

**ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
BSc Economics & Business**

**A comparison of acquirer's shareholder value following
an M&A announcement of either a meat or an alternative
meat manufacturer**



Author: Peter Mathieu Smeets
Student number: 492734ps
Thesis supervisor: Dr. J.J.G. Lemmen
Second reader: Dr. S. Van den Hauwe
Finish date: August 2021

ABSTRACT

This paper analyses mergers and acquisitions (M&A) in the market of meat substitutes and the regular meat industry. I investigate whether M&As in the alternative meat sector yield higher returns for acquirers as compared to meat manufacturer deals. For this, I shall use a sample of global deals made in the time period of 2000 to 2020. Returns shall be based on the acquirer's abnormal returns, following an M&A announcement. My research finds that acquisition of meat targets yields positive abnormal returns whereas the meat substitute deals yield insignificant negative abnormal returns. Meat substitute target types with high environmental social governance ratings yield more positive acquirer abnormal returns around the announcement date than regular meat deals.

Keywords: Meat (substitutes), alternative protein, industry comparison, abnormal returns, mergers & acquisitions

JEL Classification: G32, G34, Q5

Table of Contents

LIST OF TABLES	4
LIST OF FIGURES	5
1 Introduction	6
1.1 Research Question	6
1.2 Main findings.....	7
1.3 Structure	7
2 LITERATURE REVIEW	8
2.1 Motives for M&A	8
2.2 M&As in the regular meat industry.....	9
2.3 M&As in the alternative meat industry.....	12
2.4 Relationship ESG with M&A in both industries.....	14
3 METHODOLOGY	15
3.1 Event study.....	15
3.2 Winsorization	16
4 DATA	18
4.1 Data selection.....	18
4.2 Sample selection.....	18
4.3 Propensity score matching	19
4.4 Multicollinearity problem	20
5 Chapter 5 RESULTS	21
5.1 5.1 Hypothesis one.....	21
5.2 Hypothesis two	22
5.3 Hypothesis three.....	23
5.4 Hypothesis four	25
5.5 Relative industry comparison	26
5.6 Hypothesis five	27
6 CONCLUSION.....	30
6.1 Conclusion & Discussion.....	30
6.2 Limitations.....	31
6.3 Suggestions for further research.....	31

LIST OF TABLES

Table 4.1	Results propensity score matching	19
Table 4.2	Multicollinearity test	20
Table 5.1	Abnormal returns on meat target sample	21
Table 5.2	Frequency Distribution within both samples before and after the Oct 2015	22
Table 5.3	Abnormal returns meat target sample before and after October 2015	23
Table 5.4	Abnormal returns alternative meat sample before and after October 2015	24
Table 5.5	Regression analysis two-way interaction of Target Type and pre or post-2015	25
Table 5.6	Abnormal returns on alternative meat target sample and industry comparison	26
Table 5.7	Direct effects ESG-score and interaction effects with Target Type on CAARs	27

LIST OF FIGURES

Figure 5.1	Interaction effects of ESG score and target type	28
------------	--	----

1 Introduction

During the past decades, large players in the meat industry have amalgamated smaller manufacturers through mergers and acquisitions. At the same time, awareness of the negative consequences, related to consumption and the breeding of chicken, pork and beef has grown. The true costs of meat production are not considered, for the actual price. These costs involve animal suffering, global warming, decreasing biodiversity, general health and wellbeing of individuals etc. Population & income growth have only worsened the problem. Therefore, support for alternative proteins are growing rapidly. Consequently, mergers and acquisitions are increasingly conducted in the meat-substitute sector as compared to the rather consolidated, regular meat industry. Big corporations have also seized the opportunity to shift into meat substitutes through M&A and finance young disruptive enterprises in the sector. Newcomers have commenced to advance in innovative technology to manufacture meat substitutes. The goal of this paper is to determine whether plant-based meats create more shareholder value in the M&A context. More specifically, I shall research the acquirer's short-term abnormal returns, following take overs of (alternative) meat manufacturers.

1.1 Research Question

Since interest rates fluctuate around 0% and people would rather invest than save their money, the M&A industry is an attractive option. The paper shall shed light on both the social, environmental and financial advantages of specifically investing in meat substitute enterprises. In this non-consolidated sector lies huge potential. I am curious about the time it will take meat substitutes to reach price and taste parity with regular meat. More investments in and resources for the alternative meat industry will accelerate this process. I shall explain and hopefully prove the financial advantages of M&A in plant-based protein. Furthermore, to my knowledge, this is the first research concerning meat substitutes that extensively examines the acquirer abnormal returns in comparison to M&A in meat targets. This way, I hope to contribute to speeding up the growth of the alternative meat industry. For that reason, my research question is:

To what extent do acquirer short-term abnormal returns following M&A announcements of firms in the alternative meat industry outperform the acquisitions of regular meat industry world-wide?

