horizontal and vertical mergers in the Energy industry lead to value creation, through scales of economies, cost synergies and revenue synergies. If this is the case, we can also expect a rise in abnormal returns at times of the announcement of a M&A.

*H2: Cash as payment for a M&A has a positive effect on abnormal returns.*

Further, several studies have proofed that the consideration offered is an important factor in explaining the abnormal returns. Often enough did cash lead to a positive effect on the abnormal returns, we can expect that this is also applicable in the US Energy Industry.

*H3: Relative size of the acquiring firm has a negative effect on the abnormal returns of a M&A.*

At last, research has found that acquiring firm size influences the abnormal returns at times of the announcement of a M&A. Large acquirers seem to have lower returns than smaller acquirers, therefore we expect this to also be found in the US Energy market.

### 3. Data and Methods

This section will cover the data and methods used to investigate the research questions. To answer the main research question an event study will be done to look for abnormal returns around an announcement day of a merger or acquisition. For the supporting research questions, regression analysis will be applied. Furthermore, the relevant determinants will be explained briefly.

#### 3.1: Event Study

To investigate the effect of Mergers and Acquisitions on stock prices around the announcement day, this research will use an Event Study. To use an Event Study, first the event- and estimation window are determined. The stock prices for both the target and the acquirer are retrieved and then adjusted to the market index, which in this case will be the Standard and Poor's 500 (S&P500). The expected and realized returns are then tested for significance to calculate a final event window (CAR) where abnormal returns are significant.

The goal is to analyze the M&A announcement effect on stock prices. On the time scale, the given day for the announcement of the merger or acquisition is  $t=0$ . The stock returns are calculated with a buy-and-hold strategy with stock prices which are adjusted to any inflation or other external effects. The period of which the prices are used is -170 to +10. The estimation window is 170 days to 71 days before the merger or acquisition announcement. The gap is 70 days before to 11 days before the announcement and the event window is 20 days around the announcement [-10, 10]. A gap is used to account for any potential run-up prices in the period before the announcement (Schwert, 1996). This is possibly caused by insider information of the traders who already have the knowledge of this merger. This can lead to an information bias and could possibly cause unwanted changes in the stock prices. All firms are located in the United States of America and therefore will the Standard and Poor's 500 function as the benchmark where the prices will be compared with. The model used to calculate the expected returns will be the market model. The market model can account for some of the variances in the market which have little to do with the announcement of the merger or acquisition (Mackinlay, 1997). Thereby, the abnormal returns can be calculated more accurately. The market model (1) is formulated below.

$$R_{it} = \alpha_i + b_i * R_{Mit} + \varepsilon_{it} \quad (1)$$

$$(\varepsilon_{it} = 0)$$

Where  $R_{it}$  and  $R_{mt}$  are the returns on the firm  $i$  and the market index S&P 500, respectively, in estimation window  $t$  [-170, -70].  $u_{it}$  is the mean disturbance term. With the data, the alpha ( $\hat{\alpha}$ ) and beta ( $\hat{b}$ ) can be estimated for every target firm stock. Where the alpha is the constant term and the beta is the slope. A beta of one means that the returns are completely correlated with the market. With the market model calculated, abnormal returns can be calculated for the event window in formula 2:

$$AR_{it} = R_{it}^* - (\alpha_i + b_i * R_{Mit}) \quad (2)$$

Where  $AR_{it}$  is the abnormal return for day  $t$  for firm  $i$  in event window [-10,10] and  $R_{it}^*$  is the realized return on day  $t$  for firm  $i$ .

When established the abnormal returns, the cumulative abnormal return (CAR) can be estimated for days in the event window. Which is given in the following formula (3):

$$CAR_{[K,L]} = AR_{iK} + \dots + AR_{iL} \quad (3)$$

The CAR consists of the sum of the abnormal returns of the consecutive days [K, L] in the event window which are statistically significant different from zero. To test for significance a t-test is used.

$$T - test = \frac{\bar{X}_t - \mu}{\sigma / \sqrt{n}} \quad (4)$$

Where  $\bar{X}_t$  stands for the average abnormal returns (AAR) for day  $t$  and  $\mu$  stands for the expected average returns, which is equal to zero.  $\sigma$  is the standard deviation of the abnormal returns that particular day and  $n$  is the sample size, which is 240. The T-value retrieved can be compared with the critical value is  $t = (-) 1.960$  with a confidence level of 95%.

With the CAR calculated, the main research question can be answered. To answer the remaining research questions, the explanatory values of several factors that may affect the CAR need to be calculated. Using the CAR as dependent variable.

## 3.2: Regression analysis

To answer the supporting research questions, the explanatory value of the determinants for the CAR have to be calculated. This will be done by regression analysis. First, the determinants will be briefly discussed. After that, the method of performing the analysis is discussed.

