Norwegian School of Economics
Bergen, Fall 2019

The Role of Projected Synergies in M&A

An empirical study on management projected synergies, and its implications for bid premiums and overpayment

Marcus Kristoffersen & Sebastian Sællmann

Supervisor: Karin Thorburn

Master thesis, MSc in Economics and Business Administration,

Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

Abstract

This master thesis examines different aspects of projected synergies made by the management of acquiring firms. We study how synergies are estimated, how they affect bid premiums, and if disclosing acquirers are likely to avoid overpayment. From SDC, we retrieve information on the size of projected synergies and relevant financial data on acquirers and targets. We apply this data in three different OLS regressions.

We hypothesise that targets with high expense levels are more likely to create cost synergies for acquirers. When testing the hypothesis, our regression suggests that the expense levels of targets seem to increase the projected synergies. Furthermore, our second hypothesis claims that the size of the projected synergies has a positive relationship with bid premiums. Our findings support the suggested hypothesis. However, disclosing acquirers seem to, on average, pay a lower premium than non-disclosing acquirers. This might be due to inherent differences in deal characteristics between disclosing deals and non-disclosing deals. Our last hypothesis is that the market believes that disclosing acquirers are less likely to overpay for the target. We find that acquirer CAR seems to increase with premiums paid by disclosing acquirers. One possible explanation for this is that the market believes that disclosing acquirers are more likely to avoid overpayment. However, there might exist other explanations since disclosing acquirers seem to pay lower premiums, and the reason for this is not clear.

Acknowledgements

This master thesis concludes our Master of Science in Economics and Business Administration in Finance at the Norwegian School of Economics (NHH)

We are grateful for our time at NHH and want to thank everyone involved in making the years interesting and enjoyable.

We want to direct a special thanks to our supervisor Karin S. Thorburn for her help and expertise during this semester. We are further grateful for the contribution Karin has made to our interest in the field of M&A after we had her M&A class last spring. The M&A course is one of the most memorable courses we have taken at NHH and we further recommend it strongly to future students. Furthermore, we hope our thesis adds to existing literature and provides scholars with interesting findings that lead to further examination of the topic on synergies.

Lastly, we want to thank our families and friends for their support throughout the writing of this thesis and our years at NHH.

Bergen, December 20th, 2019

Marcus Kristoffersen

Sebastian Sællmann

Table of contents

1. Introduction

One of the main reasons for a firm to undergo a merger or acquisition process is to achieve gains from combining with the target. These gains are often referred to as synergies, and the source varies between transactions. Scholars have tried to understand whether synergies affect the deal structure and market reactions. However, estimating synergies is no easy task as it requires extensive research and is subject to uncertainty. Therefore, the existence of synergies is often assumed or captured by imprecise estimates.

Even though synergies are difficult to estimate, some acquirers disclose their projections of synergies at the date of the announcement in merger filings or company press releases. The validity and credibility of these are uncertain. However, these projections might be the best estimations of the synergies we will eventually observe. As management sits with inside information, it might be more likely to create accurate projections compared to outsiders. This claim is supported by Hassel and Jennings (1986), who find that management estimates are often more accurate than estimates made by analysts.

If an acquirer believes that a deal can create synergies, the value creation can justify paying a premium over market value for the target. Nevertheless, a prominent theory in M&A is the hubris hypothesis put forward by Roll (1986). He claims that premiums paid in deals are most likely miscalculations by the acquirer. These miscalculations are then acted upon due to CEO overconfidence. The acquirer does, therefore, overpay for their target as it pays for value creation that will never happen. However, in deals with disclosed synergies, the estimates are public, and the link between premium and value creation should be clear. If not, the acquirer is communicating overpayment, and the market will react accordingly.

In this paper, we will examine on which basis synergy projections are quantified, how they affect the price the acquirer is willing to pay for a target, and how the market reacts to the premium paid by disclosing acquirers. Our thesis thereby follows the journey synergies take from estimation to initial public perception. Hence, we define three hypotheses examining the role disclosure of synergies has in M&A.

Our first hypothesis is that there exists a positive relationship between target expense level and the size of projected synergies. The hypothesis is tested with an OLS regression. Our suggestion is supported by Gorbenko and Malenko (2014) and Levine (2017), who argues that

acquirers find high operational expense levels attractive as they give cost-cutting opportunities as well as possibilities for economies of scale. Furthermore, Bena and Li (2014) claim that R&D expenses are also attractive as they facilitate growth and opportunities for innovation which could increase value creation. Interestingly, we show that target expense levels have a positive relationship with projected synergies.

Our second hypothesis is that the size of the projected synergies is positively correlated with the size of premiums. We test the hypothesis by conducting an OLS regression, where we find that there is a positive relationship. This is in line with the theory proposed by Slusky and Caves (1991), who claim that synergistic gains are one of the major sources for increasing the acquirer's willingness to pay higher premiums.

Our third hypothesis proposes that the market believes that acquirers who disclose synergies are less likely to overpay for their target. With OLS regression, we test the relationship between acquirer Cumulative Abnormal Return (CAR) and the premium in deals with disclosure of synergies. A positive relationship could suggest that the market believes that the acquirer does not overpay as overpayment leads to negative returns. Our hypothesis is based on the work by Dutordoir, Roosenboom, and Vasconcelos (2014), who find that the market reacts positively to synergy disclosure and thereby consider these projections credible. Hence, the market might be more likely to believe that disclosing acquirers avoid overpayment. Our results suggest a positive relationship between acquirer CAR and the premium paid by disclosing acquirers, which is significant at the 1% level.

We have structured the thesis into eleven sections, where the first one is an introduction. Section 2 contains our key literature, which is applied to create our three hypotheses outlined in section 3. Further, section 4 reviews literature that helps identify control variables. Section 5 explains the data and the process of gathering and finalising it, and section 6 defines our dependent, independent, and control variables. Section 7 formulates our methodology, which then leads into section 8, where we examine descriptive statistics for our samples. Section 9 contains the analysis of our results, and section 10 describes the robustness of our models. Lastly, section 11 presents our conclusion.

2. Key literature

In this section, we review key literature for defining our hypotheses. The goal is to clearly outline the literature we apply when finding our research questions. First, we look into synergies and drivers of value creation. Then we review the literature concerning voluntary disclosure of synergies by management before examining the role of synergies when determining bid premiums. Lastly, we examine remarks extant studies make about market reactions regarding bid premiums.

2.1 Types of synergies

One of the main reasons for a firm to undertake an M&A is the potential efficiency gains from the merger. Management often forecasts these gains as merger-related synergies that enable the acquirer to pay a price over market value for the target. It is difficult to prove the existence of these synergies or calculate them in advance. The difficulty is related to uncertainty in predicting how the stand-alone company would have performed without the merger and the future performance of the merged entity. Even though managers provide their best estimates of the expected synergies, there may still be problems with realisation.

According to Schweiger and Very (2003), there are four basic sources of synergies: market power, cost, revenue, and intangibles. Cost synergies are the easiest to capture in an M&A and also the easiest to document ex-post. We can further divide cost synergies into fixed cost reduction and variable cost reductions. The fixed cost reduction might be the result of economies of scope and scale, and variable cost reductions could be increased purchase power and improved productivity. Synergies originating from increased market power, revenue, and intangibles are more difficult to capture and also harder to predict. Typical revenue synergies come from cross-selling products through complementary distribution channels to new customers and geographical regions. Synergies from market power come from increasing market share through increased entity size and by removing a competitor. Intangible synergies are the most difficult to predict and quantify; these synergies come from brand name extensions, sharing of knowledge and experience.

2.2 Sources of cost synergies

As Schweiger and Very (2003) find cost synergies to be the easiest synergies to estimate, investigating whether target expense levels affect synergies is of interest. Bena and Li (2014) find that targets with higher R&D expenses are more attractive to acquirers and especially strategic acquirers. As higher levels of R&D spending could increase the potential synergies for strategic acquirers, they show an increased premium paid. The argument is that the target's R&D spending can be used to develop products that enhance the strategic acquirer's operations or increase post-merger innovation, which facilitate value creation. Gorbenko and Malenko (2014) and Levine (2017) find that targets with high operating expenses are also attractive to acquirers. The explanation is that acquirers seek poorly performing targets, as the potential for cost synergies are higher. Levine (2017) argues that the growth of acquirers has stagnated; they, therefore, want targets that will increase economies of scale and boost growth.

2.3 Voluntary synergy disclosure

In some deals, management will voluntarily disclose their projections of synergies. Generally, management might have an incentive to disclose inside information. This is particularly pertinent in cases where there is severe asymmetrical information between insiders and outsiders, CEO compensation is affected by stock price, or prior to public equity offerings.[1] In each case, the main objective of the disclosure is to reduce negative stock returns.

Dutordoir, Roosenboom, and Vasconcelos (2014) support the argument above and suspect that management voluntarily discloses synergies to reduce negative stock returns. They further find that disclosure of synergies increases abnormal returns. Although the decision of disclosure seems opportunistic, they argue that the quality of these estimates is high, which is in line with Hassel and Jennings (1986). To further support the claim that synergy estimates are of high quality, Dutordoir, Roosenboom, and Vasconcelos (2014) argue that management is more likely to refrain from disclosing in cases with uncertainty, as disclosing increases litigation risk. According to Rule 10b-5 of the Securities Exchange Act of 1934, misleading

[1] See Moeller, Schlingemann, and Stulz (2007), Myers and Majluf (1984), and Nagar, Nanda and Wysocki (2003).

synergy disclosure is unlawful. Disclosing synergies thereby increases the risk of litigation and would be an unnecessary risk if management is uncertain in its estimates.

2.4 Premiums and synergistic gains

When deciding how much the acquirer should pay for the target, the acquirer must define its reservation price. The rational belief is that the acquirer's reservation price should not exceed the potential synergies plus the target market value. The price acquirers pay over market value is referred to as bid premium, and the difficulty in predicting the potential synergies makes it hard for the acquirer to know exactly how large this premium should be.

Sirower (1999) claims that the premiums paid will reflect the expectations of synergies. He argues that the acquirer will reveal its expectancy of synergies when announcing the premium. Higher premiums will thus mean higher synergy expectance. Slusky and Caves (1991) further claim that the premium paid lies somewhere between the acquirer's reservation price and the market value of the target. They argue that as synergistic gains increase, so will the willingness of the acquirer to pay for the merger or acquisition. The authors define the achievement of economies of scope and scale as important drivers of synergies. They thereby use firm relatedness as a proxy for synergies, since related firms are more likely to achieve economies of scope and scale. Their proxy fails to find any effect these gains might have on premiums.

Newer research on the relationship between premiums and synergistic gain uses the synergy projections of acquirer management. Ismail (2011) attempts to find out whether management projected synergies affect merger premiums. By using a data sample from 1985 to 2003, he does not find that projected synergies increase with the merger premium. He further claims that though this finding is surprising, it needs further empirical investigation before it warrants acceptance.

2.5 Overpayment and market reaction

The size of the acquirer return is often influenced by the market's view of the announced premium. If the market believes that the acquirer is overpaying for the target, the market reacts negatively. Overpayment occurs when acquirers pay a premium that is not justified by potential value creation.

Roll (1986) explains overpayment by introducing the Hubris hypothesis. The hypothesis paints a picture where the market value of a target is correct, and there are no takeover gains. In this world, the takeover premium is an error made by the bidding firm as it has overvalued the target, and any transaction would, therefore, not create value. Roll argues that a transaction will only be made because of CEO hubris, as the CEO convinces himself that the market is wrong and that his valuation is correct. Roll furthermore claims that even if takeover gains exist, we would still see errors and that, on average, not every single transaction can create value because of these errors. If the market does not believe that the transaction will create value, the acquirer will see its stock drop in value. Therefore, if the CEO wishes to obtain bidder gains, the strategic rationale and the benefits of the deal have to be communicated with credibility and accuracy.

Moreover, Sirower and Mueller (2003) find that the market reacts negatively as the premium increases since the likelihood of overpayment increases. The premium also has further implications for the performance of the combined firms. According to Sirower (1999), as many as 70% of acquirers will not be able to deliver results in line with the paid premium. Datta, Pinches, and Narayanan (1992) support this. They show that firms struggle to compensate for the paid price by earning adequate returns. Further, a too high premium might be a burden for the firm and puts pressure on management to engage in the restructuring processes and sell off assets (Wayne, Young, & Morris, 1997).

3. Hypotheses

In this section, we explain how we derive our three hypotheses from the key literature in the section above. Our hypotheses concern how synergies are projected, how they are applied in estimating premiums, and how these premiums are received by the market. Below we present the different hypotheses separately.

3.1 Management projections of merger-related synergies

Hypothesis 1: *Projected synergies increase with the target expense level.*

What managers base their synergy estimates on is not always clear, though, as Schweiger and Vary (2003) point out, the easiest synergies to estimate are cost synergies. Nonetheless, whether projections build on related theories is uncertain, but as extant studies show, managers wish to avoid ambiguity in their estimates and do not disclose when uncertainty is high. On this base, we wish to examine whether projected synergies are closely related to cost synergies, as these usually can be estimated with more certainty. The sources of cost synergies are often linked with the cost structure of the targets. Extant studies claim that as target expense levels increases, the potential for synergies is higher. Our first hypothesis derives from these studies, where we examine whether management bases its synergy projections on target expense levels. As existing research only discuss potential synergy drivers, we contribute by examining if management follow the mentioned theory when projecting synergies. We hence add to the existing research as none of the previous research examines how target expense levels might affect management synergy projections.

Our hypothesis mainly concentrates on the target's operational and R&D expenses, as reviewed literature frame these as attractive for strategic acquirers. We note that extant studies claim that R&D expenses facilitate both cost synergies and revenue synergies. Therefore, we do not exclude the possibility that R&D expenses capture synergy effects other than cost synergies.