This paper only analyses the short-term instead of the long-term acquirer wealth gains as these have a higher likelihood of solely capturing the effect of the M&A announcement instead of other events. This facilitates a more isolated announcement effect which makes it easier to draw conclusions (Barber and Lyon, 1997). In total 85 public firms will be analyzed to see whether or not there is a significant difference in cumulative abnormal returns, around the announcement date of an M&A deal, for acquirers between 2000-2020.

1.2 Main findings

For the three event windows around the announcement date, significant positive average cumulative abnormal returns (CARs) were found of .017* .022** .018**¹, meaning M&A in the meat industry yields very high shareholder value for the acquiring party. No significant results were found for M&A in the alternative meat industry. Significant changes in CARs were not found in meat or meat substitutes when separately comparing the CARs for each industry before and after 2015.

When mergers or acquisitions of meat companies occur, the acquirer ESG score barely affects the average CARs since no direct effects are found for the ESG-score or the target type. However, the meat substitute deals are positively related with average CARs for acquirers with high ESG ratings. Thus, solely for acquirers with high ESG-scores, the acquisition of meat substitute target types yields more positive returns around the announcement date and after the event date compared to acquisition of targets from the meat industry, because of interaction effects.

1.3 Structure

As for the rest of the paper, it is structured as follows: Firstly, the second chapter contains the literature on M&A, abnormal returns and more specifically in both the meat and meat substitute industry. It also introduces the hypotheses and discusses significant events and ESG-effects for the (alternative) meat targets. Secondly, chapter three discusses the methods used to conduct my research. Thirdly, the data and sample selection are analyzed. Subsequently, in chapter 5, the empirical results for all five hypotheses are given and examined. Lastly, chapter 6, thereafter elaborates on limitations and gives suggestions for further research.

¹ * and ** indicate statistical significance at the 0.10 and 0.05 level.

2 LITERATURE REVIEW

There are many reasons for companies to buy other companies. From the managers' point of view, a firm would acquire another company if it believes that its earnings from the acquisition shall eventually exceed what is spent to complete the acquisition. This positive net return could occur for several reasons. Firstly, the firm that has been bought might have been wrongly valued lower than its actual worth, meaning the bidding firm spent less than it gained from the acquisition. Secondly, merging with another firm usually means production of goods increases which could lower the cost per unit and therefore increase profits. Another advantage from M&A could be that the two firms combined create more value than the two individual firms. Additionally, post-acquisition, the bidding firm has a more dominant position in the industry which enables the firm to negotiate to its advantage with suppliers. The shareholders of the buying company on the other hand, are inclined to focus on Earnings Per Share (EPS), meaning they value how their income from dividend changes as a result of the acquisition. The following section discusses the motives to engage in M&A and the industry specific M&A market. Thereafter this paper shall describe the gains made from M&A deals which exceed the earnings in the stock markets for the meat and the alternative meat industry. Also, this section discusses the differences between the post-announcement abnormal returns before- and after October 2015. In this period two major events occurred which likely affected the meat and meat substitute industry: The Paris Agreement and a WHO report linking consumption of meat to cancer. Lastly, the effect of the acquirer and target ESG score on the earnings following the announcement of a merger or acquisition will be discussed.

2.1 *Motives for M&A*

There are conflicting views on M&A motives to be found in the literature. However, the most dominant theory for mergers and acquisitions to take place is value maximization (Lubatkin, 1987). Berkovitch and Narayanan (1993) agree on this point and add that this value maximization is often obtained by various sources of synergies. According to them, acquirers only participate in M&A deals if this results in an overall financial gain. Jensen and Ruback (1983) elaborate on the synergy motive. They state that the value is maximized through creation of economies of scope, economies of scale and by gaining market share. Schuler and Jackson (2001) make a clearer distinction between mergers and acquisitions. In order to increase market dominance, horizontal mergers are realized and to improve channel control, vertical mergers are initiated. As for acquisitions, the primary drivers for firms are acquisition of: cash, knowledge, talent and more assets to make leverage more accessible. Moreover, he argues that growth, deferred taxes, flexibility and survival are primary drivers for companies to acquire target firms.