### 3.2.1 Determinants

If we obtain significant results in obtaining the cumulative abnormal returns, it is interesting where these abnormal returns come from. In order to answer the three hypotheses, the CAR will be the dependent variable, which can possibly be answered with the following determinants which will be the independent variables in the regressions.

#### **Method of payment dummy**

As mentioned in the literature section, the financing method of the merger or acquisition is often an important and influential variable in explaining the abnormal returns. Travlos (1987) found for instance that cash as payment does have a positive effect on the abnormal returns and stock has a negative effect. However, Chang (1998) found the opposite when investigating privately held target firms. Stock in exchange for the firm seemed to have a more positive effect on the abnormal returns. To investigate this effect in the Energy and Power sector, three different forms of payment are distinguished, Cash, Stock and Mixed payment. Where Mixed is when it is financed with both cash and stock or an alternative payment method. The dummies used are the cash- and stock dummy and mixed payments will be the constant term.

#### **Macro- and Mid-Industry dummy**

Besides payment method, the 'relatedness' of the merger can also play a part in explaining the abnormal returns. In past research, synergy effects have been seen to influence the announcement effects. Dutordoir (2014) found 5% higher bidder returns for firms operating in the same industry. All acquiring firms are operating in the Energy and Power industry. However, target firms can be from any industry. The synergy effects will be investigated on two levels, macro- and mid-industry. A dummy will be used to test this effect. At both levels, there will be only a distinction between related and non-related where related is the dummy variable and non-related is the constant term.



## **Size**

To investigate the last hypothesis, the variable size will be used. Size also seems to play an important role in explaining abnormal returns. Moeller, Schlingemann & Stulz (2004) found that small firms have higher returns when entering in to a merger or acquisition in comparison to larger firms. Also the size of the target firm can play a role. Jarrel & Poulsen (1989) explain this, because the acquiring firm can be a lot larger in comparison to the target and this can delude the effect on abnormal returns. The determinant used will be the natural logarithm of the market value. The natural logarithm of a value reduces the power of outliers without undermining the relative size.

## **Market-to-book ratio**

A lot of research has been done on the difference between glamour stocks and value stocks in the stock market. Value stocks usually represent undervaluation of the stock and is expected to rise on the long term. But there is still enough research to be done for the difference between these two in the event of a merger or acquisition. The determinant that will be used to investigate this is the Book-to-market. Where a high book-to-market ratio usually represents a value firm and vice versa.

## **Price/Earnings ratio**

The price/earnings (P/E) ratio is an indicator for the over- or undervaluation of stocks compared to different companies. The higher the P/E, usually the higher overvaluation of the stock. The effect of this determinant will be regressed against the CAR to see if this has any effect on the abnormal returns.

## **Earnings per Share**

Besides the price/earnings ratio, earnings per share (EPS) also offers a view on how the company's profits are divided among the shareholders. The EPS is the net income divided by the common shares outstanding. A higher EPS usually represents a higher profitability.

### **Purpose of the M&A dummies**

When a merger or acquisition is announced, the firm releases the purpose of the event. This can be several reasons and most of the times more than one is given. The purposes used are retrieved from the Thomson One database and may give an insight on how firms 'sold' the merger or acquisition to their stockholders and to the rest of the world. The most common reason is to strengthen their operations, this is to compete better with competitors with a more efficient use of their assets. Realizing synergy effects is also a common motivator why firms decide to acquire, this can also support the first hypothesis. Furthermore, creating shareholder value, expanding the line of products and expansion to new markets are also given to be the purposes of the mergers or acquisitions. A dummy will be created for all these five purposes and will be tested for significance.

### **Fixed-Year Effects**

To account for the differences through the years in regulation, industry size and merger waves, the fixed year effects will be added to every regression to rule out any differences throughout the years and thus making the regression more correct.

### **3.2.2 Application of the regression**

The method that will be used to calculate the explanatory value of the determinants will be done through regression analysis. First all determinants will be regressed separately against the CAR, with the CAR as dependent variable and the determinants as independent variables. And against each other, to see if there is multicollinearity. Formula 5 gives the relationship that the CAR and the variables have

$$CAR_{i[K,L]} = \alpha + \beta_{i,X} X_i \quad (5)$$

Where  $\alpha$  is the constant term and  $\beta_1$  is the slope of the regression of the determinant calculated. All the terms will be checked for any linear relationship in the Pearson Matrix, the sign denotes a positive or negative relationship. The bigger the coefficient, the bigger the effect. All variables will then be put in a multivariate model to be checked if they have any

effect on the CAR. All variables will be tested for significance. The multivariate regression is formulated in formula 6:

$$CAR_{i[K,L]} = \alpha_i + \beta_{i,X}X_i + \dots + \beta_{i,\theta}\theta_i \quad (6)$$

Where  $\theta_i$  is the last, significant independent variable. The regression that remains is a model that can (partly) explain the cumulative abnormal returns, with the determinants given.