3.2 Merger premium

Hypothesis 2: *Premiums increase with the size of projected synergies.*

The management projection of synergies represents the value the acquirer believes the deal will create, and the projections might further determine the acquirer's reservation price. Thus, an increment in synergistic gain from the deal will cause a corresponding increment in the acquirer's reservation price. The management projections of synergies should hence be reflected in the price the acquirer is willing to pay for the target. This claim is in line with Sirower (1999), who argues that the size of the premium reveals the expected synergies.

Extant studies agree with this claim but fail to find a significant relationship between projected synergies and premium. However, the data samples applied in these findings are prior to 2003, and the nature of synergy disclosure might, therefore, have changed. We re-examine their findings by applying a newer data sample.

3.3 Premiums in disclosed deals

Hypothesis 3: *Acquirer CAR increases with premiums in deals with synergy disclosure.*

Extant studies find that a major factor for the reduction in bidder gains is overpayment. The market seems to react negatively to a higher premium as the likelihood of overpayment increases. However, extant studies have not investigated how the market reacts to premiums paid by acquirers that disclose synergies. Our hypothesis examines whether the market believes that these acquirers are less likely to overpay. Dutordoir, Roosenboom, and Vasconcelos (2014) show that the market reacts positively to disclosed synergy estimates, which suggests that the market finds these estimates credible. Therefore, it could be interesting to investigate if the market is more inclined to believe that the acquirers that disclose avoid overpayment.

We examine the relationship premiums in deals with synergy dislosure have with acquirer CAR. The application of CAR, rather than other measures, is based on the findings that it

provides the best estimate of the stock market's valuation of the merger.[2] A positive relationship might suggest that disclosing acquirers avoid overpayment in the market's view. We apply a 3-day event window for acquirer CAR as it allows for better isolation of announcement effects since it reduces noise from unrelated market movement.

[2] See Eckbo, Masulis and Norli (2005) and Harford (2005), who find that other methods are biased or rely heavily on assumptions.

4. Relevant literature

In this section, we examine extant studies that are related to the M&A process. Our goal is to define drivers of synergy, premium, and acquirer CAR, other than those suggested in our hypotheses. This helps us build precise models with efficient control variables. Furthermore, the section will be structured section-wise as the deals seem to be affected by effects in three different categories. The three categories discussed below are *Conditions in the market, Target characteristics,* and *Deal characteristics.* Note, as for target characteristics, some of the relevant literature used to find efficient control variables is already discussed in section 2.

4.1 Conditions in the market

4.1.1 Merger waves

The activity in the merger market has, over the years, occurred in a wave-like pattern. It is well known that these waves exist, but there is no consensus concerning what drives them. The waves often reach different industries at different times. Research from Mitchell and Mulherin (1996) ties the waves within different industries to technology, economic, and regulatory shocks in particular industries. Other studies, such as Eisfeldt and Rampini (2003), consider waves a result of capital liquidity in the market. They show that capital liquidity is cyclical and impacts the degree of total capital reallocation in the market. Furthermore, Rhodes-Kropf and Viswanathan (2005) find a correlation between fundamental stock valuation in the market and merger waves. Lastly, Gugler, Mueller, Weichselbaumer, and Yurtoglu (2012) find that there is a negative correlation between merger waves and market reactions. The authors claim that acquirers are more likely to see a negative market return if they undergo an M&A process during a merger wave.

4.2 Target characteristics

4.2.1 Other sources of acquisition gains

Alongside synergistic gains, defined in section 2.1, there exists other sources of value creation in M&A. Servaes (1991) and Slusky and Caves (1991) claim that the merger might create value if the target's management is performing poorly. These gains are called managerial

gains. Servaes (1991) show that acquirers that take over poorly performing targets are more likely to achieve higher abnormal returns. With regard to abnormal returns, he finds that the importance of target performance is greater than how the acquirer performs. Slusky and Caves (1991) examine the performance of targets in relation to bid premiums. Their findings suggest that if stock return captures management performance, good performance will increase target returns, which again lead to lower premiums.

4.2.2 Size difference

Extant literature shows that the relative size of the target and acquirer has implications for both premium and stock performance. However, extant studies find that these implications vary based on the relative size of the target. Kitching (1967) finds that deals where the target is relatively small create less value for the acquirer. Therefore, acquirers should seek out targets that are similar in size. He argues that similarity in size is more likely to create value. However, Alexandridis, Fuller, Terhaar, and Travlos (2013) conclude that acquirers tend to pay less for large firms. As to bidder gains, several studies show that deals with relatively large targets tend to achieve higher abnormal returns for the acquirer.[3]

4.3 Deal characteristics

4.3.1 Firm relatedness

Several studies claim that relatedness can cause value creation. Lemelin (1982) finds that relatedness in industry affiliation is likely to increase the potential synergies. He argues that firms look to create growth by both vertical and horizontal acquisition. Shelton (1988) proposes that acquirers create more value by buying targets with similar assets. She further claims that acquirers should look for related targets that either expand the existing business or enable expansion into related markets. Mercer (1999) argues that acquiring related firms creates value as it increases the simplicity of removing duplicated activities and cross-selling products to new and existing customers.

[3] See Eckbo and Thorburn (2000), Jarrel and Poulsen (1989), and Moeller, Schlingemann, and Stulz (2007).

4.3.2 Payment method

In an M&A decision, the acquirer faces many different choices, where one of the more important decisions is the selection of payment methods. An acquirer has the choice between cash, stocks, or a mixture of the two.

Martin (1996) concludes that an acquirer will prefer to pay with internal cash if they have the available cash reserves. As a firm often has limited cash reserves, it also must consider taking up debt if it wishes to pay all cash. Myers and Majluf (1984) further find that full payment in stocks will convey information to the market that the acquirer is financially constrained. Martin (1996) and Myers and Majluf (1984) claim that the financial structure of the deal is of substantial importance for both firms, and several empirical studies have further shown how it influences the premium and the announcement return. La Brusleire (2013) highlights that the choice of payment is not a continuum between an all-cash and an all-stock offer. He shows a positive relationship between the percentage of cash in the offer and the merger premium. Eckbo (2008) also supports these findings and finds that the premium tends to be higher when the offer is an all-cash offer.

Further, Eckbo (2008) finds substantial evidence for a negative market reaction on average when the acquirer offers seasoned equity. The argument behind this finding is that outside investors could believe that the seasoned equity offered is overpriced. Travlos (1987) supports these claims as he find that all-stock payments give the lowest and sometimes negative returns for the acquirer Lastly, when it comes to announcement return, Eckbo and Thorburn (2000) and Giammarino, Heinkel, and Eckbo (1990) find that all-cash offers give, on average, the highest abnormal announcement return.

4.3.3 Effects of competition in M&A

The M&A market will, in many cases, be competitive, with multiple participants competing for a single target. A bidding war in M&A can force the winning bidder to pay a price over the intended premium. Eckbo and Betton (1999) find that in cases with a bidding war, the first bid is, on average, lower than in deals where there is only one single bid. This could imply that the first bidder in a bidding war expects competition for the target and might, therefore, be afraid of giving too high an opening bid. Nevertheless, they show that the first bidder in a bidding war only has a 41% chance of winning the target. This might imply that there is no

first-mover advantage. The study further shows that the second bidder raises the initial bid by as much as 10%.

While the initial bid is, on average, lower in multiple-bidder cases, empirical evidence shows the opposite when it comes to the winning bid. With a sample of over 10 000 U.S. targets from 1973-2002, Eckbo, Thorburn, and Betton (2009) show that the final bid premium in cases with multiple-bidders is, on average, eight percentage points higher than in deals with one single bidder.

5. Data and sample selection

To further be able to build our models and test our hypothesis, we collect relevant data. When gathering our data, we use different databases and methods to end up with our final samples. A thorough process is important to ensure quality in our data sample and that it contains enough information for testing our hypotheses. We will use this section to present how we gather our data and create our final samples.

5.1 SDC Platinum

To retrieve data on deals, we use SDC platinum, which has information on over 1.1 million global transactions since the 1970s (Refinitiv, 2012). It allows the user to sort on deal characteristics, so only the deals that fit one's criteria are retrieved. The number of possible criteria is large, and these criteria range from target and bidder nationality to exact deal value. Furthermore, SDC allows the user to retrieve the matching deals in a custom report. This report can include announcement dates and deal value, but also target and bidder financials as well as the deal attitude or if any poison pills existed. To retrieve a manageable and concise data sample, it is therefore important to be certain of what information is necessary.

5.1.1 SDC criterion

Our data sample ranges from 01.01.2009 to 31.12.2018, which is ten years, and only contains US deals, which means that the acquirer and the target are both US firms. The target and acquirer can be public or private and from any industry. As to the deal itself, the status must be completed and unconditional, which makes our results only apply to deals with the same status. The value of the transaction must be disclosed, and we are interested in Mergers and Acquisitions when we sort on the form of the deal. Preliminary attempts have revealed that information on expected synergies is scarce. We keep these criteria as uncomplicated as possible so as not to put large constraints on our data sample. Entering these criteria gives us a data sample of 3 367 transactions. When retrieving the transactions in our custom report, we include items such as deal value and premium, but also target and bidder financials. Management projections of synergies are also included in this report, which SDC has retrieved from merger filings or press releases. If SDC is not able to find a specific item searched for in

the custom report, the cell that would contain this information is left blank rather than excluding the entire transaction from the sample.

5.2 Additional criterion

5.2.1 Further sample screening

The custom report from SDC is exported to Excel, where we sort it further. The screening makes sure we have the required financial information to create the variables defined in section 6. In cases where R&D cost is left blank, we assume that the specific company does not have any or capitalises the expenses, and it is, therefore, equal to zero. Many of the deals do not include a bid premium or are lacking essential financials for either bidder, target, or both. These deals are excluded, which reduces the sample substantially. We end up with a data sample of 775 observations. The transactions in this sample are all equal when it comes to information available; the only differences are whether expected synergies are disclosed or not. In our final data sample, only 210 transactions have disclosed expected synergies, which leaves 565 transactions where expected synergies are not disclosed. See section 13.1 for table with sample creation. We do not want to remove outliers, as this could potentially harm the statistical validity of our model since the final sample is relatively small.

5.2.2 Synergy

When retrieving synergy estimates from SDC, these are given as annual values before tax. However, we wish to use the present value of these synergies. The present value of synergies is calculated as in Dutordoir, Roosenboom, and Vasconcelos (2014), and Houston, James, and Ryngart (2001). We first retrieve one-year acquirer Beta from WRDS, to find the cost of equity using the Capital Asset Pricing Model (CAPM). The following equation is applied:

$$k_e = R_f + \beta_i R_{MP}$$

where R_f is the risk-free rate given by the US 10-year treasury bond at the time of the announcement, β_i is the Beta of acquirer i, and R_{MP} is the market premium set to 7%[4]. The cost of equity is further applied when estimating the present value of synergies. This assumes

[4] See Dutordoir, Roosenboom and Vasconcelos (2014), Houston, James and Ryngart (2001) and Ismail (2011).

no debt financing but does, however, give conservative estimates of synergies.[5] Cost of equity is further applied when estimating the present value of synergies, which is given by the following equation:

$$PV\ of\ Synergies = \frac{Annual\ Synergies}{(k_e - g)}$$

We thereby assume that the annual synergies are achieved immediately after consummation, which means that combined companies do not need a few years before synergies are realised, which sometimes is the case. Furthermore, we assume the growth to be 2%, which is equal to inflation. The present value of synergies is before tax estimates, as the annual synergies listed in SDC are before tax.

5.2.3 Premium criterion

We also retrieve one-day premiums from SDC. However, SDC has been proven to be somewhat unreliable, as shown in a study done by Mulherin and Simsir (2015). They find that 24.1% of the premiums given by SDC are misleading as merger rumours have increased the share price of targets. Hence, we suspect that low or high premiums might be not correct. To solve this issue, we double check the merger filings of deals where the premium is lower than 5% or above 80%. In cases where SDC is wrong, we adjust the premiums to the one-day premiums listed in merger filings found in the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database by the US Securities and Exchange Commission (SEC).

5.3 Eventus

To test the third hypothesis, we retrieve data samples containing CAR for the bidders around the announcement dates. For this, we use Eventus, which is a program made by Wharton Research Data Services (WRDS) that lets one enter a file with the acquirer's Committee on Uniform Securities Identification Procedures (CUSIP) code and respective announcement date. To find the acquirers' CUSIP, we use a linking table from WRDS where we match the acquirers' tickers from the data sample we created earlier. For our Benchmark, we use the

[5] See Dutordoir, Roosenboom and Vasconcelos (2014), Houston, James and Ryngart (2001) and Ismail (2011).

Center for Research in Security Prices (CRSP) Equally Weighted Market Index, which is an equally weighted portfolio that contains all securities listed on NYSE, NYSE American, NASDAQ and ARCA (CRSP, 2019). Our estimation period ends 46 days prior to the event date, and the estimation length is 255 days. These are all default parameters in Eventus; in most cases, it will also ensure that the event itself or merger rumours do not affect the market model. Eventus estimates the normal return for this period, which it further uses to calculate abnormal returns and thereby cumulative abnormal returns for our event window. The normal return is estimated by the single-factor market model given by the following formula:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

where $R_{i,t}$ is the return of firm i on day t, β_i is the beta of firm i, and $R_{m,t}$ is the return of the market index on day t. $R_{i,t}$ is then used as the expected return when estimating abnormal return. Daily abnormal returns for a specific firm are estimated by the following formula:

$$AR_{i,t} = R_{i,t} - E(R_{i,t})$$

where $R_{i,t}$ is firm i's observed return on time t and $E(R_{i,t})$ is firm i's expected return on time t as shown in the previous equation. CAR is estimated by summing the calculated Abnormal Returns found in our event window. It is given by the following formula:

$$CAR_{(t_1,t_2)} = \sum_{t=t_1}^{t_2} AR_{i,t}$$

where t_1 and t_2 is the first and last day in the event window. The retrieval of CAR reduces our data sample somewhat as the CUSIP is not found for every acquirer, or Eventus does not manage to estimate abnormal returns for every acquirer. The sample is thus reduced from 775 to 610 transactions, where 153 have disclosed synergies. We retrieve CAR with event windows from -1 to +1, which is the event window applied when testing or third hypothesis. The three day event windows is also commonly used in similar studies. [6]

[6]See Alexandridis, Fuller, Terhaar, and Travlos (2013), Moeller, Schlingemann, and Stulz (2004, 2007), and Díaz, Sanfilippo, and Lopéz (2009).