In 1996, a study by Mitchell and Mulherin found that waves of M&A deals often take place after regulatory, economic and technological shocks. Shleifer and Vishny (2003) partially agree. The reason for this is that these shocks cannot be the sole reason for aggregate waves. If there is a technological advancement in a certain industry, this shall not create a cumulative wave across the entire M&A market. In their opinion, acquisitions take place as a consequence of market mispricing. Another researcher (Bower, 2001) stresses that acquisition motives are numerous and varied. On the one hand, M&A can be used to take advantage of a target's technological advancements or to combine R&D. By doing so, companies can work together as complementary entities and achieve major synergy advantages. This is in line with what previously mentioned researchers state. On the other hand, globalization has given rise to a rapidly changing environment in which fast adaptation is crucial. For instance, in case of diminishing demand, overcapacity can quickly be dealt with, new products can quickly be sold in new markets and the threat of competitive rivalry can be reduced. This can all be achieved relatively effortlessly through participating in the M&A market.

2.2 M&As in the regular meat industry

Approximately one third of global calorie intake by humans comes from chicken, pork and beef. To keep up with demand, the industrial meat industry has evolved in a gigantic, multiplex market.² It involves animal feed manufacturers & transporters, storage centers, stock-breeders, feeding companies, slaughterhouses, meat & processing companies and retailers. Pre-covid, in 2019, "the 6 largest meat companies had a combined \$60B in market capitalization, with the largest, Hormel, boasting a \$23B valuation."³ The meat market has experienced consolidation for years. The industry has matured and M&A has been a contributor to maintain profitability, despite offering similar products, at roughly the same price and quality, to the same markets. At the same time, disruptive innovation in the animal-based meat industry has lagged. During the 'expansion stage' in consolidation, the frequency of M&As is low, but the deals are usually large in size.⁴ As for large acquirers in the meat industry, the high-profile acquisitions are mainly focused on increasing market share to take on rival companies more effectively. As most firms are mature and predictable, the acquisition could yield a good return on investment and boost EPS which shall please its shareholders and raise stock prices.

Previous studies have shown that gains from a takeover are related to the target's size, which is most likely large in case of the meat industry. According to research by Fuller et al. (2002), it is more challenging and costlier to integrate large targets, which in turn results in lower abnormal returns. Unfortunately, sufficient data lacks for the relative size of targets to conduct statistical research on

² <https://www.cbinsights.com/research/future-of-meat-industrial-farming/>

³ <https://www.monigroup.com/article/our-meatless-future-how-90b-global-meat-market-gets-disrupted>

⁴ <https://investmentbank.com/industry-consolidation/>

this determinant of CARs. Yet, meat manufacturers are generally larger in size as compared to producers of mock meats. Stating that meat M&As therefore generate lower shareholder value would be in line with Fuller et al. (2002).

However, studies by Alexandridis et al. (2013) argue that targets of larger size generally have a large product market share and therefore help the acquirer in building a dominant market position. Taking both studies into consideration, the large target size has an ambiguous effect on the announcement effect of M&A deals in the meat sector.

As for the influence of bidding firms' size on M&A gains, Alexandridis et al. (2013) take a stance as well. They find that large acquirers often engage in takeovers for fuzzy reasons such as ego or politicking. Managerial hubris and the urge of empire building can result in acquirers paying higher premiums, resulting in lower abnormal returns. Meat giants such as Hormel, Cargill, Tyson Foods or JBS could potentially fall victim to these pitfalls. In contrast, Niinivaara (2010) explains that larger acquirers have a stronger bargaining position and that this shall in fact reduce the premiums paid. Since these high-profile deals catch a lot of media attention, disproportionate premiums shall negatively affect the short-run share prices too. Moeller et al. (2004) affirm the stance taken by Alexandridis et al. (2013). Their research elaborates on the M&A decisions of large firms. Managerial hubris causes these conglomerates to engage in mergers with suboptimal synergy gains, causing lower abnormal returns around the announcement date. Based on target and acquirer size, I believe that in the short run, mergers in the meat industry results in negative abnormal returns for the bidding firms. My first hypothesis is:

H1: In the short-run, the acquirer announcement effect on abnormal returns following mergers in the meat industry is negative.

Over the past years, the meat industry has increasingly received bad media attention. A major hit was taken in 2015, after a press release by the International Agency for Research on Cancer (IARC) made headlines all over the world. The organization stated that it had found a significant relation between red meat & processed meat consumption and an increased risk of cancer. The research agency which is an arm of the World Health Organisation (WHO) did not only conduct research itself but also used combined evidence, obtained from over 800 studies on consuming meat and cancer links (Unknown, 2015). The question is what effect the publication would have a noticeable effect on the global meat industry. Due to how recently the WHO released its publication, little research has been published on effects of the IARC report. However, more research has been done on the effect of similar events for the companies in certain industries.