All the data will be checked for heteroscedasticity and will be corrected. There is no reason to check for stationarity or autocorrelation because the data is not in time series.

### 3.3 Data

The mergers and acquisitions of this research were found with the financial database Thomson One. The sample consists of 240 different events with the data for both the acquirer and the target. All deal values were 100 US dollar or higher and where between firms both located in the United States of America. The announcement day range is from 1995 until 2017. All acquirers are from the macro industry Energy and Power, provided by Thomson One. The targets are not necessarily from the Energy and Power sector. All M&A's were publicly available. After this the stock price data are retrieved from Datastream and are checked for missing information. Firms with missing data are removed from the dataset, both target and acquirer of the same event. The (financial) determinants are taken exactly 70 days [-70] before the announcement day, this due to possible interference caused by the event. In table 1 gives the descriptive statistics for the financial determinants.

Not surprisingly, the absolute market value of the acquirers is more than four times higher than the absolute market value of the targets. Given the standard deviations of the absolute market values in comparison to the mean, it can be concluded that it got a right-skewed distribution. It is thoughtful to take the natural logarithm to reduce the explanatory power of big firms and make it more evenly distributed. Furthermore, the P/E ratio is greater for acquirers than for targets, which indicates overvaluation of the acquirers stocks. This is consistent with earlier literature. Investors often have less information than managers, which can be influenced by hubris (Roll, 1986). Managers can be power-seeking and seduced to engage in non-value

creating deals, this is easier to do when the stocks used are over-valuated (Myers & Majluf, 1984).

Besides the financial determinants, also dummy variables are used to calculate the explanatory value of the categorical variables. The payment method is separated in three different groups: Cash; Stock and Mixed. Cash when payment method is cash only, Stock when payment method is stock only and Mixed when a combination of cash and stock or a different kind of payment method. Also a dummy will be created which takes value 1 if the target is in the same industry as the acquirer and takes 0 when it is in a different industry than Energy and Power, this will be performed on both macro- and mid-industry. Lastly, the number of firms that have given the purpose of the M&A is given. Table A gives the distribution of the dummy variables.

	<b>Targets</b>				
	n=	Mean	Std. Dev.	Minimum	Maximum
<b>Earnings per Share (in \$)</b>	226	1,5104	1,85437	0	16,38
<b>Market-to-book-ratio</b>	203	2,78227	2,93246	0,01	21,12
<b>Ln(Market Value)</b>	234	6,58077	1,76268	-2,30259	10,35082
<b>Discounted Cashflow (in \$)</b>	214	350,625,8	634,576	-173,700	4,200,000
<b>Price/Earnings (in \$)</b>	178	24,54382	29,14566	1,9	316
	<b>Acquirers</b>				
	n=	Mean	Std. Dev.	Minimum	Maximum
<b>Earnings per Share (in \$)</b>	235	2,08375	4,77237	0	54,04
<b>Market-to-book-ratio</b>	228	3,32504	13,33345	0,22	190,51
<b>Ln(Market Value)</b>	240	8,19816	1,44654	2,95126	11,62066
<b>Discounted Cashflow (in \$)</b>	230	1,130,131	1,958,393	-460,288	16,150,000
<b>Price/Earnings (in \$)</b>	212	40,47264	177,4414	0,3	2560

Table 1: Descriptive Statistics Financials

## 4. Results

This section will give the results for this research. First the results of the event study will be given, then the regression analysis will be discussed. Also the hypotheses will be rejected or not.

### 4.1 Results of the event study

To answer the research question, the abnormal returns of the event study have been calculated per day. In table 3 are the results of the event study per day for both the acquirer and the targets. Also the significant days are highlighted with a significance level of 5% or 1%.

Test Period Day	Target	Acquirer
t=-5	0,00188	-0,00009
t=-4	0,00572**	-0,00117
t=-3	0,00236	-0,00086
t=-2	0,00290*	0,00025
t=-1	0,01435**	0,00006
t=0	0,11846**	-0,01672**
t=1	0,03215**	-0,00207
t=2	0,00038	-0,00147
t=3	0,00005	0,00238**
t=4	-0,00092	-0,00119
t=5	-0,00169*	-0,00357**

Table 3: Abnormal Returns (AR) for acquirers and targets per day

\*p-value < 0.05 \*\* p-value < 0.01

For the acquirers a negative abnormal return is obtained on the day of the announcement of -1,67% and also on the third and fifth day after the announcement a significant abnormal return is obtained. For the targets a positive abnormal return is obtained from day [-2,1] around the announcement day. Also day t=-4 and t=5 an abnormal return is obtained. To determine the CAR [K,L] we want to use only significant abnormal returns around the announcement day which are subsequent from each other. For the acquirers this would be only t=0 and for the targets this would be [-2,1]. However, if we want to measure the explanatory value for the CAR's accurate, they should be equal for both the acquirer and the target.