6. Variables

With the data gathered, we further form our models by defining different variables used to test our hypothesis. Each of our three hypotheses will be tested with an individual regression, with dependent and explanatory variables in line with the discussion in section 2. Furthermore, the corresponding control variables in each regression have been shown to affect our dependent variables in extant studies discussed in section 4.

Firstly, in this section, we will introduce the variables used as dependent and explanatory variables for each regression. We then present relevant control variables .[7]

6.1 Key variables

6.1.1 Regression 1

Projected synergies

The variable *projected synergies* are retrieved from the SDC database, where it is listed as the management's projections of synergies. The projected synergies retrieved are given as annual synergies, and we further calculated the PV as described in section 5.2.2. To normalise the synergies, we divide the PV of expected synergies by target market value four weeks prior to the announcement, which is in line with the method Ismail (2011) applies. The *projected synergies* variable is used as the dependent variable in our first regression as research frequently claims that management projections of synergies are a reliable quantification of synergies.[8]

Operating expenses

As SDC does not report operating expenses for targets, we make this variable by subtracting EBITDA from net sales. To find a ratio that is comparable and consistent across all firms, we divide operating expenses by total assets. The variable is used as an explanatory variable in our first regression, as Gorbenko and Malenko (2014) and Levine (2017) claim that targets

[7] See section 13.1 for a full table with all variable definitions and the data source used to retrieve each variable.

[8] See Dutordoir, Roosenboom, and Vasconcelos (2014), and Hassel and Jennings (1986).

with high operational expenses are suitable for cost-cutting, and hence a potential source of synergistic gain.

R&D expenses

We create the R&D expenses variable by dividing the target's R&D expenses retrieved from the SDC database on total assets. Some of the targets do not report R&D expenses, and here we assume that the firm does not have any or that it capitalises the expenses. Using the variable *R&D expenses* as an explanatory variable for *projected synergies* is supported by Bena and Li (2014). As mentioned, they find that higher R&D expenses facilitate both cost synergies and revenue synergies.

6.1.2 Regression 2

Premium

The premium for each transaction is retrieved from SDC. It is given in percentages paid over target market value one day prior to the announcement. It is used as the dependent variable in regression 2.

Projected synergies

Projected synergies is the dependent variable in regression 1, and further becomes an explanatory variable in regression 2, where we want to test whether synergies explain the premium paid. Extant studies claim that synergies increase the acquirer's willingness of paying for the target, and using management projections is further found to be a more reliable estimation compared to analyst estimations of synergies (Hassel & Jennings, 1986).

6.1.3 Regression 3

Cumulative Abnormal Return (CAR)

CAR is retrieved from Eventus and, as shown in section 5.3, it is estimated by summing the calculated abnormal returns in the event window for a specific firm. Since we wish to test how the premiums announced in disclosing deals affect the stock return of the acquirer, we retrieve acquirer CAR observed on the announcement date of the respective deals. The event windows

we wish to look at are -1 to +1. As discussed in section 3.3, a short event window isolates the effect of the announcement and reduces noise from unrelated market movement.

Interaction variable – Synergy disclosure and premium

This variable is created by multiplying the dummy variable *synergy disclosure* with *premium* and allows testing of hypothesis 3 with OLS regression. By creating an interaction variable, we isolate the relationship premiums in deals with synergy disclosure have with acquirer CAR. This will enable an interpretation of how the market reacts to premiums in deals with disclosed synergies.

6.2 Control variables

6.2.1 Controlling for target characteristics

To control for target-specific effects affecting synergies, premium, and CAR, we include different variables to capture these. Target characteristics such as *Operating*- and *R&D expenses* are used as the explanatory variables in our first regression. The variables are discussed in key literature but are used as control variables in the second and third regression, while the *P/B - difference* and *relative size* are present in all our regressions as control variables.

Operating and R&D expenses

As control variables, *operating expenses* and *R&D expenses* are calculated as described in section 6.1. As Levine (2017) and Bena and Li (2014) find that the size of both expense levels could affect acquisition gain, we control for *operating expenses* and *R&D expenses* in the second and third regressions.

Price to book difference (P/B - difference)

P/B - difference is a continuous variable where the P/B of the target is subtracted from the P/B of the industry. Target P/B is collected from the SDC Database, while Industry P/B is retrieved from Thomson Reuters Datastream. The inclusion of this variable is based on extant studies that claim that stock performance signals management performance, discussed in section 4.2.1. A low target P/B is more likely to suggest that the target has low growth prospects

compared to the industry. Therefore, it might be a sign of a struggling firm incapable of growing with high pressure on its margins. This could signal the potential for managerial gains. It is further included in all three regressions.

Relative size

Relative size is a continuous variable, defined as the total assets of the acquirer are divided by the total assets of the target. The decision to include *relative size* as a control variable is based on the extant literature that shows how it affects value creation, premium, and acquirer abnormal return.[9] Therefore, *relative size* will be controlled for in all our regressions.

6.2.2 Controlling for deal characteristics

In section 4.3, extant literature claims that deal characteristics have an impact on our dependent variables. As not all deal characteristics have been shown to affect value creation, we choose to only include the variable *Same macro industry* in our first regression. Furthermore, we include all control variables controlling for deal characteristics in the second and third regressions.

Same macro industry

This is a dummy variable that is equal to one if the acquirer and target operate in the same macro-industry. The variable is made by comparing the macro industries, defined by SDC, for the acquirer and target. Extant studies find that firm relatedness in M&A increases the possibility of value creation as the firms can expand the business.[10] It is included in all our regression to capture effects related to different types of synergies.

All cash and all stocks

As the payment method can be all cash, all stocks, or a mixed payment, we include two dummies for the two first options. *All cash* is a dummy that is equal to one if the payment method is only cash and zero; otherwise, *All stocks* is a dummy for an all-stock offer. If the

[9] See Eckbo and Thorburn (2000), Jarrel and Poulsen (1989), Moeller, Schlingemann, and Stulz (2004), and Kitching (1967).

[10] See Mercer (1999), Lemelin (1982) and Shelton (1988).

deal is a mixed offer, both dummies will take the value of zero. As extant studies show that payment method in most cases influences both the premium paid and CAR, we believe that these variables are efficient control variables in the second and third regressions.

Multiple Bidders

This variable is a dummy for bidding war. It takes the value of one if more than one bidder put in an offer for the target. If the variable is zero, it tells us that there was only one bidder in the auction and that this bidder also acquired the target. As Eckbo and Betton (1999) and Eckbo, Thorburn, and Betton (2009) show, the number of bidders affects the premium. Thus, we consider this to be an important control variable for regression 2 in particular, but it will also control for the effect of a bidding war in regression 3.

Premium

Premium as a control variable is retrieved as mentioned in section 6.1.2 and is included in regression 3. Sirower and Mueller (2003) find that as premium increases, acquirer CAR is reduced, which is in line with the overpayment hypothesis. The authors claim that the likelihood of overpayment increases with premium size, which makes the market react negatively. Besides being a control variable in regression 3, *premium* is also used as part of the explanatory interaction variable discussed in section 6.1.3.

Synergy disclosure

As not all our deals disclose synergies, we use a dummy for synergy disclosure as a control variable in the second and third regressions. *Synergy disclosure* is used as a way to isolate the effect that projected synergies have on the premium in regression 2. Furthermore, it is used in regression 3 to interact with *premium* to form an interaction variable discussed in section 6.1.3.

6.2.3 Controlling for conditions in the market

To control for the market conditions discussed in section 4.1, we have chosen to include two different variables. We have chosen to include variables controlling for year and industry fixed effects as similar studies have argued for the use of fixed effects in their models. This is supported by literature on merger waves.

Year dummies

These variables are dummies used to control the yearly variation in merger activity. Controlling for years are highly supported in similar studies and will be included in all our regressions. The literature on merger waves further supports controlling for year fixed effects, as merger activity varies across time and will affect all our dependent variables. We avoid overfitting in our model by pairing years together, which gives us five dummies, *2009/2010, 2011/2012, 2013/2014, 2015/2016,* and *2017/2018*. The *2017/2018* dummy is our benchmark in all regressions where year fixed effects are included.

Industry dummies

To cover any industry-specific effects, we include dummies for the four largest industries in our sample, *Healthcare, High Technology, Financials*, and *Energy & Power*. These control variables are included in all our regressions, as Mitchell & Mulherin (1996) find that merger waves hit different industries at different times through shocks and industry-specific events.

7. Methodology

In the following section, we introduce and describe the empirical analysis used in this thesis to test the presented hypotheses. First, we explain how we apply a statistical univariate test (t-test) to examine differences in subsamples. Secondly, we outline the design of our three regressions and which assumptions that must hold.

7.1 Two sample t-test

In our sample, we have both deals with and without management projections of the synergies. The part of the sample that does not have management projection of synergies could potentially have synergy projections which are, however, not made available to the public. It is, therefore, interesting to compare the different variables between the two groups. Note, this test is not conducted to look for any causal relationships, but to compare means- and median values across the two subsamples. We will not include all variables in this test, but test for the difference between the most important variables in our regressions as well as deal value. The t-test will be summed up and visualised in a table in section 8.2. As the sample shrinks when retrieving acquirer CAR, we conduct a separate t-test for this sample.

7.2 OLS regression

Since our dependent variables are continuous, we can use OLS regressions to explore the dependent variables' relationship with their respective explanatory variables. Common for all our models is that the variables are observed in different time periods and different industries. We might, therefore, see year or industry fixed effects of economic conditions in the M&A market. However, including too many dummies might make the model overfitted. This could cause regression coefficients, p-values, and R-squared to be misleading (Wooldridge, 2016). To avoid this, we pair years into dummies and only include industry dummies for industries that consist of a substantial amount of our total observations. Constructing our models in this way thereby serves two purposes, avoiding overfitting and increasing robustness as this helps to adjust for clustered standard errors. We also use robust standard errors when there are issues with heteroscedasticity (see section 10.4 and appendix 13.5.2).

The second and third models differ from the first as there are reasons to believe that there exists endogeneity in the form of omitted variable bias (Heckman, 1979). The bias would occur as reasons or motivations behind the decision to disclose synergies are not known and hence are difficult to control. For instance, management's decision on disclosure could be motivated by the expectation of unfavourable market reactions when the deal is announced. However, the specific reason why management chooses to disclose is not available to the public. Heckman (1979) provides a method to control for unobserved variables by using a probit regression and the inverse Mills ratio, which is a two-step treatment effects regression model. The first step is the probit regression, where we use target and deal characteristics as explanatory variables, while the dummy variable *synergy disclosure* is the dependent variable. The estimation of the probability that disclosed synergies are equal to one is used to calculate the inverse Mills ratio. By including the ratio in the original OLS regressions, we control for endogeneity, which is the second step. If there is endogeneity, the ratio will be significant. The results of the test are discussed in section 10, and the probit regression is listed in the appendix, section 13.3.

7.2.1 Regression 1: OLS with synergies

Hypothesis 1 – Synergies

$$Synergies_i = \alpha_i + \beta_1 Operating\_expenses + \beta_2 R\&D\_expenses + \beta_3 Same\_macroindustry + \beta_4\ Relative\_size + \beta_5\ P/B\_Difference\ +\ \varepsilon_i$$

The first model's main objective is to examine the relationship between the projected synergies and target expense levels. We add relevant target and acquirer characteristics used as control variables in similar empirical models. We perform the regression step by step in Table 9-1, so we can examine the effect on our depending variable by adding or removing different control variables.

7.2.2 Regression 2: OLS with premium

Hypothesis 2 – Premium

$$Premium_i = \alpha_i + \beta_1 Projected\_synergies + \beta_2 Disclosed\_synergy + \beta_3 P/B\_difference + \beta_4 Same\_macroindustry + \beta_5 relative\_size + \beta_6 All\_cash + \beta_7 All\_stock + \beta_8 Multiple\_bidders + \beta_9 Operating\_expenses + \beta_{10} R\&D\_expenses + \beta_{11} Operating\_interaction\_no\_synergies + \beta_{12} R\&D\_interaction\_no\_synergies + \varepsilon_i$$

In the second model, we test hypothesis 2 by examining the relationship between premium and projected synergies. We include the control variables as listed in regression 1 but also add variables controlling for deal characteristics. The regression is performed step by step and is shown in Table 9-2.

7.2.3 Regression 3: OLS with CAR

Hypothesis 3 – CAR

$$CAR(-1,+1)_i = \alpha_i + \beta_1 Interaction\_variable + \beta_2 Premium + \beta_3 Disclosed\_synergy + \beta_4 Same\_macroindustry + \beta_5 All\_cash + \beta_6 All\_stock + \beta_7 Multiple\_bidders + \beta_8 P/B\_difference + \beta_9 Relative\_size + \beta_{10} Operating\_expenses + \beta_{11} R\&D\_expenses + \varepsilon_i$$

In the third model, we test hypothesis 3, which examines the relationship between bidder gain and premiums in disclosing deals. We add the same control variables as the second model. The regression is performed step by step and shown in Table 9-3.

The assumptions for the third model are somewhat different from the other two as we must assume that the benchmark chosen is the most fitting and that there are ideal market conditions. We have tested the available benchmarks supplied by Eventus and find that the chosen benchmark provides the best results. As for ideal market conditions, we assume that the trading of the firm's stock is frequent and that no information leakage took place prior to the announcement date. Finally, market reaction is subject to the market's opinion on the likelihood of deal completion. We assume that the market's opinion of likelihood is uncorrelated with the left-hand side variable.