In the event study methodology, a major assumption is the efficient markets hypothesis. It states that the worth of a company, appointed by players in the financial market will be “the best available unbiased estimates of the value of a company’s assets,” (Fama, 1970 and Konar, 1997). All available information about a company eventually determines this value mentioned above. When new information, which potentially has an impact on the company operations, is made publicly available, the company share price will change as a response to this news. In this particular case, this information is the IARC announcement by the WHO, on October 26th, 2015. As the meat industry is highly concentrated and just a small number of large companies account for the most of the market size, large M&A deals generally gain a lot of media attention. Public opinion on meat has been affected by this press release and I therefore initially expect that mergers in the meat industry shall be perceived as value diminishing for the acquirer after 2015. However, research by Downs (2009) and Cao (2015) gave evidence that consumers’ behaviour is not affected significantly by food safety information. This study was done on the link between obese and certain unhealthy foods but the effects of the publication are likely to be similar for the IARC publication and might and may lessen the impact of the announcement on share prices. I am inconclusive about the change the IARC article has brought about for the short-term shareholder value, following M&A in the meat industry.

In the same year as the WHO report, the Paris Agreement was signed by 196 countries. The Paris Agreement of 2015 likely affected the meat and meat substitute M&A market. Meat companies emit massive amounts of CO₂ and methane every year. Countries which committed to the emission targets are likely to introduce new punitive regulations for the unsustainable livestock industry at some point in the future. When, where and what measures will be implemented is unsure, but for the long-run, the meat industry shall have to cut back on its meat production one way or the other. Therefore, I hypothesize that this event, as well as the WHO report, will lead to fewer investments in the meat industry on the financial markets. Acquisition of a meat target might have therefore led to lower abnormal returns after 2015. Bidding firms, seeking to buy new companies might be keen on acquiring alternative protein manufacturers to emit less CO₂ as compared to merging with a livestock company. Hence, buying meat targets might not yield more shareholder value following the announcement date.

Taking both the WHO report and the Paris Agreement into account, I am curious whether lower abnormal returns were yielded after 2015. My second hypothesis is:

H2: The acquirer short-term abnormal returns from deals in the meat industry were significantly different before October 2015 as compared to afterwards.

2.3 M&As in the alternative meat industry

At the same time, the recognition of meat as being hazardous to consumers most likely increased popularity of firms that produce alternative sources of protein. This is in line with the third hypotheses:

H3: The short-term acquirer abnormal returns from deals in the alternative meat industry were higher after October 2015 as compared to before.

As stated above I hypothesize the IARC announcement to have had a positive impact on acquirer abnormal returns but there are more factors impacting the ARs. Overall, meat substitutes are gaining traction. Start-ups using technology to engineer alternative meat are developing high-end protein products. “The global meat substitute market size was valued at USD 4,340.5 million in 2018 and is projected to reach USD 8,155.8 million by 2026, exhibiting a compound annual growth rate (CAGR) of 8.4% during the forecast period.” Naturally, an acquirer might be particularly interested to take over the seller because it needs to grow more quickly and sees a the faster-growing, meat substitute company as a way to accomplish this. While the potential is huge, there are still major challenges ahead to reach price and taste parity with ‘real’ meat.⁵ Market trends that are driving this growth are increasingly beneficial government regulations and policies, swelling investments by players in the meat substitute sector as well as the meat industry and augmented consumer preferences for ‘mock meats. This affirms Mitchell and Mulherin’s (1996) research that waves of M&A deals often take place after regulatory, economic and technological shocks. “A recent study found that about 11% of consumers in the US, UK, and Germany are very interested in alternative proteins; 66% are somewhat interested.”⁶

The higher price and perceived inferior taste are reason for individuals to not buy these products.⁷ Whether investors engage in mergers and acquisitions is a good indication of their faith in the profitability of the meat substitute sector. Therefore, my initial belief is that abnormal returns in this branch are relatively high. The alternative meat industry is both ethically and environmentally beneficial, compared to consuming and manufacturing animal-based protein. Research by Gregory et al. (2014) found that corporate social responsibility (CSR) has a positive effect on short- and long-term growth rates in firm’s abnormal earnings. The question remains whether empirics will prove this too, for the M&A deals used in this paper. Therefore, my fourth hypothesis is:

⁵ <https://www.fortunebusinessinsights.com/industry-reports/meat-substitutes-market-100239>

⁶ <https://web-assets.bcg.com/a0/28/4295860343c6a2a5b9f4e3436114/bcg-food-for-thought-the-protein-transformation-mar-2021.pdf>

⁷ <https://web-assets.bcg.com/a0/28/4295860343c6a2a5b9f4e3436114/bcg-food-for-thought-the-protein-transformation-mar-2021.pdf>

H4: The announcement of an M&A deal in the alternative meat industry yields positive abnormal returns for the acquirer.