Therefore, the CAR used will be from day -1 till 1. Which are for both the acquirer and target significant at a 1% level. In table 4 are the descriptive statistics for the cumulative abnormal returns for event window [-1,1].

Cumulative Abnormal Returns [-1,1]			
	Acquirer	Target	Joint
<b>Mean</b>	-3,66%	16,49%	1,62%
<b>P-value</b>	0,000*	0,000*	0,036*
<b>Std. Dev.</b>	12%	22,75%	11,79%
<b>Minimum</b>	-35,94%	-16,57%	-21,06%
<b>Maximum</b>	33,44%	239,85%	87,88%
<b>Observations</b>	240	240	234

Table 4: Descriptive statistics for CAR[-1,1]

\*P-value < 0,05

The main research question states to what extent abnormal returns are obtained at times of a merger or acquisition in the US Energy industry. The cumulative abnormal returns for acquiring firms are -3,66% on average. The average cumulative abnormal returns for acquired firms are 16,49%. Also the CAR's are added to see what the joint abnormal returns are, relative to absolute Market Value<sup>1</sup>. The Jointed CAR's have an average abnormal return 1,62%. Also the target's CAR is much more distributed than acquirer CAR and Joint CAR has the smallest distribution. These results are in line with a lot of earlier literature. Dodd & Ruback (1977) and Jarrel & Poulsen (1989) found abnormal positive returns for targets and Jarrel and Poulsen likewise found slightly negative abnormal returns for acquirers. The results are as well in line with the research of Bruner (2002) who found also positive abnormal for returns for targets and the combined abnormal returns where significantly higher than zero. The fact that the Joint CAR is significantly different from zero in a positive matter, means that value is created during the M&A announcement. On average, investors expect that the NPV of these M&A's are positive for the merged company.

<sup>1</sup> Joint CAR =  $\frac{\text{Market Value Target}}{\text{Total Market Value}} * \text{CAR Target} + \frac{\text{Market Value Acquirer}}{\text{Total Market Value}} * \text{CAR Acquirer}$

## 4.2 Correlation Matrices

Table C and D (appendix) present the Pearson Correlation matrices for the acquirer and target respectively, showing the correlation coefficients between all the independent and dependent variables. They present the power of the relationship between the dependent and independent variables. Too do they give the direction of the relationship. All the coefficients are relatively low, with the exception for  $\ln(\text{Market Value})$  and Discounted Cash Flow for both the target and the acquirer. This is somewhat logical because big companies also have greater cash flows and since it is an absolute value, it is not surprising. The low coefficients imply that there is no reason to believe that multicollinearity is present. Of course, is there a positive relationship between the dummy for macro- and mid-industry, because a firm cannot be in the mid-industry without being in the macro-industry. Furthermore, the purpose of the M&A, Synergy effects and Shareholder Value creation does seem to have a positive relationship, which is not surprising. Often shareholder value is created through economies of scale and thus synergy effects. The sign for  $\ln(\text{Market Value})$  and both the CAR's implies a negative relationship between these two variables, which is consistent with hypothesis 3. It is however too low to conclude anything yet.

## 4.3 Regression Analysis

With the knowledge that abnormal returns exist at times of a M&A announcement, now the hypotheses can be tested. It has been found that the abnormal returns for bidders are negative and the abnormal returns for targets are positive. The objective is to know where these announcement effects come from. The CAR will be regressed against the earlier explained determinants and will be tested for significance. All coefficients are regressed with fixed-year effects to account for clustered standard errors. Table 5 gives the results of the regression analyses for the acquirer-, target and joint CAR for one day before the announcement to one day after the announcement.

The dummy for macro-industry is weakly significant for explaining the abnormal returns for the acquirers. This means that merging in the Energy sector has an positive effect for stock prices and can explain 3,3% of the CAR for the acquirers when the target is also active in the Energy industry. This consistent with hypothesis 1, which states that merging in the same industry has

a positive effect on abnormal returns. Surprisingly, cash as payment method seems to have negative effect on abnormal returns for acquirers, but it is both statistically and economically insignificant, with a coefficient of 0,3%. As we expected from the correlation matrix, the natural logarithm of market value has a negative effect on abnormal returns, however it is both economically and statistically insignificant for the acquirers. But when looking at the Joint CAR, there is indeed a statistically and economically significant relationship of minus 3,3% between the abnormal returns and relative market value. There are no variables which can explain the CAR for the targets significantly. What we do find are positive constants for Target CAR and Joint CAR, which is not surprising, because they were also significant when tested without the variables. In combination with the R-squared for all the CAR's, which do not exceed the 0,14, it becomes clear that a lot of the abnormal returns cannot be explained with the variables used in this research.