8. Descriptive statistics and two-sample t-test

To give an overview of our sample, we present descriptive statistics. We divide the sample into two subsamples: deals with disclosed synergies and deals without disclosed synergies. We will go through and present our sample from a few different angles before conducting two independent t-tests for the difference in means between the subsamples. The first t-test will, as mentioned in section 7.1, be for the whole sample by comparing the most important variables, and the last test will be done with the CAR-sample to compare the different CAR between our two subsamples.

8.1 Deal and variable overview

8.1.1 The total sample

We start by presenting the sample of deals across different years. Table 8-1 shows that out of our total sample of 775 deals, the earlier years contain fewer deals than the later years. The year with the fewest deals is 2011, while the year with the highest number of deals is 2015.

Table 8-1 Deals over the years - Total sample

Years	Number of deals	% of total sample disclosing synergies
2009	56	33.93 %
2010	77	22.08 %
2011	51	29.41 %
2012	65	26.15 %
2013	72	15.28 %
2014	91	25.27 %
2015	103	28.16 %
2016	94	34.04 %
2017	75	29.33 %
2018	91	27.47 %
Total/Average	775	27.10 %

Table 8-1 also displays the percentage of deals in the total sample that disclose synergies in each year. As shown in the table, 27.1 % of the deals in the total sample disclose their synergies. The year where fewest deals disclosed their synergies was 2013, while the most were in 2016. Overall, the distribution of disclosure is somewhat evenly spread across the years.

We next present the target market value of the two subsamples, where the market value is the trading price of the target four weeks before the announcement of the deal. Table 8-2 shows that targets in our sample have market values from under USD 100 million to USD 65 billion.

Table 8-2 Overview of Target market value - Total sample

Target Market Value (in million USD)	Disclosed synergies	Disclosed synergies % of total	No Disclosed synergies	No Disclosed synergies % of total	Total number of deals
0 to 100	8	4.68 %	163	95.32 %	171
100 to 200	14	15.38 %	77	84.62 %	91
200 to 400	16	15.53 %	87	84.47 %	103
400 to 600	14	25.45 %	41	74.55 %	55
600 to 800	13	33.33 %	26	66.67 %	39
800 to 1000	13	40.63 %	19	59.38 %	32
1 000 to 2 000	43	41.75 %	60	58.25 %	103
2 000 to 3 000	20	41.67 %	28	58.33 %	48
3 000 to 5 000	27	52.94 %	24	47.06 %	51
5 000 to 10000	20	48.78 %	21	51.22 %	41
10 000 to 15 000	4	23.53 %	13	76.47 %	17
15 000 to 25 000	8	72.73 %	3	27.27 %	11
25 000 to 40 000	4	66.67 %	2	33.33 %	6
50 000 to 65 000	6	85.71 %	1	14.29 %	7
Total	210	27.10 %	565	72.90 %	775

The table shows that most of the smaller targets in our sample are acquired by acquirers that do not disclose their synergies. Further, acquirers that disclose synergies more often acquire targets thar are large. It thus seems that in deals with larger targets, the acquirers are more willing to disclose their projections of synergies voluntarily. Perhaps voluntary disclosure is necessary to make investors accept the larger deals.

8.1.2 Overview of premium paid

To get a close overview of premium paid by the two subsamples, we have created Table 8-3. The table shows that our sample consists of deals where the acquirer pays from -20 % to 360 % over market value for the target. However, most of our deals have premiums ranging from 10 % to 75 % over market value. For both subsamples, it looks as if the distribution is evenly spread across the premiums. We will discuss the difference in means for the premium paid across the two subsamples in section 0.

Table 8-3 Overview of premium paid – Total sample

Premium over market value in %	Disclosed Synergies	Disclosed synergies as % of total	No Disclosed synergies	No Disclosed synergies as % of total	Total number of deals
- 20 % to 0 %	6	30.00 %	14	70.00 %	20
0 % to 10 %	31	31.96 %	66	68.04 %	97
10% to 20 %	39	29.32 %	94	70.68 %	133
20 % to 30 %	48	33.80 %	94	66.20 %	142
30 % to 40 %	34	25.37 %	100	74.63 %	134
40 % to 50 %	14	18.42 %	62	81.58 %	76
50 % to 75 %	23	21.70 %	83	78.30 %	106
75 % to 100 %	7	18.92 %	30	81.08 %	37
100 % to 150 %	6	27.27 %	16	72.73 %	22
150 % to 360 %	2	25.00 %	6	75.00 %	8
Total	210	27.10 %	565	72.90 %	775

8.1.3 Overview of disclosed synergies

In this subsection, we present descriptive statistics for the subsample consisting of the 210 deals that disclose synergies. Firstly, we take a closer look at the dollar value of the expected synergies. Synergies are presented as Present value (PV) of before tax synergies, and as Table 8-4 shows, our sample has deals that project up to USD 65 billion in PV synergies.[11] Nevertheless, the projected synergies are mostly below USD 2.5 billion.

Table 8-4 PV of expected synergies - Disclosed synergy sample

PV(Synergies) in million USD	Number of deals	% of total
0 to 250	25	12 %
250 to 500	37	18 %
500 to 750	23	11 %
750 to 1 000	16	8 %
1 000 to 2 500	55	26 %
2 500 to 5 000	26	12 %
5 000 to 10 000	16	8 %
10 000 to 20 000	5	2 %
20 000 to 40 000	5	2 %
40 000 to 65 000	2	1 %
Total	210	100 %

[11] See section 5.2.2 for calculation of (PV) of synergies

8.2 T-test for difference in means across subsamples - Whole sample

Table 8-5 displays the means and medians for the most important variables in our sample. The table further provides a t-stat for the difference in means across the subsamples. In this section, we go through the results from the t-test step by step.

Table 8-5 T-test fort the diff. in means across subsamples Disclosed synergies and No Disclosed synergies

	All transactions		Disclosed Synergies		No Disclosed synergies		T- Test for difference in mean	
	N= 775		N = 210		N=565			
	Mean	Median	Mean	Median	Mean	Median	Diff in mean	T-stat
Dependent variable								
Premium	0.36	0.29	0.33	0.26	0.37	0.32	-0.04	-1.41
Deal characteristics								
All cash offer	0.39	0	0.33	0	0.41	0	-0.08	-1.96 *
All stock offer	0.22	0	0.25	0	0.21	0	0.04	1.18
Mixed payment	0.39	0	0.42	0	0.38	0	0.03	0.88
Same macro industry	0.83	1	0.77	1	0.85	1	-0.09	-2.63 ***
Multiple bidders	0.04	0	0.05	0	0.03	0	0.01	0.84
Target Market Value (in million USD)	2392	482	4937	1562	1446	269	3491	4.92 ***
Target characteristics								
Price/Book difference	0.40	0.75	0.16	0.00	0.48	0.91	-0.32	-0.67
Operating expenses	0.66	0.50	0.83	0.65	0.60	0.39	0.23	3.79 ***
R&D expenses	0.05	0	0.04	0	0.05	0	-0.01	-1.93 *
Relative size	23.74	4.73	7.72	2.33	29.70	6.47	-21.98	-5.89 ***

*** p<0.10, ** p<0.05, *** p<0.01**

8.2.1 Premium

The average premium paid for the total sample is 36%. Further, the table shows that the difference in means between the subsamples is not significant.

8.2.2 Deal characteristics

As to the payment method, when testing for differences in means, all cash is the only variable that is significantly different between the subsamples. The means are significantly different at the 10% level. It thus seems that deals where synergies are not disclosed pay in all cash more often. This, however, could be explained by the difference in relative size we observe between

the subsamples. Acquirers that disclose synergies are more similar to their target in size, which makes it more difficult to pay in all cash.

Further, testing for the difference in the macro industry reveals a significant difference between the subsamples at the 1% level. Acquirer and target seem to operate in the same industry more often in deals where synergies are not disclosed. Hence, acquirers might be more likely to disclose synergy estimates when the target is in a different industry. As extant studies show, related firms are more likely to create value by combining. Perhaps the acquirers disclose in order to signal that though the target operates in a different industry, synergies still exist.

As to multiple bidders, our sample mainly consists of deals with one bidder. Of the total sample, only 4% of deals experience a bidding competition. The difference between the subsamples is not significantly different on multiple bidders.

The average target market value in the sample with disclosed synergies is USD 4 937 million, while the average is USD 1 446 million for the sample without disclosed synergies. Consequently, the difference in means is strongly significant at 1% level. This suggests that deals of larger value are more likely to disclose their synergies. Investors could potentially need more convincing when a deal is large; disclosing might hence nudge investors towards accepting the deal.

8.2.3 Target characteristics

For the P/B - difference across the two subsamples, there is no significant difference in means.

There is, however, a significant difference in means between the expense levels. The operating expenses are significantly different at the 1% level, where targets in deals with disclosed synergies have higher operating expenses. The R&D expenses are also significantly different at the 10% level. Targets in deals without disclosed synergies tend to have higher R&D expenses. In appendix, Table 13-4, a large proportion of the non-disclosing deals take place in industries where R&D is important. This might explain the difference in means. Note that most targets do not have R&D expenses or capitalise these expenses, which explains the low means.

Table 8-5 shows that the means of the variable relative size are significantly different at the 1% level between the two subsamples. The acquirer has, on average, 7.72 times larger total assets than the target in deals with disclosed synergies, while the same number is 29.7 times in deals without disclosure of synergies. This suggests that acquirer and targets tend to be similar in size in deals with disclosed synergies, while the acquirer tends to be relatively large in deals without disclosed synergies. Kitching (1967) claims that deals with similarity in size are more likely to create value. However, relatively large targets might also increase the complexity of synergy realisation. This could cause the acquirer of a relatively large target to disclose synergies. The goal is to communicate the benefits of the merger, and that management is able to realise the synergies successfully. Moreover, the difference in relative size might explain why deals with synergy disclosure are less likely to be all-cash transactions.

Furthermore, note that the medians in the two groups are much more similar, which suggests large outliers.

8.3 T-test for the difference in means across subsamples – CAR Sample

The sample used in the third regression is a smaller sample than the one used in the second regression. As discussed in section 5.3 above, this is due to Eventus' inability to retrieve information on every deal. We have a total of 610 deals in this sample, where 157 deals disclose their synergies and 453 do not. In this section, we report results for three different event windows.

Table 8-6 T-test for diff. in means across subsamples
Disclosed synergies and No Disclosed synergies

	All transactions		Synergies		No synergies		T- Test for difference in mean	
	N = 610		N = 157		N = 453			
	Mean	Median	Mean	Median	Mean	Median	Diff in mean	T-stat
CAR								
CAR (-1,0)	-0.77 %	-0.35 %	-0.39 %	0.10 %	-0.90 %	-0.46 %	0.51 %	0.82
CAR (-1,1)	-0.95 %	-0.67 %	-0.42 %	0.17 %	-1.13 %	-0.76 %	0.71 %	0.44
CAR (-2,2)	-0.88 %	-0.69 %	-0.42 %	-0.29 %	-1.03 %	-0.80 %	0.61 %	0.80

*** p<0.10, ** p<0.05, *** p<0.01**

Table 8-6 shows that the mean CAR for all event windows is slightly negative, although not significantly different from zero. There is also no significant difference in CAR between the two subsamples.

9. Results

In this section, we present the results from testing our three hypotheses. Since we use OLS regression, this section examines the coefficients of the variables and their significance before further discussing these in light of our reviewed literature. Each subsection includes a presentation of the results and a discussion.[12]

9.1 Testing hypothesis 1

9.1.1 Examining the results

When we examine the relationship between the projected synergies and target characteristics, we test the following null hypotheses:

H_0: Projected synergies do not increase with target expense levels

H_1: Projected synergies increase with target expense levels

The results of the OLS regressions are shown in Table 9-1, which presents five different regressions. Alongside the key explanatory variables discussed in section 6.1.1, columns 2 to 5 include other target characteristics. We include year fixed effects in all columns except column 4 and 5. Furthermore, industry fixed effects are included in all columns, except column 5. To clarify our null hypothesis, if either or both operational expenses and R&D expenses have a significant and positive effect on projected synergies, the null hypothesis is rejected.

Column 1 shows that *projected synergies* has a positive relationship with both *operating expenses* and *R&D expenses*. *Operating expenses* is significant at the 1% level, while *R&D expenses* are significant at the 5% level.

In column 2, we add the dummy *same macro industry*, which takes the value of 1 if target and acquirer operate in the same macro industry. The variable is added to capture effects of firm relatedness, which has previously shown to increase value creation. The inclusion of *same*

[12] For better visualization all regressions in this section are precented without year- and industry variables, see section 13.6 for regressions with all variables visualized.

macro industry changes the significance level of *R&D expenses* to 10% while *operating expenses* remains unchanged.

In column 3, we add variables concerning differences in size and management performance; *relative size* and *P/B - difference*. *Relative size* is included as extant studies find that relatively larger targets increase the potential of value creation. *P/B - difference* is added to capture effects of managerial gain, which the acquirer might achieve. The addition of these variables causes *R&D expenses* to gain significance, and it is now significant at the 5% level. *Operating expenses* is still significant at the 1% level.

In column 4, we remove yearly fixed effects. This is done to see whether the variables vary across time, as it is not clear whether synergy estimates are affected by time fixed effects. When removing year fixed effects, *R&D expenses* reduces its significance level to 10% while *operating expenses* is still significant at the 1% level.

In column 5, we remove both yearly and industry fixed effects. The industry fixed effect is removed for the same reason as yearly fixed effects. Removing both these effects does not alter the significance of *operating expenses* or *R&D expenses*. However, we note that the coefficient of *R&D expenses* drops in value when excluding industry fixed effects.