This topic is especially interesting since the importance of investing in socially responsible companies to the acquirer's operations is soaring. Acquirer's focus on alternative protein when it is in line with their long-term vision or because shareholders push them into this direction for ethical reasons. Additionally, over the past decade, the number of firms publishing yearly CSR reports, providing data about their CSR acquisitions has surged (Deng et al., 2013). This has led to a greater necessity for firms to be transparent to shareholders and nudges them to invest in alternative meat rather than animal-based meat.

As discussed before, the main reason for engaging in M&A is to maximize value. Research by Malik (2014) and Harper (2012) has shown that a company with potential value-enhancing capabilities is more likely to become an M&A target. The bidding company sees the takeover as a way of maximizing value by implementing the sellers' capabilities (Berchicci et al., 2012). This is particularly the case in the alternative meat industry. In many cases, the smaller targets have mainly invested in R&D and larger firms want to take advantage of their technological advancements in either taste or production efficiency. The target often possesses important intellectual property that both the acquiring firm as well as investors view as essential. An acquisition signals that the acquirer is ahead of competitors in reaching either price or taste parity to regular meat. Because of that, closing such deals and consequent acquisition announcements could greatly boost the bidders' abnormal returns, which is in line with the fourth hypothesis.

The relation between the target's corporate social responsibility and acquirer returns are well-documented in M&A literature. Aktas et al. (2011) find that acquisitions of firms who conduct business responsibly signals that the bidding party is keen on learning from their CSR operations. This is beneficial to acquirer shareholders. Namely, if value is created by acquiring alternative meat manufacturers with high CSR scores, then the abnormal returns of the acquiring firm are positively impacted by the target CSR rating (Aktas et al., 2011). Betton and Eckbo (2000) most likely endorse this point of view. According to them, the target's reputation is a major determinant of the announcement effect for acquisitions. As the target's CSR score falls within the company's overall image, the CSR shall positively impact the acquirer's abnormal returns around M&A announcements. A few years later, similar, more specific conclusions are drawn by Aksak et al. (2016). Corporate socially responsible conduct communicates moral values and shall build a stronger brand name. This in turn improves the regard financial market participants have of the company and shall augment share prices. As meat substitute manufacturers contribute to an environmentally and societal sustainable future, they also enhance the bidding firms' reputation in case of a deal. Consequently, the

acquirer's ability to acquire financing sources from governmental organizations and financial investors improves as well (McGuire et al., 1988). This again supports that the announcement effect of an M&A deal in the plant-based meat industry should yield positive shareholder value as stated in H4.

2.4 Relationship ESG with M&A in both industries

In the paragraphs above on hypotheses 4, alternative meat targets are assumed to have earned higher CSR scores as compared to the regular meat targets in the sample that is used. A way of quantifying CSR is using the Environmental Social Governance (ESG) score as a measure of CSR. The ESG rating is a transparent reflection of a firm's performance based on its environmental, corporate governance and social performance. ESG was first defined and mentioned as a term in 2005, in a conference report about the effect of ESG components on the financial markets. At this conference regulators, investors and asset managers met and unanimously agreed on the importance of ESG in companies' operations. Nonetheless, businesses did not act convincingly upon these ESG agreements. In 2015, all United Nations member states signed the Paris Agreement on Climate Change. This did not only affect the popularity of meat manufacturers on the financial markets which contributed to my view on H2 and H3. It also had an impact on the importance of ESG. After 2015, ESG gained traction and got publicized for an increasing number of firms. Many relevant events took place in 2015 that might have affected M&A in the (alternative) meat industry as stated before. I believe researching the effect of acquirer ESG scores shall too yield interesting results as well in the context of this paper. In the past two decades, studies linking acquirer ESG and M&A returns have increasingly been published. Research by Deng et al. (2013) analyse a sample from 1992 to 2007 of 1556 deals in North America and find that high CSR rated acquirers, earn higher abnormal returns around the announcement date. A study by Rani et al. (2014) supports these findings. They have examined 155 deals globally between 2003 and 2008 and find a positive relationship between the short-run returns of acquiring firms and their CSR rating. Which is, in case of my research, based on ESG ratings. In case of meat substitutes, this could be the case because financial market participants have more trust in a fruitful merger when the acquirer has experience on how to run operations of similar ESG targets. In contrast, other research using a sample of 113 European and U.S. deals finds no significant effect between acquirer ESG rating and their short-term abnormal returns. (Meckl and Theuerkorn, 2015). This implies that acquirer ESG behaviour is not rewarded in the financial market. Research shows mixed results on this topic. I am particularly interested whether alternative meat M&As yield higher returns for socially, environmentally responsible or irresponsible acquirers. Hence, the fifth hypothesis is:

H5: The abnormal returns around alternative meat M&A announcements are larger for acquirers with a high ESG score as compared to acquirers with a low ESG score.