#### **4.4 Robustness checks**

In table E (appendix) the multivariate regression is repeated with robust standard errors. The dummy for macro-industry for acquirers is still positive and somehow related to the non-robust regression, but is now significant. This implies that heteroscedasticity is still interfering with the variables and fixed year effects do not resolve the problem of heteroscedasticity. This is also found when looking at the effect of the natural logarithm of market value on the joint CAR. This means that the coefficients are not efficient when using normal standard errors. However, other coefficients become significant when using robust standard errors. Market-to-book value becomes significant at a 5% level, however the coefficient is with 0,07% and 0,09% for the acquirer and the joint CAR respectively not economically significant to make any difference. The dummy for macro-industry is significant with 5,4% when the CAR's are combined, which means that hypothesis 1 will not be rejected just yet. Contradictory, the dummy for mid-industry has a negative effect on abnormal returns of 3,8% on acquirer abnormal returns. The Price/Earnings ratio for explaining target abnormal returns is statistically significant, however not economically. The dummy for product expansion as purpose is weakly significant at a 10% level, having a negative effect on the acquirers abnormal returns of 5,2%.



**Table 5: Regression results – Cumulative Abnormal Returns [-1, 1]**

Results for the OLS regression with the acquirer, target and joint CAR as dependent variable. The joint CAR financial determinants are based on the acquirer's financials. All models are controlled for heteroscedasticity and autocorrelation by using clustered standard errors with year as fixed effect. The standard errors are reported in the parentheses. \*\*\*, \*\* and \* denote statistical significance at a 1%, 5% and 10% level respectively.

VARIABLES	Acquirer CAR [-1,1]	Target CAR [-1,1]	Joint CAR [-1,1]
Earnings per Share	7.10e-05 (0.000)	0.00663 (0.0130)	-9.07e-05 (0.000)
Market to book value	0.000464 (0.0005)	-0.00372 (0.00853)	0.000682 (0.001)
ln(Market Value)	-0.00906 (0.0081)	-0.0240 (0.0228)	-0.0325** (0.0137)
Discounted Cash Flow	6.18e-09 (5.91e-09)	5.59e-09 (4.22e-08)	4.60e-09 (9.08e-09)
Price/Earnings	-1.37e-05 (4.06e-05)	-0.00101 (0.001)	-6.74e-05 (4.88e-05)
Dummy Stock	0.0253 (0.0173)	0.0344 (0.0532)	0.0290 (0.0265)
Dummy Cash	-0.00331 (0.0253)	0.0274 (0.0722)	0.0151 (0.0383)
Dummy Mid-industry	-0.0175 (0.0210)	0.0586 (0.0584)	-0.0180 (0.0301)
Dummy Macro-industry	0.0329* (0.0298)	0.00465 (0.0964)	0.0249 (0.0473)
Dummy Synergies	0.0108 (0.0203)	-0.0461 (0.0561)	-0.0119 (0.0294)
Dummy Shareholder Value	-0.0185 (0.0240)	-0.0393 (0.0661)	-0.0133 (0.0324)
Dummy Product Expansion	-0.0253 (0.0296)	0.0794 (0.0860)	0.00984 (0.0410)
Dummy Market Expansion	0.0256 (0.0322)	0.0596 (0.0740)	0.00315 (0.0411)
Dummy Strengthen Operations	0.00420 (0.0210)	-0.0793 (0.0603)	-0.0332 (0.0313)
Constant	-0.0148 (0.0712)	0.316** (0.157)	0.283*** (0.107)
Observations	203	162	147
R-squared	0.067	0.081	0.140
Number of Years	23	23	23
Year FE	YES	YES	YES

## 4.5 Testing the hypotheses

Now all the results of the research are given, the hypotheses can be kept or rejected.

*H1: M&A's in the same industry will experience higher abnormal returns than unrelated M&A's.*

This hypothesis is tested on two levels, the macro- and mid-industry level. Of course, if two firms operate in the same mid-industry, they also operate in the same macro-industry. With OLS with standard errors a positive effect was found on acquirer abnormal returns of 3,3% when the two firms were operating in the same macro industry. However, when looking at the regression with robust standard errors, only the joint CAR was positive with 5,4%. Even more surprising, when the two firms were active in the same mid-industry, a negative abnormal return of 3,8% was found. This is not exactly in line with Eckbo (1983), who only found higher abnormal returns for targets in the same industry. However, Hypothesis 1 will not be rejected and does hold on a macro-industry level. It does not hold on a mid-industry level.