Table 9-1 Hypothesis 1: Regression with *Projected synergies* as dependent variable

	Projected synergies				
	(1)	(2)	(3)	(4)	(5)
Operating expenses	0.786***	0.810***	0.903***	0.910***	0.824***
	(0.177)	(0.176)	(0.189)	(0.190)	(0.188)
R&D expenses	3.963**	3.478*	3.652**	3.331*	2.604*
	(1.799)	(1.799)	(1.787)	(1.801)	(1.554)
Same macro industry		0.637**	0.609**	0.580*	0.644**
		(0.306)	(0.305)	(0.307)	(0.306)
Relative size			-0.004	-0.004	-0.003
			(0.004)	(0.004)	(0.004)
P/B – Difference			0.044*	0.045*	0.042*
			(0.023)	(0.023)	(0.023)
Constant	0.443*	-0.057	-0.078	0.089	0.023
	(0.246)	(0.342)	(0.341)	(0.333)	(0.313)
Year dummies	Yes	Yes	Yes	No	No
Industry dummies	Yes	Yes	Yes	Yes	No
Observations	210	210	210	210	210
Adjusted R^2	0.126	0.140	0.153	0.130	0.113

Standard errors in parenthesis *p<0.1; **p<0.05; ***p<0.01

9.1.2 Discussion

In all model specifications, the null hypothesis is rejected at the 1% level: projected synergies seem to increase with the target's expense levels. This inference is robust for adding control variables. Our findings are consistent with extant studies, suggesting that higher expense levels lead to higher synergies. Moreover, what type of synergies the management estimate is not clear. In section 3.1, we hypothesised that management would be more likely to disclose cost synergies as these are easier to estimate. Since high target expense levels seem to increase projected synergies, management seems likely to disclose cost synergies. However, whether or not the projected synergies are exclusively cost synergies is not clear. R&D expenses can facilitate both cost synergies and revenue synergies. Distinguishing which category R&D expense falls into is dependent on management intentions. Furthermore, the significance of

same macro industry does not help clarify which type of synergies the management disclose. Acquiring a related firm could be used to enter new markets, which increases revenue, or to achieve economies of scale, which reduces costs. Which type of synergy the management the expects to achieve from acquiring a related firm is not clear, potentially it could be both. Further, *P/B-difference* is significant at the 10% level, which suggests that the potential for managerial gain has a positive relationship with projected synergies. Takin all the mentioned factors into consideration, it seems that the disclosed synorgies cannot be assumed to be cost synergies only.

Moreover, we notice that the exclusion of year and industry fixed effects does not alter the rejection of the null hypothesis. This suggests that the projection of synergies does not vary across time or industries. It is not clear why synergies should vary across years. Moreover, it seems unlikely that there is no variation across industries, which the regression suggests. Industries where R&D matters are more likely to assume that R&D expenses lead to higher revenues or growth, while other industries would see R&D expenses as a way to cut costs. Thereby, how the projected synergies are influenced by R&D ecpenses could potentially vary across indsutries. However, we note that the drop in the coefficient of *R&D expenses* might suggest that some variation across industries exists.

9.2 Testing hypothesis 2

9.2.1 Examining the results

When we examine the relationship between premium and projected synergies, we test the following null hypothesis:

H_0: Premiums do not increase with the size of projected synergies

H_2: Premiums increase with the size of projected synergies

The results of the OLS regressions are shown in Table 9-2. All model specifications include year and industry fixed effects. The inclusion is based on literature from section 4.1, where it is claimed that merger waves affect the valuation of targets, which hit industries at different points in time. First, we examine the key explanatory variable in column 1, before including target and deal characteristics in columns 2 to 5.

Column 1 includes *projected synergies* and *disclosed synergy* only. *Disclosed synergy* is added to isolate the effect projections of synergy size have on the premium paid. Both variables generate coefficient estimates that are significant at the 1% level. However, *projected synergies* has a positive coefficient while *disclosed synergy* is negative.

Column 2 includes the variable *P/B – difference* as well as *relative size* and s*ame macro industry. P/B – difference* is included as extant studies show that the performance of target management affects merger gains and premiums. The similarity in *relative size* often diminishes the acquirer's possibility of paying a high premium, while *same macro industry* increases the potential for value creation, which should increase the acquirer's willingness to pay for the target. Adding these variables does not change the significance of *projected synergies* or *disclosed synergy*.

Column 3 further adds dummies for payment method, a*ll cash,* and a*ll stocks,* as well as the dummy *multiple bidders.* Extant studies show that the choice of payment and the presence of multiple bidders capture effects related to premium. Firstly, we see that all earlier included variables keep their significance level except *disclosed synergy,* which now is significant at the 5% level.

In column 4, we include the two expense variables, *operating,* and *R&D*. Extant studies show that target expense levels are related to value creation and therefore impact the willingness of the acquirer to pay for the target. The inclusion of these variables makes *disclosed synergy* lose some of its significance, down to 10%. Furthermore, the absolute value of the coefficients for both *disclosed synergy* and *projected synergies* is reduced. One reason for the loss of significance and drop in coefficient might be that, as shown in regression 1, both *R&D*- and *operating expenses* seem to affect synergies. This can cause a problem with multicollinearity, where the expense variables take some of the effects away from the synergy variables.

To mitigate the problems in column 4, we include two interaction variables in column 5. These interaction variables are interactions between each of the individual expenses and the deals without synergy disclosure. By including these variables, we isolate the effect that target expense levels might have on premiums in deals with no synergy disclosure. When including the interaction variables, we see from the table that *disclosed synergy* regains the significance at the 5% level. The significance of *projected synergies* is unaltered.

Table 9-2 Hypothesis 2: Regression with *premium* as dependent variable

	Premium				
	(1)	(2)	(3)	(4)	(5)
Projected synergies	0.038***	0.037***	0.037***	0.028***	0.027***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Disclosed synergy	-0.100***	-0.085***	-0.072**	-0.051*	-0.075**
	(0.030)	(0.031)	(0.031)	(0.030)	(0.032)
P/B – Difference		0.004***	0.004**	0.006***	0.007***
		(0.002)	(0.002)	(0.002)	(0.003)
Same macro industry		-0.037	-0.033	-0.030	-0.029
		(0.033)	(0.033)	(0.033)	(0.032)
Relative size		0.001*	0.0004	0.0003	0.0003
		(0.0003)	(0.0003)	(0.0003)	(0.0003)
All cash			0.062*	0.057*	0.061*
			(0.033)	(0.031)	(0.032)
All stocks			-0.053**	-0.054**	-0.050*
			(0.027)	(0.027)	(0.027)
Multiple bidders			0.165	0.153*	0.150*
			(0.110)	(0.088)	(0.086)
Operating expenses				0.045*	0.095*
				(0.026)	(0.050)
R&D expenses				0.565	-0.026
				(0.386)	(0.250)
Interaction - R&D and No Disclosed synergy					0.741*
					(0.422)
Interaction - Operating and No Disclosed Synergy					-0.073
					(0.053)
Constant	0.347***	0.357***	0.326***	0.271***	0.277***
	(0.024)	(0.041)	(0.045)	(0.054)	(0.049)
Year dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	775	775	775	775	775
Adjusted R^2	0.050	0.061	0.080	0.108	0.116

Robust standard errors in parenthesis *p<0.1; **p<0.05; ***p<0.01

9.2.2 Discussion

Overall, the results in Table 9-2 reject the null hypothesis at the 1% level in all columns. The model thus suggests that there is a positive relationship between projected synergy sizes and premiums. By re-examining the effects that projected synergies might have on premiums, we oppose the findings of Ismail (2011) and Slusky and Caves (1991). Nevertheless, our findings are in line with the theory presented, which argues that synergistic gain increases the acquirer's willingness to pay a higher premium.

Further, the coefficients of significant control variables for both target and deal characteristics are as expected. However, the variable *synergy disclosure* is negative and with varying significance in all model specifications. This suggests that although premium seems to increase with the size of projected synergies, premiums are, on average, lower in deals where synergies are disclosed.

The negative coefficient of *synergy disclosure* is conflicting with the t-test conducted in Table 8-5, where we see no difference in premium means between the subsamples. It seems, therefore, that controlling for the size of projected synergies, and year and industry fixed effects, reveals a difference between the subsamples. Why we observe these differences could be explained by differences between the subsamples presented in section 8.2. It might be that targets or deal characteristics in deals with disclosure are inherently different.

As shown in section 8.2, the means of the subsamples are significantly different in *all cash*, *relative size*, and *same macro industry*. Acquirers that do not disclose synergies seem to be more likely to pay all cash, to be relatively large, and are more likely to operate in the same industry as their target. These are all factors that could affect the premium paid. Extant studies show that *all cash* deals, on average, pay higher premiums. Furthermore, as the relative size difference between targets and disclosing acquirers is small, it can make it harder for these acquirers to pay large premiums. This is supported by Alexandridis et al. (2013), who finds that acquirers pay less for relatively large targets. Lastly, firm relatedness is shown to increase value creation, which could increase the acquirer's willingness to pay a high premium. These factors can help explain why we observe that disclosing acquirers pay lower premiums. We do not exclude the possibility of other factors that are not discussed or included here.

9.3 Testing hypothesis 3

9.3.1 Examining the results

When we examine the relationship between bidder gain and premiums paid in disclosing deals, we test the following hypothesis:

H_0: Acquirer CAR does not increase with premiums in deals with synergy disclosure

H_3: Acquirer CAR increases with premiums in deals with synergi disclosure

We test Hypothesis 3 by running OLS regression presented in Table 9-3. As in the previous models, column 1 does not include control variables for target and deal characteristics. They are included in columns 2 to 4. Furthermore, we use CAR (-1, +1) as the dependent variable since short even windows better capture the imminent effects of the announcement. Year and industry fixed effects are controlled for in all columns as merger waves have shown to affect acquirer abnormal return.

In column 1, we include *disclosed synergy* and *premium* alongside *Interaction - Disclosed synergy* and *Premium* (*The interaction variable*). *The interaction variable* has a positive coefficient and is significant at the 1% level. This suggests that there is an interaction relationship between *premium* and *disclosed synergy*. *Premium* has a negative coefficient and is also significant at the 1% level. The variable *disclosed synergy* is not significant.

In column 2, we add control variables related to deal characteristics, which are shown to affect acquirer CAR. These variables are *same macro industry*, *all cash*, and *all stocks. Same macro industry* captures effects connected to firm relatedness, which extant studies find increase value creation and thereby should increase CAR. The payment method is shown by numerous studies to have important implications for market reaction and is therefore added. The inclusion of these variables does not change the significance of *the interaction variable* or *premium*.

In column 3, we add the target characteristics variables, *P/B – difference* and *relative size*. *P/B - difference* captures effects related to the performance of target management, where acquiring poorly performing targets increases abnormal returns. *Relative size* is added as extant studies

find that acquiring relatively large targets lead to higher abnormal returns. The significance of the explanatory variable is not altered by adding these control variables.

In column 4, we add target characteristics, which in this case is *R&D expenses* and *operating expenses* to capture effects related to target characteristics that might increase value creation. None of these change the significance of the interaction variable or *premium*.

Table 9-3 Hypothesis 3: Regression with *CAR* as dependent variable

	CAR (-1,+1)			
	(1)	(2)	(3)	(4)
Premium	-0.037***	-0.045***	-0.047***	-0.048***
	(0.010)	(0.009)	(0.009)	(0.010)
Disclosed synergy	-0.013	-0.008	-0.008	-0.008
	(0.010)	(0.009)	(0.009)	(0.009)
Interaction - Disclosed synergy and Premium	0.050***	0.054***	0.053***	0.052***
	(0.017)	(0.015)	(0.015)	(0.016)
Same macro industry		0.012	0.012	0.013*
		(0.008)	(0.008)	(0.008)
All cash		0.037***	0.037***	0.037***
		(0.008)	(0.008)	(0.008)
All stocks		0.004	0.004	0.004
		(0.007)	(0.007)	(0.007)
Multiple bidders		0.029**	0.029**	0.030**
		(0.013)	(0.013)	(0.013)
P/B - Difference			0.001**	0.001**
			(0.001)	(0.001)
Relative size			0.00001	0.00000
			(0.00003)	(0.00003)
Operating expenses				0.003
				(0.005)
R&D expenses				0.001
				(0.034)
Constant	-0.004	-0.032***	-0.032***	-0.035***
	(0.009)	(0.012)	(0.012)	(0.012)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	610	610	610	610
Adjusted R^2	0.067	0.118	0.129	0.127

Robust standard errors in parenthesis *p<0.1; **p<0.05; ***p<0.01

9.3.2 Discussion

The results from our last OLS regression suggest that there is a positive relationship between the premiums in deals that disclose and the acquirer CAR. The interaction variable is significant at the 1% level, which thus rejects the null hypothesis for all model specifications. Note that the sum effect is positive, even though *premium* is negative. One interpretation of the finding is as hypothesised in section 3.3; the market believes that disclosing acquirers are more likely to avoid overpayment. Overpayment is shown to reduce abnormal returns; a positive reaction would hence suggest that disclosing acquirers keep some of the value creation from the deal and thereby avoid overpayment.

However, whether the market believes that disclosing acquirers avoid overpayment because they disclose is not clear. As examined in section 9.2, disclosing acquirers seem to pay on average a lower premium than non-disclosing acquirers. In section 9.2.2, we discussed that certain deal characteristics could explain the lower premiums. These factors may help disclosing acquirers avoid overpayment. Since disclosing acquirers seem less likely to pay all-cash, the implication is that premiums will be lower. Disclosing acquiers are also more likely to acquire relatively larger targets which is suggested to reduce premium. Alexandridis et al. (2013) support this as they find that acquirers of relatively large targets are more likely to avoid overpayment. Lastly, since disclosing acquirers seem to more often operate in different industries than their targets, the potential for value creation might be reduced. The reduction of value creation suggests that the acquirers are less willing to pay a high premium for the target. Given these factors, it is not possible to claim that the market believes that disclosing acquirers are more likely to avoid overpayment.