3 METHODOLOGY

3.1 Event study

To investigate the impact of M&A on stock prices around the announcement day, this study will use a standard event study which is described by MacKinlay (1997) and Brown and Warner (1985). This method enables you to investigate if there is a measurable response from investors to an occurrence of a given type of event on the share price of a company. One assumption of the event study method is the market place rationality, which has direct reflection of the merger or acquisition in the stock prices (Mackinlay, 1997). In order to do so the event window, which is the chosen time interval around the announcements date, has to be determined. An estimation period does not need to be accounted for in the market-adjusted model. For calculation of the abnormal returns, the market adjusted model is used with data from three days before the event date, the announcement day itself and three days after the announcement ($t=-3$ to $t=3$). For all dates within this window, the acquirer share prices have been retrieved and have been adjusted to the market index. This research will analyze a short event window to eliminate all other factors which could potentially influence a firms' security price and to isolate the announcement effect. Since the deals in my sample are from acquisitions all over the world, the MSCI has been chosen as a measure of the market index. The objective of an event study is to investigate the M&A announcement effect on stock prices. The bidding firms' abnormal returns ($AR_{i,t}$), are calculated as shown in formula underneath:

$$AR_{it} = R_{it} - R_{mt} \quad (1)$$

In the chosen model, the observed return of the MSCI index on day t (R_{mt}) is subtracted from the return (R_{it}) of the observation i on day t . The observation is simply the return of the acquirers' shares. The AR observations must also be accumulated to deduce inferences for an event. To calculate the cumulative abnormal return (CAR) for the acquirer the abnormal returns for 7 days are taken and different time spans shall be given as to compare different outcomes. To evaluate the statistical significance of the cumulative abnormal returns, a one-sample t-test is used. As for answering the hypotheses, the following tests used are: one-sample t-test, two-sample t-test, and regression analyses. As a measure of effect size, Hedge's g and R-Squared were calculated. Hedges' g is a measure of effect size, which tells us how many standard deviations the average CARs of meat substitute targets differ from the regular meat group. The Hedge's g formula is:

$$Hedge's\ g = \frac{Mean_1 - Mean_2}{SD_{pooled}} \quad (2)$$

In which:

M_1 = average CARs of meat deals for a certain event window

M_2 = average CARs of meat substitute deals for a certain event window

SD_{pooled} = pooled standard deviation

Hedges' g does have an inflation, or in other words, an upward bias in outcomes around 3%. Cohen's d and Hedges' g do not differ much, and generally standard deviations of results are the close.

However, when a sample size is below 20, Hedges' g performs better than Cohen's d. A rule of thumb is that a Hedge's g below < 0.20 implies a negligible difference between both industries,

Hedge's g indicates how many standard deviations both groups differ:

$< .20$ negligible

$> .20$ "small" effect (R squared .01 -> $r = .10$)

$> .50$ "medium" effect (R squared .09 -> $r = .30$)

$> .80$ "strong" effect (R squared .25 -> $r = .50$)

R-squared (R^2) is a measure that shows the proportion of the variance for a dependent variable, in this case the average CAR, that is explained by the independent dummy variable, namely meat substitutes as a target. R-squared explains to what extent the independent variables explain the variance of the dependent variable.

$$R^2 = 1 - \frac{RSS}{TSS} \quad (3)$$

RSS = sum of squares of residuals, which is the unexplained variation

TSS = total sum of squares, which is the total variation

Conveniently, the t-test assumes sample normal distribution which is crucial given the minor size of the sample. In this respect, regression analysis assumes normality of residuals, linear relationships between predictors and the dependent variable, independence and homoscedasticity of the error term.