*H2: Cash as payment for a M&A has a positive effect on abnormal returns.*

For acquirers cash as payment does have a slight positive effect, as it has a slight negative effect for the acquired firm. But for both payment methods the difference is not significantly different from zero. This is not in line of expectation which stated that Cash as payment method has a positive effect on abnormal returns (Huang & Walkling, 1987). Therefore, hypothesis 2 will be rejected, cash as payment method does not have a positive effect on abnormal returns in the US Energy Market.

*H3: Relative size of the acquiring firm has a negative effect on the abnormal returns of a M&A.*

In the normal regression, the natural logarithm of market value has a negative effect of 3,3% on the abnormal returns for the joint firm's abnormal returns. However, this did not hold when the regression was the model was adjusted for robust standard errors. This makes it hard to draw any conclusions on the effect of the size on the abnormal returns. Therefore, hypothesis 3 will be rejected with a little side note, possibly a larger sample size had made the difference between retaining and rejecting the hypothesis. But in this sample, the relative size has no effect on the abnormal returns around the announcement date of a merger or acquisition.

## 5. Conclusion

In this research, the objective was to investigate the effects of a merger or acquisition in the US Energy Industry for the years 1995 to 2017. A total of 240 different mergers and acquisition are used with a minimum of 100 million dollars of deal value. The main research question is:

***To what extent do abnormal returns for both target and acquiring firms exist around the announcement day of a merger or acquisition in the United States Energy Industry?***

To answer this research question an event study is used and the returns of the stocks around the announcement day are compared with market model. The cumulative abnormal returns for the day before, while and after the announcement are for the acquirers and targets, -3,66% and 16,49% respectively. This means that abnormal returns around the announcement day of a merger or acquisition in United States Energy Industry do exist. Furthermore, the joint cumulative abnormal return's for both the target and acquirer is 1,62%. This implies that value is created for shareholders around the announcement day of a merger or acquisition.

To support the main research question, three hypotheses are taken to explain where the abnormal returns come from. Only hypothesis 1 is retained, the rest is rejected. Merging in the Energy and Power industry leads to higher abnormal returns of 5,4% for the sum of the abnormal returns of the firms. This is however when controlled for heteroscedasticity. Hypothesis 3 is a sort of in a grey area on rejecting or retaining. There seems to be a negative relationship between the size of the firm and the abnormal returns, but other ways of testing give other results. Further research in this sector will maybe come to a decision concerning this hypothesis.

At last, there seems to be a negative relationship between expanding the product line and the acquirers abnormal returns, which has an effect of 5,2%. This is maybe due with hubris infested managers, which are overconfident and power-seeking and therefore take the wrong investment decisions. But the exact source of this negative connection does need more research.

This thesis also consists of some shortcomings. First, the sample maybe was not big enough to really draw any good conclusions on it. Bigger samples often detect irregularities better and can

therefore be more trusted. Also the sample maybe consists of omitted variable bias, because maybe relevant variables were not included in the regressions which would help better explain the abnormal returns. Furthermore, seeing the sample experienced a lot of heteroscedasticity, ordinary least squares were maybe not the best linear unbiased estimator and an another method of measuring the abnormal returns would have been more efficient. It is therefore interesting to extend this study with the application of other regression models. Also the sample can be changed to different countries or industries, to see if the results still hold. Also is it possibly interesting to look at the long term effects of mergers and acquisitions, do these events still pay off on the long? Anyway, there is still a lot to find with investigating mergers and acquisitions abnormal returns.