10. Robustness

To test whether our models are robust, we will, in this section, discuss statistical caveats that our models may be exposed to and how we correct them. We will also examine whether our results are robust to altercations of our dependent variables. The results of any robustness test done in this section will be found in section 13, the appendix.

10.1 Sample size

The sample sizes collected and used vary between our different models, where the first model has the smallest sample with 210 observations. However, similar studies on synergies and synergy disclosure do not collect sample sizes that are substantially higher than ours. Furthermore, SDC might not be able to collect every deal that discloses synergies. Finding these deals would have taken us a considerable amount of time as merger filings and press releases for each deal would have to be examined thoroughly. Yet, we tread carefully when drawing inference from our results as the precision of our variables might be reduced.

10.2 Causal relationship

Claiming a causal relationship between dependent variables and explanatory variables must always be done with great caution. There might be factors we have not included or considered that further explain the results we have obtained. For example, there might be other target characteristics that explain how the acquirer estimates the projected synergies such as proximity in culture and increased brand recognition. Our regressions, suggest that the explanatory variables have significant effect on the dependent variables. However, we examine our results attentively to avoid wrongly claiming the existence of causality.

10.3 Multicollinearity

Multicollinearity is created when two or more independent variables are highly correlated, and can lead to misleading results (Wooldridge, 2016). To check whether our models are exposed to multicollinearity, we use a VIF-test. The VIF-test estimates how much the variance of independent variables is increased due to a high correlation with other variables. For our

models, the tests suggest that there are not considerable problems with multicollinearity (appendix, section 13.5.1). Adding variables such as interactions, causes some multicollinearity according the VIF-test in regression 2.

To examine the result of the VIF-test further, we create correlation matrices for each model, which show that the correlation is moderately low or low for most of our variables (Section 13.5.1). We thereby interpret these coefficients carefully in accordance with Wooldridge (2016).

10.4 Heteroscedasticity

Heteroscedasticity can have a serious impact on the estimation of standard errors, which leads to unreliable confidence intervals and hypotheses testing (Wooldridge, 2016). It is created when the variance of the standard errors is not constant. To test for heteroscedasticity, we perform a Breusch-Pagan test where the null hypothesis is that the model is homoscedastic. The tests yield p-values close to zero for regressions 2 and 3, which means that the null is rejected and suggests that our regressions contain heteroscedasticity (appendix, section 13.5.2). To handle this, we use robust standard errors in these regressions.

10.5 Endogeneity

Endogeneity occurs when an independent variable correlates with the error term. This correlation could be due to omitted variable bias where unobserved variables affect the dependent variable. In our case, we suspect that one such variable is management's motivation for voluntary disclosure of synergies. The problem occurs because deals where synergies are disclosed may have different characteristics that drive the premium itself. If management wants to rationalise paying a high premium or suspects a negative market reaction to an announcement, disclosing information could potentially justify its decision. This reason is, however, unknown and is thus difficult to control.

We perform a Heckman correction and find that we might have issues with endogeneity in regressions 2. Some of the independent variables lose their significance when adding the inverse Mills ratio, which controls for correlation with the error term. However, the inverse Mills ratio itself is not significant, and our null hypothesis is still rejected. This is why we have not included OLS regressions with the Heckman correction in our results section. The probit

regressions used for estimating the inverse Mills ratio and the OLS regressions containing the inverse Mills Ratio are listed in the appendix, section 13.3.2**.**

In regression 3, we also suspect endogeneity and thereby add the inverse Mills ratio to a regression similar to column 5 in Table 9-3. The inverse Mills ratio in this model is negative and insignificant, which means that the Heckman correction does not find endogeneity in our model. Furthermore, adding the inverse Mills ratio does not alter the coefficients or significance of the other variables. The regression including the inverse Mills ratio is listed in the appendix, section 13.3.2.

10.6 Testing model consistency

Furthermore, to test our models for consistency, we conduct the three regressions similar to the regressions listed in section 9 but with other dependent variables. This is to test the robustness of our depending variables and the results of our regressions.

Firstly, in regression 1, we scale the projected synergies to PV. However, as SDC gives these synergies as annual synergies, we conduct a regression to test whether the usage of annual synergies as a dependent variable give another result than in section 9.1. The new regression is listed in section 13.4.1, and as seen in Table 13-8, our explanatory variables are robust for *annually projected synergies* as the dependent variable.

In the second regression, the dependent variable is *premium*. This variable is the premium the acquirer offers over the market value of the target one day before the announcement of the deal. When using premium one day prior to the announcement as the dependent variable, the market value of the target could suffer from fluctuation in price due to merger rumours. Therefore, we test whether our explanatory variables are sensitive to a premium calculated earlier than one day prior to the announcement. We, therefore, obtain the *four weeks premium* from the SDC database and conduct a new regression, see section 13.4.2. As we can see in Table 13-9, our results are robust to the new dependent variable.

We further test the robustness of regression 3 with two different event windows as the dependent variable. Firstly, testing with CAR(-1,0) as the dependent variable, our explanatory variables lose some of their significance, see section 13.4.3. The explanatory variable in Table 13-10 is not significant in columns 1 and 4 but is significant at the 10% level in columns 2 and

3. To further test the robustness of regression 3, we do another regression with CAR(-2,+2) as the dependent variable, see section 13.4.3. Table 13-11 shows the same results as in section 9.3, where the explanatory variable is significant at the 1% level in all columns. Summed up, the result is ambiguous as the explanatory variable is seen to be robust to the event window CAR(-2,+2), but loses some significance when using CAR(-1,0).

11. Conclusion

In this thesis, we have studied the role of disclosing synergies in the M&A process. Firstly, we examined the characteristics affecting the size of the projected synergies before analysing the synergies' role in premium paid. Lastly, we study whether the market believes that deals with synergy disclosure are more likely to avoid overpayment. Relevant empirical research has helped to form the three hypotheses: *(1) Projected synergies increase with target expense levels, (2) Premiums increase with the size of projected synergies (3) Acquirer CAR increases with premiums in deals with synergy disclosure.* Furthermore, to test our hypotheses, we have collected relevant data from SDC and conducted three different OLS regressions controlling for relevant factors reviewed in extant literature. All our regressions seem to be robust for nearly all model specifications.

Our first model suggests that management projections of synergies increase with target expense levels, specifically operational and R&D expenses. Our findings are in line with extant studies, which suggest that targets with high expense levels facilitate higher synergies. However, whether management discloses cost synergies exclusively is less clear. As our results suggest, other types of synergies seem to affect the management's projected synergies.

The second model suggests that the size of the projected synergies has a positive relationship with the size of bid premiums. However, our regression suggests that disclosing acquirers, on average, are more likely to pay a lower premium than non-disclosing acquirers. Further, we discuss whether inherent differences in deal and target characteristics could explain the lower premiums. Extant studies show that some deal or target characteristics are more likely to lead to lower premiums. We suspect that these characteristics could be more likely to occur in deals with synergy disclosure.

In our last model, we examine whether the market believes that acquirers in deals with synergy disclosure are less likely to overpay for the target. We create an interaction variable by multiplying the dummy synergy disclosure with the variable premium. We use the acquirer CAR to measure whether the market believes that the acquirer is overpaying. The interaction variable seems to have a positive relationship with the acquirer CAR, and the sum effect is positive. This suggests that the market believes that acquirers that disclose synergies are less likely to overpay for their target. However, since disclosing acquirers seem to pay a lower

premium, we discuss whether this can explain the positive market reaction. Therefore, it is uncertain whether the market believes that disclosing acquirers avoid overpayment.

Lastly, we believe that there are interesting findings to be made for further research. The management's intention in synergy disclosure is not clear, and without inside information, one can only speculate. A qualitative paper based on interviews with disclosing managers could, therefore, be of interest. Further, what type of synergies the management estimate is not clear as we find that factors related to revenue synergies also seem to increase the projected synergies. We thereby suggest that scholars continue examining how much of the projected synergies are based on cost synergies and how much is based on other sources. Further, more research can be made on why disclosing acquirers seem to pay lower premiums. Where the research could be made on the differences in the deal and target characteristics between deals with disclosed synergies and deals without disclosed synergies.

12. Bibliography

Alexandridis, G., Fuller, K., Terhaar, L., & Travlos, N. (2013). Deal size, acquisition premia and shareholder gains. *Journal of Corporate Finance*, 1-13.

Bena, J., & Li, K. (2014). *Corporate Innovations and Merger and Acquisitions.* USA: The Journal of Finance, Volume 69, Issue 5.

CRSP. (2019). *Stock File Indexes* . Retrieved from Center for Research in Security Prices: http://www.crsp.com/products/documentation/stock-file-indexes

Datta, D., Pinches, G. E., & Narayanan, V. K. (1992). *Factors influencing wealth creation from mergers and acquisitions: A meta-analysis.* Kansas, USA: John Wiley & Sons, Ltd. .

Díaz, B., Sanfilippo, S., & Lopéz, C. (2009). Are M&A Premiums Too High? Analysis of a Quadratic Relationship between Premiums and Returns. *Quarterly Journal of Finance and Accounting*, 5-21.

Dutordoir, M., Roosenboom, P., & Vasconcelos, M. (2014). Synergy Disclosure in Mergers and Acquisitions. *International Review of Financial Analysis* , 88-100.

Eckbo, B. (2008). *Bidding startegies and takeover premiums: A review.* Journal of Corporate Finance 15, 149-178.

Eckbo, B., & Betton, S. (1999). *Toehold, Bid-Jump and Expected Payoffs in Takeovers.* Forthcoming, Review of Financial Studies.

Eckbo, B., & Thorburn, K. (2000). *Gains to Bidder Firms Revisited: Domestic and Foreign Acquisitions in Canada.* USA: Journal of Financial and Quantitative Analysis 35(01):1-25.

Eckbo, B., Masulis, R., & Norli, O. (2005). Security Offerings. In B. Eckbo, *Handbook of Corporate Finance* (pp. 233-373). Hanover: Elsevier.

Eckbo, B., Thorburn, K., & Betton, S. (2009). *Merger negotiations and the toehold puzzle.* Journal of Financial Economics, Volume 91, Issue 2, PAge 158-178.

Eisfeldt, A., & Rampini, A. (2003). *Capital reallocatipon and liquidity.* Chicago, USA: Unbulblished working paper, Northwestern University.

Giammarino, R., Heinkel, R., & Eckbo, B. (1990). Asymmetric information and the medium of exchange in takeover: Theory and tests. *Review of Financial Studies* , 651-675.

Gorbenko, A., & Malenko, A. (2014). *Strategic and Financial Bidders in Takeover Auctions.* USA: The Journal of Finance.

Gugler, K., Mueller, D., Weichselbaumer, M., & Yurtoglu, B. (2012). Marekt optimism and merger waves. *Managerial and decision economics*, 159-175.

Harford, J. (2005). *What drives merger waves?* USA: Journal of Financial Economics, Volume 77, Issue 3, page 529-560.

Hassel, J., & Jennings, R. (1986). Relative Forecast Accuracy and the Timing of Earnings Forecast Announcements. *The Accounting Review*, 58-75.

Heckman, J. (1979). Sample Selection Bias as a Specification Error. *Econemetrica*, 153-161.

Houston, J., James, C., & Ryngart, M. (2001). Where do merger gains come from? Bank mergers from the perspective of insiders and outsider. *Journal of Financial Economics*, 285-331.

Ismail, A. (2011). Does the Management's Forecast of Merger Synergies Explain the Premium Paid, the. *Financial Management*, 879-910.

Jarrel, G., & Poulsen, A. (1989). The Returns to Acquiring Firms in Tender Offers: Evidence from Three Decades. *Financial Management*, 12-19.

Kitching, J. (1967). Why do mergers miscarry? *Harvard Business Review*, 84-101.

La Brusleire, H. (2013). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Banking & Finance*, 2106-2123.

Lemelin, A. (1982). Relatedness in the Patterns of Interindustry Diversification. *The Review of Economics and Statistics*, 646-657.

Levine, O. (2017). *Acquiring growth.* Journal of Financial Economics, 126(7), 300-319.

Martin, K. (1996). *The method of payment in corporate acquisitions, investement opporunities, and mangment ownership.* USA: Jorunal of Finance, 51 (4), pp. 1227-1246.

Mercer, C. (1999). *Financial vs. Strategic Buyers.* Reprinted from Mercer Capital's Transaction Advisor – Vol. 2, No. 2, 1999.

Mitchell, M., & Mulherin, J. (1996). *The impact of industry shocks on takeover and restructuring activity.* USA: Journal of Financial Economics, 41 pp.193-229.

Moeller, S., Schlingemann, F., & Stulz, R. (2004). Firm size and the gains from acquisitions. *Journal of Financial Economics*, 201-228.

Moeller, S., Schlingemann, F., & Stulz, R. (2007). How Do Diversity of Opinion and Information Asymmetry Affect Acquirer Returns? *Review of Financial Studies*, 2047-2078.

Mulherin, H., & Simsir, S. (2015). Measuring Deal Premiums in Takeover. *Financial Management*, 1-14.

Myers, S., & Majluf, N. (1984). *Corporate financing and investment decisions when firms have information that investors do not have.* USA: Journal of Financial Economics, 13, pp. 187-221.

Nagar, V., Nanda, D., & Wysocki, P. (2003). Discretionary Disclosure and Stock-Based Incentives. *Journal of Accounting and Economics*, 283-309.