3.2 **Winsorization**

Within the dataset, outliers need to be accounted for to ensure that the statistical inference is reliable. The extreme data points can contain valuable information in the already small sample size. To avoid deleting useful data, I winsorized the dataset (Powel, 2004). First, I checked whether the outliers were caused by corrupt datapoints which was not the case. As the usage of outliers can cause unreliable estimations, variables with severe outliers were winsorized. Through winsorization on the 5th and 95th percentile, extreme values of the cumulative abnormal returns were limited in the dataset. This means substituting the top and bottom 5 percent of observations with the value of the 95th and the 5th percentile respectively. The ESG rating has not been winsorized as it simply is a scale from zero to hundred points and no severe outliers were present in the data. The hypotheses that were tested are:

H1: In the short-run, the acquirer announcement effect on abnormal returns following mergers in the meat industry is negative.

H2: The acquirer short-term abnormal returns from deals in the meat industry were significantly different before October 2015 as compared to afterwards.

H3: The short-term acquirer abnormal returns from deals in the alternative meat industry were higher after October 2015 as compared to before.

H4: The announcement of an M&A deal in the alternative meat industry yields positive abnormal returns for the acquirer.

H5: The abnormal returns around alternative meat M&A announcements are larger for acquirers with a high ESG score as compared to acquirers with a low ESG score.

4 DATA

In this section, the procedure to acquire the data to test the hypotheses will be elaborated. Subsequently the sample selection shall be discussed. Thereafter, I will explain why and how a matched sample was put together and lastly the multicollinearity issue is examined.

4.1 *Data selection*

The data for deals containing meat targets were relatively effortlessly obtained from the Thomson ONE Eikon database and Datastream. These databases were used to acquire the following deal characteristics: percentage of completion of deal, the announcement date of a merger, the deal size and the CARs. A merger is completed when 100% of the target's shares are owned by the bidding party post-takeover. I decided to only divide my sample based on either 100% deal completion or <100% of shares owned post-merger. Therefore, I simply used a dummy coded variable for deal completion.

Despite of the fact that the meat deal variables were easily obtained, the majority of deals in the alternative meat industry are private and necessary deal specifics are generally undisclosed. Most acquirers are Venture Capitalists and sometimes Private Equities. The abnormal returns following the acquisition announcements are available for neither. Additionally, the alternative meat industry has no SIC code. In order to find deals, I searched for a couple of known public deals and checked the SICs given there (see Table 1). Thereafter, I plugged those and other SICs that seemed applicable in the database search. Also, I used a textual search function. Eventually, I manually searched for alternative meat targets in the Thomson ONE Eikon database. For both regular and alternative meat, this study investigates the mergers and acquisitions that were announced between the 1st of January 2000 and the 31st of December 2020. The minimum deal size chosen is 1 million euros and geographically, no criteria are set. Only M&A deals were selected in which the acquirer is a publicly traded company. The sample criteria are summarized in appendix A1.

4.2 *Sample selection*

The initial sample consisted of 1186 mergers or acquisitions. Mergers were excluded when the acquirer Sedol was missing, or for acquirers when price data was missing. Unfortunately, lower transaction values and the non-completed deals may have a lower impact on an acquirer's CARs. Reason for this is that small deal sizes are perceived as less important to the acquirer's enterprise value by shareholders and for the same reason, acquiring 10% of a target has a lesser impact than acquiring the entire firm. However, the intention was to maximize an already narrow sample. I have therefore used propensity score matching in order to control for systematic differences in the value of transaction and completion rate across both samples.

Acquirer Environmental Social Governance scores were obtained from the ASSET4 Database of Thomson Reuters. All available ratings on ESG environmental social governance for the year in which the announcement was made, were matched with the bidding firms. For the M&As for which the acquirer ESG score was unavailable on the announcement date but available at most two years before or after that date, the ESG from the nearest date was used.

4.3 Propensity score matching

To account for covariates, I have used propensity score matching. A statistical advantage of using this method instead of multiple separate covariates is that you save degrees of freedom. As there are many meat deals and fewer M&As in meat substitutes within my sample, on average five meat deals are matched to every alternative meat takeover, based on nearest neighbors. The sample is matched based on the transaction value and deal completion. A deal is complete when 100% of the target shares are owned by the bidding party after the transaction. The goal is to match both groups on those two deal characteristics as well as possible. However, although 5 nearest neighbors were chosen from the sample of 413 mergers in the meat industry, 329 meat deals were also lost during the matching process. An important advantage is that there is no endogeneity with the deal size and deal completion.

Results are presented in Table 4.1. Initially, 413 mergers were included in the matching, of which 14 within the meat substitute sector and 399 in the meat industry. After matching, 65 mergers within the livestock industry observations were matched, of which 5 mergers were matched multiple times (in total 70 weighted observations). Before the propensity score matching is applied, the alternative meat group had a lower transaction value. The average difference of all observations between both groups is 170.134 million dollars. After matching on deal size the difference dropped to only 9.115 million dollars. At this point, 57.1% of deals with meat substitute targets is completed after the acquisition versus 47.1% for meat deals. After propensity score matching on complete or incomplete deals the difference between both groups is zero for this variable. The probit regression estimation used for propensity score matching is given in Appendix B1. Additionally, the distribution of the matched sample is relatively uniform across years (see Appendix A2).