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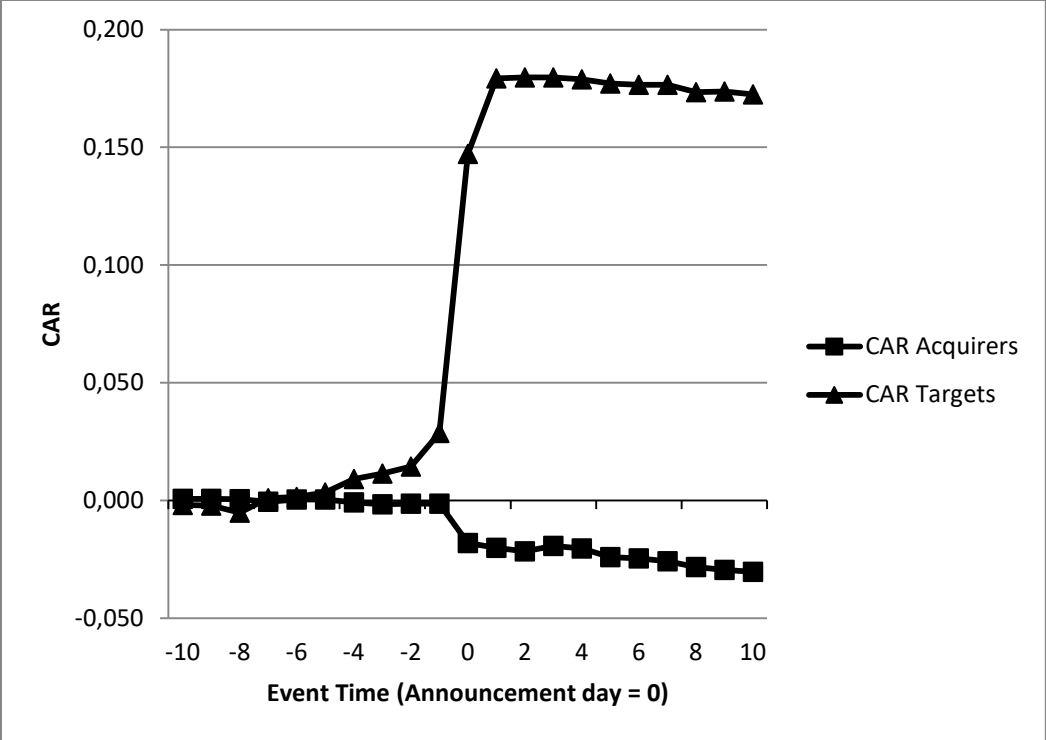
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## Appendix

Consideration	N=	Percentage
Cash	26	10,83%
Stock	73	30,42%
Mixed	141	58,75%
<b>Mid and Macro-Industry</b>		
Target in different industry	26	10,83%
Target in same macro-industry	214	89,17%
Target in same mid-industry	174	72,50%
<b>Purpose</b>		
Strengthen Operations	75	31,25%
Synergy Effects	54	22,50%
Shareholder Value	32	13,33%
New Products	18	7,50%
Expansion	19	7,92%
Total deals	240	100%

Table A: dummy variable distribution



Graph A: Plot of the cumulative abnormal returns around the announcement day from t=-10 to t=10



Test Period Day	Target	Acquirer
t=-10	-0,00186	0,00069
t=-9	-0,00026	0,00001
t=-8	-0,00305**	-0,00020
t=-7	0,00615**	-0,00106
t=-6	0,00054	0,00102
t=-5	0,00188	-0,00009
t=-4	0,00572**	-0,00117
t=-3	0,00236	-0,00086
t=-2	0,00290*	0,00025
t=-1	0,01435**	0,00006
t=0	0,11846**	-0,01672**
t=1	0,03215**	-0,00207
t=2	0,00038	-0,00147
t=3	0,00005	0,00238**
t=4	-0,00092	-0,00119
t=5	-0,00169*	-0,00357**
t=6	-0,00060	-0,00065
t=7	0,00008	-0,00122
t=8	-0,00322**	-0,00243**
t=9	0,00034	-0,00116
t=10	-0,00123	-0,00077

Table B: Average Abnormal Return (AAR)

\*\*P-value < 0,05, \*P-value < 0,1

**Table C: Correlation Matrix Acquirers:**

Pearson's Correlation Matrix between the independent and dependent variables concerning the acquirer. All correlation coefficients present the linear relation between the two variables. The sign presents a positive or negative relationship between the variables.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Acquirer CAR [-1, 1]	1,000														
2. Earnings per Share	0,034	1,000													
3. Market to book value	0,067	-0,014	1,000												
4. ln(Market Value)	-0,074	-0,024	0,088	1,000											
5. Discounted Cash Flow	-0,025	-0,025	-0,004	0,670	1,000										
6. Price/Earnings	-0,047	-0,023	0,005	-0,065	-0,066	1,000									
7. Dummy Stock	0,074	-0,073	-0,033	-0,165	-0,143	-0,007	1,000								
8. Dummy Cash	0,010	0,182	-0,019	0,228	0,144	-0,034	-0,231	1,000							
9. Dummy Mid-industry	-0,043	-0,094	0,045	-0,135	-0,018	0,064	0,042	-0,176	1,000						
10. Dummy Macro-industry	0,006	0,030	0,012	-0,007	0,098	0,021	-0,032	-0,224	0,566	1,000					
11. Dummy Synergies	0,013	0,006	-0,059	0,108	0,072	-0,041	-0,009	0,069	-0,003	0,027	1,000				
12. Dummy Shareholder Value	-0,003	0,028	-0,039	0,061	-0,010	-0,018	-0,073	0,021	0,049	0,058	0,317	1,000			
13. Dummy Product expansion	-0,026	-0,026	-0,042	-0,034	-0,016	-0,006	-0,051	0,053	0,069	-0,053	0,301	0,214	1,000		
14. Dummy Market Expansion	0,049	0,211	0,000	0,045	-0,057	-0,033	-0,093	0,096	-0,096	-0,096	0,101	0,203	0,210	1,000	
15. Dummy Strengthen Operations	-0,010	-0,031	0,089	0,014	0,031	-0,040	-0,055	0,054	-0,048	0,004	0,369	0,317	0,218	0,169	1,000