Refinitiv. (2012, May 12). *SDC Platinum*. Retrieved from Refinitiv: https://www.refinitiv.com/en/products/sdc-platinum-financial-securities/?utm_content=SDC%20Platinum-OTHER-EMEA-G-EN-BMM&utm_medium=cpc&utm_source=google&utm_campaign=68832_RefinitivBAUPaidSearch&elqCampaignId=5917&utm_term=+sdc%20+platinum&gclid=EAIaIQobC

Rhodes-Kropf, M., & Viswanathan, S. (2005). *Market Valuation and Merger Waves.* The Journal of Finance, Volume 59, Issue 6.

Roll, R. (1986). The Hubris Hypothesis of Corporate Takeovers. *The Journal of Business*, 197-216.

Schweiger, D., & Very, P. (2003). *CREATING VALUE THROUGH MERGER.* Elsevier Schience Ltd. - Advances in Merger and Acquisitions, Volume 2, page 1-26.

Servaes, H. (1991). Tobin's Q and the Gains from. *The journal of finance*, 409-419.

Shelton, L. (1988). Strategic Business Fits and Corporate Acquisition: Empirical Evidence. *Strategic management journal*, 279-287.

Sirower, M. (1999). *The Synergy Trap: How Companies Lose the Acquisition Game.* New York, USA: New York, The free press.

Sirower, M., & Mueller, D. (2003). The Causes of Mergers: Tests Based on the Gains to Acquiring Firms' Shareholders and the Size of Premia. *Managerial and Decision Economics*, 373-391.

Slusky, A., & Caves, R. (1991). Synergy, Agency, and the Determinants of Premia Paid in Mergers. *The Journal of Industrial Economics,*, 277-296.

Travlos, N. (1987). Corporate Takeover Bids, Methods of Payment, and Bidding Firm's Stock Returns. *The Journal of Finance* , 943-963.

Wayne, C., Young, C., & Morris, J. (1997). *Financial consequences of employment-change decisions in major U.S. corporations.* USA: The Academy if Mangment Journal.

Wooldridge, J. M. (2016). *Introductory Econometrics: A Modern Approach, 6th edition.* CENGAGE Learning Custom Publishing.

13. Appendix

13.1 Variables and sample creation

Table 13-1 Steps to final sample[13]

Filters	# of deals
Date Announced: 1.1.2009 to 31.12.2018; Target and Acquirer Nation: US	92 762
Target and Acquirer Status: Public or Private	52 152
Deal Status: Completed and Unconditional	42 455
Deal Type: Disclosed Value	8 635
Form of the Deal: Acquisition or Merger	3 368
Deals exported to Excel	**3 368**
Target financial screening: Assets, net sales, EBITDA, Book-value and share price = NOT BLANK	1 098
Acquirer financials screening: Assets = NOT BLANK	900
Premium = NOT BLANK	775
Total sample	**775**
Deals of total sample with synergy Disclosure	**210**
Deals of total sample with Acquirer CAR from Eventus	**610**

[13] Out of the total sample of 775 deals, Eventus only calculated CAR for 610 deals (CAR sample).

Table 13-2 Variable definitions and sources

Variables	Description	Source
Dependent variables		
Projected synergies	A ratio for projected synergies as part of deal value. The variable is calculating by taking the PV of projected synergies divided by Target market value.	SDC
Premium	The amount the acquirer pays over market value for the target in percent.	SDC
CAR	CAR for the acquirer with a 3-day event window	Eventus
Deal characteristics		
All cash	A dummy variable, equal to one if the acquirer pays for the target with only cash.	SDC
All stock	A dummy variable, equal to one if the acquirer pays for the target with only stocks.	SDC
Same macro industry	A dummy variable, equal to one if the acquirer and the target operates in the same macro industry.	SDC
Multiple bidders	A dummy variable, equal to one if it there is more than one bidder involved in the auction for the target.	SDC
Year dummies	Dummies for the year of the deal. Two years are merged together (example 2009/2010 and 2011/2012). Using 2017/2018 as benchmark.	SDC
Disclosed synergy	A dummy variable equal to one if the acquirer disclose synergies.	SDC
Interaction - Disclosed synergy and Premium	An interaction variable between the disclosed synergy dummy and premium.	SDC
Target characteristics		
Industry dummies	Dummies for the different target macro industries. Equal to one if the target is in the given macro industry, zero otherwise.	SDC
Price/Book difference	A variable that indicate the difference between the targets P/B and the average P/B in the industry the targets operates.	SDC and Datastream
Operating expenses	A ratio for operating expenses. Operating expenses divided by total assets.	SDC
R&D expenses	A ratio for R&D expenses. R&D expenses divided by total assets.	SDC
Interaction - Operating and No Disclosed synergy	An interaction variable between operating ratio and the dummy for No Disclosed synergies.	SDC
Interaction - R&D and No Disclosed synergy	An interaction variable between R&D ratio and the dummy for No Disclosed synergies.	SDC
Relative size	A variable for relative size between the acquirer and the target. The variable is calculated as acquirer total assets divided on targets total assets.	SDC

13.2 Descriptive statistics

Table 13-3 Summary statistics of total sample

	Mean	Median	Min	Max	Standard deviation
Premium	0.36	0.29	-0.16	3.58	0.33
Deal characteristics					
All cash offer	0.39	0	0	1	0.49
All stock offer	0.22	0	0	1	0.41
Mixed payment	0.39	0	0	1	0.49
Same macro industry	0.83	1	0	1	0.38
Multiple bidders	0.04	0	0	1	0.19
Target Market Value (in million USD)	2522	494	4.60	60014	6277
Target characteristics					
Price/Book difference	0.40	0.75	-95.27	52.63	6.24
Operating ratio	0.66	0.50	-0.11	4.71	0.74
R&D ratio	0.05	0.00	-0.07	0.89	0.11
Relative size	23.74	4.73	0	694.84	60.77

Table 13-4 Target by macro industry

Macro industries	Disclosed synergies	Disclosed synergies % of total	No disclosed synergies	No disclosed synergies % of total	Total number of deals
Consumer Products and Services	17	63 %	10	37 %	27
Consumer Staples	10	53 %	9	47 %	19
Energy and Power	20	26 %	57	74 %	77
Healthcare	33	34 %	64	66 %	97
High Technology	38	25 %	112	75 %	150
Industrials	21	36 %	37	64 %	58
Materials	15	47 %	17	53 %	32
Media and Entertainment	11	44 %	14	56 %	25
Retail	7	44 %	9	56 %	16
Telecommunications	11	39 %	17	61 %	28
Financials	16	7 %	199	93 %	215
Real Estate	11	35 %	20	65 %	31
Total	210	100 %	565	100 %	775

13.3 Endogeneity and Heckman correction

13.3.1 Probit regressions

Table 13-5 Probit regressions – CAR sample and All transaction sample

	Disclosed synergy (All transactions sample)	Disclosed synergy (CAR sample)
Operating expenses	0.162**	0.102
	(0.079)	(0.093)
R&D expenses	-1.840**	-1.212
	(0.714)	(0.747)
Same macro industry	-0.139	-0.122
	(0.139)	(0.168)
Relative size	-0.008***	-0.030***
	(0.002)	(0.006)
P/B - Difference	-0.012	-0.010
	(0.009)	(0.011)
All cash	-0.285**	-0.035
	(0.134)	(0.155)
All stocks	0.231	0.146
	(0.143)	(0.165)
Multiple bidders	0.103	0.108
	(0.262)	(0.292)
Energy and Power	-0.643***	-0.741***
	(0.186)	(0.224)
Healthcare	0.029	0.088
	(0.174)	(0.209)
High Technology	-0.212	-0.289
	(0.169)	(0.200)
Financial	-1.401***	-1.297***
	(0.174)	(0.199)
2009/2010	0.036	-0.113
	(0.175)	(0.199)
2011/2012	-0.243	0.142
	(0.205)	(0.203)
2013/2014	0.327	-0.512**
	(0.211)	(0.206)
2015/2016	-0.378**	0.084
	(0.188)	(0.172)

Constant	0.105	0.213
	(0.173)	(0.239)
Observations	775	610
Log Likelihood	-372.119	-275.050
Akaike Inf. Crit.	778.238	584.101
Standard errors in parenthesis		*p<0.1; **p<0.05; ***p<0.01

13.3.2 Heckman corrections – regressions with Inverse Mills ratio

Table 13-6 Heckman correction on regression with Premium as dependent variable

	Premium
Projected synergies	0.026***
	(0.009)
Inverse Mills	-0.112
	(0.393)
Disclosed synergy	-0.073**
	(0.031)
P/B - Difference	0.008**
	(0.004)
Same macro industry	-0.018
	(0.054)
Relative size	0.001
	(0.003)
All cash	0.082
	(0.080)
All stocks	-0.069
	(0.073)
Multiple bidders	0.142
	(0.101)
Operating expenses	0.083
	(0.061)
R&D expenses	0.122
	(0.521)
Interaction - Operating and No synergy disclosure	-0.074
	(0.053)
Interaction - R&D and No synergy disclosure	0.748*
	(0.416)
Constant	0.356
	(0.283)
Year dummies	Yes
Industry dummies	Yes
Observations	775
Adjusted R^2	0.115
Robust standard errors in parenthesis	*p<0.1; **p<0.05; ***p<0.01

Table 13-7 Heckman correction on regression with CAR as dependent variable

	CAR (-1,+1)
Premium	-0.048***
	(0.010)
Inverse Mills	0.004
	(0.027)
Disclosed synergy	-0.008
	(0.009)
Interaction - Disclosed synergy and Premium	0.052***
	(0.016)
P/B - Difference	0.001*
	(0.001)
Same macro industry	0.012
	(0.008)
Relative size	-0.0001
	(0.001)
All cash	0.037***
	(0.008)
All stocks	0.004
	(0.008)
Multiple bidders	0.030**
	(0.013)
Operating expenses	0.004
	(0.006)
R&D expenses	-0.003
	(0.041)
Constant	-0.038**
	(0.017)
Year dummies	Yes
Industry dummies	Yes
Observations	610
Adjusted R^2	0.126
Robust standard errors in parenthesis	*p<0.1; **p<0.05; ***p<0.01

13.4 Sensitivity analysis with different depending variables

13.4.1 Testing for Annually projection of synergies

Table 13-8 Regression 1 with Annually Projected synergies as dependent variable

	Annually projected synergies				
	(1)	(2)	(3)	(4)	(5)
Operating expenses	0.090***	0.093***	0.104***	0.105***	0.099***
	(0.018)	(0.018)	(0.020)	(0.020)	(0.019)
R&D expenses	0.537***	0.489***	0.506***	0.466**	0.419***
	(0.187)	(0.187)	(0.186)	(0.187)	(0.161)
Same macro industry		0.063**	0.061*	0.057*	0.060*
		(0.032)	(0.032)	(0.032)	(0.032)
Relative size			-0.0005	-0.001	-0.0005
			(0.0004)	(0.0004)	(0.0004)
P/B - Difference			0.004*	0.004*	0.004*
			(0.002)	(0.002)	(0.002)
Constant	0.011	-0.038	-0.041	-0.021	-0.030
	(0.025)	(0.036)	(0.035)	(0.035)	(0.032)
Year dummies	Yes	Yes	Yes	No	No
Industry dummies	Yes	Yes	Yes	Yes	No
Observations	210	210	210	210	210
Adjusted R^2	0.160	0.172	0.184	0.159	0.154
Standard errors in parenthesis					*p<0.1; **p<0.05; ***p<0.01

13.4.2 Testing for premium 4 weeks before announcement

Table 13-9 Regression 2 with Premium 4 weeks before announcement as dependent variable

	Premium 4 weeks				
	(1)	(2)	(3)	(4)	(5)
Projected synergies	0.052***	0.051***	0.052***	0.046***	0.047***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Disclosed synergy	-0.110***	-0.090***	-0.077**	-0.057*	-0.060*
	(0.030)	(0.031)	(0.031)	(0.030)	(0.032)
P/B - Difference		0.001	0.001	0.003	0.004
		(0.002)	(0.002)	(0.002)	(0.003)
Same macro industry		-0.018	-0.015	-0.018	-0.017
		(0.033)	(0.033)	(0.033)	(0.032)
Relative size		0.001**	0.001**	0.001*	0.001*
		(0.0003)	(0.0003)	(0.0003)	(0.0003)
All cash			0.059*	0.057*	0.060*
			(0.033)	(0.031)	(0.032)
All stocks			-0.067**	-0.069**	-0.066**
			(0.027)	(0.027)	(0.027)
Multiple bidders			0.276**	0.259***	0.258***
			(0.110)	(0.088)	(0.086)
Operating expenses				0.017	0.047
				(0.026)	(0.050)
R&D expenses				0.598	-0.022
				(0.386)	(0.250)
Interaction - R&D and No Disclosed synergy					0.767*
					(0.422)
Interaction - Operating and No Disclosed Synergy					-0.044
					(0.053)
Constant	0.345***	0.336***	0.304***	0.275***	0.273***
	(0.024)	(0.041)	(0.045)	(0.054)	(0.049)
Year dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Observations	775	775	775	775	775
Adjusted R^2	0.114	0.124	0.156	0.174	0.180

Robust standard errors in paranthesis *p<0.1; **p<0.05; ***p<0.01

13.4.3 Testing for different event windows in CAR

Table 13-10 Regression 3 with CAR (-1,0) as dependent variable

	CAR (-1,0)			
	(1)	(2)	(3)	(4)
Premium	-0.021**	-0.026***	-0.027***	-0.025**
	(0.010)	(0.009)	(0.009)	(0.010)
Disclosed synergy	-0.005	-0.002	-0.003	-0.002
	(0.010)	(0.009)	(0.009)	(0.009)
Interaction - Disclosed synergy and Premium	0.027	0.030*	0.030*	0.025
	(0.017)	(0.015)	(0.015)	(0.016)
Same macro industry		0.010	0.009	0.012
		(0.008)	(0.008)	(0.008)
All cash		0.024***	0.024***	0.024***
		(0.008)	(0.008)	(0.008)
All stocks		0.0002	0.0001	0.0001
		(0.007)	(0.007)	(0.007)
Multiple bidders		0.024*	0.024*	0.026**
		(0.013)	(0.013)	(0.013)
P/B - Difference			0.0001	0.00001
			(0.001)	(0.001)
Relative size			-0.00000	-0.00001
			(0.00003)	(0.00003)
Operating expenses				0.007
				(0.005)
R&D expenses				-0.036
				(0.034)
Constant	-0.005	-0.024**	-0.024**	-0.031***
	(0.009)	(0.012)	(0.012)	(0.012)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	610	610	610	610
Adjusted R^2	0.054	0.091	0.088	0.094

Robust standard errors in parenthesis *p<0.1; **p<0.05; ***p<0.01

Table 13-11 Regression 3 with CAR (-2,+2) as dependent variable

	CAR (-2,+2)			
	(1)	(2)	(3)	(4)
Premium	-0.034***	-0.042***	-0.044***	-0.046***
	(0.010)	(0.009)	(0.009)	(0.010)
Disclosed synergy	-0.014	-0.009	-0.010	-0.009
	(0.010)	(0.009)	(0.009)	(0.009)
Interaction - Disclosed synergy and Premium	0.054***	0.057***	0.056***	0.056***
	(0.017)	(0.015)	(0.015)	(0.016)
Same macro industry		0.013	0.012	0.013*
		(0.008)	(0.008)	(0.008)
All cash		0.036***	0.036***	0.036***
		(0.008)	(0.008)	(0.008)
All stocks		0.001	0.001	0.001
		(0.007)	(0.007)	(0.007)
Multiple bidders		0.027**	0.026**	0.027**
		(0.013)	(0.013)	(0.013)
P/B - Difference			0.001**	0.001**
			(0.001)	(0.001)
Relative size			0.00000	-0.00000
			(0.00003)	(0.00003)
Operating expenses				0.004
				(0.005)
R&D expenses				0.014
				(0.034)
Constant	-0.002	-0.029**	-0.029**	-0.033***
	(0.009)	(0.012)	(0.012)	(0.012)
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Observations	610	610	610	610
Adjusted R^2	0.056	0.101	0.111	0.110

Robust standard errors in parenthesis *p<0.1; **p<0.05; ***p<0.01

13.5 Statistical robustness

13.5.1 Testing for multicollinearity

Table 13-12 VIF - test for Multicollinearity

Variables	Regression 1	Regression 2		Regression 3
	(3)	(4)	(5)	(5)
Projected synergies		1.41	1.51	
Disclosed synergy		1.58	2.68	1.27
Premium				1.64
Ineraction - Disclosed synergy and Premium				2.54
P/B Difference	1.03	1.12	1.13	1.15
Same macro industry	1.06	1.13	1.13	1.14
Relative size	1.18	1.22	1.22	1.26
All cash		1.62	1.63	1.62
All stocks		1.25	1.26	1.26
Multiple bidders		1.03	1.03	1.04
Operating expenses	1.26	1.47	4.13	1.48
R&D expenses	1.43	1.61	6.76	1.73
Interaction - Operating and No Disclosed Synergy			4.90	
Interaction - R&D and No Disclosed synergy			6.64	
Average VIF	1.19	1.34	2.83	1.47

Table 13-13 Correlation matrix - Disclosed synergy sample

Correlation	R&D expenses	Operating expenses	P/B Diff	Relative Size	Same Macro Industry
R&D expenses	1				
Operating expenses	0.172	1			
P/B Diff	-0.039	0.016	1		
Relative Size	0.024	-0.054	0.145	1	
Same Macro Industry	0.063	-0.115	-0.067	0.017	1

Table 13-14 Correlation matrix - Whole sample

Correlation	Synergies	R&D expenses	Operating expenses	P/B Diff	Relative Size	Same Macro	All Cash	All Stocks	Multiple Bidders
Synergies	1								
R&D expenses	-0.022	1							
Operating expenses	0.022	0.234	1						
P/B Diff	0.032	-0.282	-0.076	1					
Relative Size	-0.065	0.152	0.247	-0.118	1				
Same Macro Industry	0.015	-0.023	-0.227	0.001	-0.104	1			
All Cash	0.016	0.236	0.319	-0.061	0.344	-0.167	1		
All Stocks	0.041	-0.131	-0.174	0.052	-0.161	0.115	-0.421	1	
Multiple Bidders	-0.018	0.081	-0.009	-0.003	-0.026	0.017	0.024	-0.055	1

Table 13-15 Correlation matrix - CAR sample

Correlation	Premium	Synergy Disclosure	Same Macro Industry	All Cash	All Stock	Multiple Bidders	P/B Diff	Relative Size
Premium	1							
Synergy Disclosure	-0.055	1						
Same Macro Industry	-0.069	-0.062	1					
All Cash	0.178	-0.054	-0.182	1				
All Stock	-0.124	0.033	0.113	-0.424	1			
Multiple Bidders	0.104	0.024	0.009	0.023	-0.048	1		
P/B Diff	0.077	0.015	0.007	-0.064	0.046	-0.001	1	
Relative Size	-0.018	-0.073	-0.021	0.150	-0.072	-0.160	-0.066	1

13.5.2 Testing for heteroscedasticity

Table 13-16 Breausch-Pagan test for Heteroscedasticity

Breusch-Pagan test for Heteroscedasticity	Regression 1 (3)	Regression 2 (5)	Regression 3 (4)
χ^2	14.579	98.103	50.748
P-value	0.3344	0.00000	0.0001

13.6 Regressions displayed with inclusion of year and industry dummies

Table 13-17 Regression 1 - All variables included

	Projected synergies				
	(1)	(2)	(3)	(4)	(5)
Operating expenses	0.786***	0.810***	0.903***	0.910***	0.824***
	(0.177)	(0.176)	(0.189)	(0.190)	(0.188)
R&D expenses	3.963**	3.478*	3.652**	3.331*	2.604*
	(1.799)	(1.799)	(1.787)	(1.801)	(1.554)
Same macro industry		0.637**	0.609**	0.580*	0.644**
		(0.306)	(0.305)	(0.307)	(0.306)
Relative size			-0.004	-0.004	-0.003
			(0.004)	(0.004)	(0.004)
P/B - Difference			0.044*	0.045*	0.042*
			(0.023)	(0.023)	(0.023)
Energy and Power	-0.508	-0.554	-0.595	-0.540	
	(0.462)	(0.459)	(0.456)	(0.451)	
Healthcare	-0.604	-0.605	-0.602	-0.556	
	(0.378)	(0.375)	(0.372)	(0.376)	
High Technology	-0.388	-0.293	-0.343	-0.226	
	(0.405)	(0.404)	(0.402)	(0.406)	
Financials	0.973*	0.864*	0.929*	0.913*	
	(0.503)	(0.501)	(0.498)	(0.505)	
2009/2010	1.125***	1.144***	1.133***		
	(0.412)	(0.409)	(0.406)		
2011/2012	-0.400	-0.348	-0.382		
	(0.508)	(0.505)	(0.501)		
2013/2014	0.033	0.017	0.019		
	(0.533)	(0.529)	(0.525)		
2015/2016	0.290	0.269	0.229		
	(0.487)	(0.483)	(0.480)		
Constant	0.443*	-0.057	-0.078	0.089	0.023
	(0.246)	(0.342)	(0.341)	(0.333)	(0.313)
Observations	210	210	210	210	210
R^2	0.168	0.185	0.206	0.167	0.134
Adjusted R^2	0.126	0.140	0.153	0.130	0.113
Residual Std. Error	1.842 (df = 199)	1.827 (df = 198)	1.813 (df = 196)	1.838 (df = 200)	1.855 (df = 204)
F Statistic	4.004*** (df = 10; 199)	4.096*** (df = 11; 198)	3.907*** (df = 13; 196)	4.470*** (df = 9; 200)	6.333*** (df = 5; 204)

Standard errors in parenthesis *p<0.1; **p<0.05; ***p<0.01

Table 13-18 Regression 2 - All variables included

	Premium				
	(1)	(2)	(3)	(4)	(5)
Projected synergies	0.038***	0.037***	0.037***	0.028***	0.027***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Disclosed synergy	-0.100***	-0.085***	-0.072**	-0.051*	-0.075**
	(0.030)	(0.031)	(0.031)	(0.030)	(0.032)
P/B - Difference		0.004***	0.004**	0.006***	0.007***
		(0.002)	(0.002)	(0.002)	(0.003)
Same macro industry		-0.037	-0.033	-0.030	-0.029
		(0.033)	(0.033)	(0.033)	(0.032)
Relative size		0.001*	0.0004	0.0003	0.0003
		(0.0003)	(0.0003)	(0.0003)	(0.0003)
All cash			0.062*	0.057*	0.061*
			(0.033)	(0.031)	(0.032)
All stocks			-0.053**	-0.054**	-0.050*
			(0.027)	(0.027)	(0.027)
Multiple bidders			0.165	0.153*	0.150*
			(0.110)	(0.088)	(0.086)
Operating expenses				0.045*	0.095*
				(0.026)	(0.050)
R&D expenses				0.565	-0.026
				(0.386)	(0.250)
Interaction - R&D and No Disclosed synergy					0.741*
					(0.422)
Interaction - Operating and No Disclosed Synergy					-0.073
					(0.053)
Energy and Power	-0.064	-0.053	-0.024	0.001	-0.002
	(0.049)	(0.048)	(0.051)	(0.054)	(0.051)
Healthcare	-0.006	-0.007	-0.018	-0.083	-0.080
	(0.028)	(0.028)	(0.028)	(0.054)	(0.051)
High Technology	0.107**	0.113**	0.095*	0.049	0.044
	(0.053)	(0.053)	(0.049)	(0.040)	(0.040)
Financials	-0.044	-0.025	0.015	0.061	0.055
	(0.028)	(0.027)	(0.029)	(0.038)	(0.035)
2009/2010	0.082**	0.080**	0.084**	0.084**	0.083**
	(0.036)	(0.036)	(0.036)	(0.037)	(0.037)
2011/2012	0.060	0.052	0.042	0.050	0.048
	(0.041)	(0.041)	(0.042)	(0.042)	(0.042)
2013/2014	0.018	0.011	0.015	0.013	0.011
	(0.041)	(0.041)	(0.041)	(0.042)	(0.041)
2015/2016	0.052	0.045	0.035	0.031	0.032
	(0.035)	(0.035)	(0.036)	(0.036)	(0.036)

Constant	0.347***	0.357***	0.326***	0.271***	0.277***
	(0.024)	(0.041)	(0.045)	(0.054)	(0.049)
Observations	775	775	775	775	775
R^2	0.062	0.077	0.099	0.128	0.139
Adjusted R^2	0.050	0.061	0.080	0.108	0.116
Residual Std. Error	0.322 (df = 764)	0.320 (df = 761)	0.317 (df = 758)	0.312 (df = 756)	0.311 (df = 754)
F Statistic	5.033*** (df = 10; 764)	4.888*** (df = 13; 761)	5.207*** (df = 16; 758)	6.189*** (df = 18; 756)	6.090*** (df = 20; 754)

Robust standard errors in parenthesis *p<0.1; **p<0.05; ***p<0.01

Table 13-19 Regression Hypothesis 3 - All variables included

	CAR			
	(1)	(2)	(3)	(4)
Premium	-0.037***	-0.045***	-0.047***	-0.048***
	(0.010)	(0.009)	(0.009)	(0.010)
Disclosed synergy	-0.013	-0.008	-0.008	-0.008
	(0.010)	(0.009)	(0.009)	(0.009)
Interaction - Disclosed synergy and Premium	0.050***	0.054***	0.053***	0.052***
	(0.017)	(0.015)	(0.015)	(0.016)
Same macro industry		0.012	0.012	0.013*
		(0.008)	(0.008)	(0.008)
All cash		0.037***	0.037***	0.037***
		(0.008)	(0.008)	(0.008)
All stocks		0.004	0.004	0.004
		(0.007)	(0.007)	(0.007)
Multiple bidders		0.029**	0.029**	0.030**
		(0.013)	(0.013)	(0.013)
P/B - Difference			0.001**	0.001**
			(0.001)	(0.001)
Relative size			0.00001	0.00000
			(0.00003)	(0.00003)
Operating expenses				0.003
				(0.005)
R&D expenses				0.001
				(0.034)
Energy and Power	-0.043***	-0.035***	-0.035***	-0.034***
	(0.010)	(0.010)	(0.010)	(0.009)
Healthcare	0.001	-0.008	-0.004	-0.004
	(0.011)	(0.011)	(0.011)	(0.011)
High Technology	0.002	-0.004	-0.002	-0.002
	(0.009)	(0.008)	(0.008)	(0.009)
Financials	-0.014**	-0.001	-0.002	0.001
	(0.007)	(0.008)	(0.008)	(0.008)
2009/2010	0.014	0.015*	0.014	0.015

	(0.009)	(0.009)	(0.009)	(0.009)
2011/2012	0.022**	0.021**	0.020**	0.019**
	(0.010)	(0.010)	(0.010)	(0.010)
2013/2014	0.035***	0.033***	0.034***	0.034***
	(0.008)	(0.008)	(0.008)	(0.008)
2015/2016	0.007	0.007	0.007	0.007
	(0.008)	(0.008)	(0.008)	(0.008)
Constant	-0.004	-0.032***	-0.032***	-0.035***
	(0.009)	(0.012)	(0.012)	(0.012)
Observations	610	610	610	610
R^2	0.084	0.139	0.154	0.155
Adjusted R^2	0.067	0.118	0.129	0.127
Residual Std. Error	0.068 (df = 598)	0.066 (df = 594)	0.065 (df = 592)	0.065 (df = 590)
F Statistic	4.981*** (df = 11; 598)	6.410*** (df = 15; 594)	6.326*** (df = 17; 592)	5.675*** (df = 19; 590)
Robust standard errors in parenthesis				*p<0.1; **p<0.05; ***p<0.01