**Table D: Correlation Matrix Targets:**

Pearson's Correlation Matrix between the independent and dependent variables concerning the acquirer. All correlation coefficients present the linear relation between the two variables. The sign presents a positive or negative relationship between the variables.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Target CAR [-1, 1]	1,000														
2. Earnings per Share	0,074	1,000													
3. Market to book value	0,036	-0,071	1,000												
4. ln(Market Value)	-0,073	0,422	0,066	1,000											
5. Discounted Cash Flow	-0,048	0,386	-0,045	0,619	1,000										
6. Price/Earnings	-0,112	-0,321	0,190	-0,012	-0,111	1,000									
7. Dummy Stock	0,023	-0,080	-0,048	-0,096	-0,073	0,094	1,000								
8. Dummy Cash	-0,029	0,035	-0,031	-0,030	-0,070	0,171	-0,231	1,000							
9. Dummy Mid-industry	0,055	0,049	0,054	0,072	0,101	0,031	0,042	-0,176	1,000						
10. Dummy Macro-industry	-0,042	0,094	0,021	0,166	0,122	-0,017	-0,032	-0,224	0,566	1,000					
11. Dummy Synergies	-0,023	-0,050	0,035	-0,021	-0,015	-0,041	-0,009	0,069	-0,003	0,027	1,000				
12. Dummy Shareholder Value	-0,035	-0,016	0,040	0,060	-0,032	-0,024	-0,073	0,021	0,049	0,058	0,317	1,000			
13. Dummy Product expansion	0,059	-0,026	0,009	-0,093	-0,064	-0,085	-0,051	0,053	0,069	-0,053	0,301	0,214	1,000		
14. Dummy Market Expansion	0,054	0,020	0,026	0,069	-0,014	-0,015	-0,093	0,096	-0,096	-0,096	0,101	0,203	0,210	1,000	
15. Dummy Strengthen Operations	-0,066	-0,062	0,142	0,029	0,044	-0,036	-0,055	0,054	-0,048	0,004	0,369	0,317	0,218	0,169	1,000

**Table E: Robustness Check – Cumulative Abnormal Returns [-1, 1]**

Results for the OLS regression with the acquirer, target and joint CAR as dependent variable. The joint CAR financial determinants are based on the acquirer's financials. All models are controlled for heteroscedasticity and autocorrelation by using clustered standard errors with year as fixed effect. The robust standard errors are reported in the parentheses. \*\*\*, \*\* and \* denote statistical significance at a 1%, 5% and 10% level respectively.

VARIABLES	Acquirer CAR [-1,1]	Target CAR [-1,1]	Joint CAR [-1,1]
Earnings per Share	9.19e-05 (0.0001)	0.00688 (0.0086)	-0.000167 (0.0001)
Market to book value	0.000715* (0.0004)	-0.00374 (0.0095)	0.000993** (0.0004)
ln(Market Value)	-0.0117 (0.0131)	-0.0233 (0.0179)	-0.0339 (0.0199)
Discounted Cashflow	7.17e-09 (7.13e-09)	3.08e-09 (1.89e-08)	8.34e-09 (9.00e-09)
Price/Earnings	-2.42e-05 (0.000)	-0.000993** (0.000)	-0.000232 (0.000)
Dummy Stock	0.0158 (0.022)	0.0313 (0.035)	0.0390 (0.022)
Dummy Cash	-0.000531 (0.0297)	0.0265 (0.063)	0.0323 (0.031)
Dummy Mid-industry	-0.0379** (0.0142)	0.0574 (0.0445)	-0.0272 (0.0173)
Dummy Macro-industry	0.0281 (0.0223)	0.00472 (0.0758)	0.0535** (0.0190)
Dummy Synergies	0.0196 (0.0150)	-0.0447 (0.0313)	-0.0112 (0.0181)
Dummy Shareholder Value	0.0175 (0.0213)	-0.0330 (0.0402)	0.003 (0.0248)
Dummy Product expansion	-0.0524* (0.0261)	0.0760 (0.0680)	0.0287 (0.0333)
Dummy Market Expansion	0.0180 (0.0298)	0.0547 (0.0551)	0.0107 (0.0291)
Dummy Strengthen Operations	-0.00483 (0.0176)	-0.0645 (0.0394)	-0.0442 (0.0259)
Constant	0.0439 (0.104)	0.313** (0.132)	0.265 (0.161)
Observations	173	163	173
R-squared	0.074	0.079	0.126
Number of Years	23	23	23
Year FE	YES	YES	YES