Table 4.1: Results propensity score matching

Variable	Sample	Treated	Control	Difference	S.E.	T-stat
Value of Transaction	Unmatched	231.059	401.192	-170.134	437.667	-0.390
	Matched	231.059	221.944	9.115	168.093	0.050
dComplete	Unmatched	0.571	0.471	0.100	0.136	0.740
	Matched	0.571	0.571	0.000	0.152	0.000

This Table shows the Value of transaction in millions and the percentage of completed deals (dComplete in the Table) of the unmatched and matched samples of the treatment (meat substitute) and control (meat industry) mergers. 'S.E.' is the standard error and 'Difference' is the amount in the 'Treated' column minus the amount in the 'Control' column.

Due to missing values on ESG, the sample size decreased to 48 observations in the regression to answer H5 and consists of 11 deals in the alternative meat industry and a matched sample of 37 deals with meat substitute targets. Unfortunately, the limited sample size can shrink the statistical power of the regression model.

4.4 Multicollinearity problem

The relationship between all independent variables that have been used in this research were examined for problems with multicollinearity. In case of strong correlations between independent variables exist, this reduces the precision and reliability of estimations made. To formally test for multicollinearity, I calculated the Variance Inflation Factor (VIF) of each predictor in STATA. Strong collinearity is present when variables show a VIF above 10. This forms a major problem for a model. When VIF is smaller than 5 there is no multicollinearity issue. As can be seen in Table 4.2, the highest Variance Inflation Factor is 1.189 thus there is no need for further investigation towards multicollinearity.

Table 4.2: Multicollinearity test

	VIF	1/VIF
dMeatSubstitute	1.033	.968
ESG	1.160	.862
dMeatSubstitute*ESG	1.189	.841
Mean VIF	1.127	

This Table shows the results of the VIF test. The variance inflation factors (VIF) in the regression model of meat substitute and ESG variable are given, including interaction term with ESG. This table is relevant for the fifth hypothesis.

5 Chapter 5 RESULTS

5.1 5.1 Hypothesis one

In this paper, the announcement effect on average CARs is assessed relative to the MSCI for several event windows. The tested event windows are the following: [-3; 3], [-2; 2], [-1; 1], [t=0], [-3; -1] and [1; 3]. By using these different windows, I can analyze either different or rather similar results for different timeframes. The event periods above include windows around the announcement day, pre-announcement windows and post-announcement windows.

Table 5.1 displays the mean of the CARs for the bidding company for different event windows. A one-sample *t*-test has been conducted for multiple time windows, each time on the same meat deal sample. This way, it is simply tested whether the average cumulative abnormal returns significantly differ from zero. For two out of three-time intervals around the announcement date, namely [-2; 2] and [-1; 1], the results are significant at the 5% level. These acquirer CARs are high compared to previous research which often finds negative or rarely slightly positive CARs for the bidding firm (Campa and Hernando, 2004). Thus, the empirical results are not in line with the first hypothesis that:

H1: In the short-run, the acquirer announcement effect on abnormal returns following mergers in the meat industry is negative.

Since shareholder value in the meat industry is actually showing positive CARs around the announcement date, I must reject H1. It is also important to know that no abnormal returns were found for the [-3; 3] window, meaning that it is unlikely that insider trading or information asymmetry occurred. The post-event window shows marginally significant positive CAARs of 1.4%.

Table 5.1: Abnormal return test statistics meat target sample

CAR	Mean	S.E.	t-value	p-value
RET [-3; 3]	.017*	.009	1.98	.052
RET [-2; 2]	.022**	.007	2.889	.005
RET [-1; 1]	.018**	.007	2.951	.005
RET [t = 0]	.007*	.004	1.74	.087
RET [-3; -1]	-.001	.004	-.243	.809
RET [1; 3]	.014*	.007	1.901	.062

This table shows the one-sample *t* test results for acquirer CAARs from meat targets. In the left column, six different event windows are given. The 'Mean' column gives the mean of the cumulative abnormal returns for a specific event window. The sample size is 65. The 'S.E.' represents the standard error. *Note.* ** $p < .05$, * $p < .10$

5.2 Hypothesis two

As discussed before, in 2015 major events took place. These raised questions about the impact of these events on acquirer shareholder value following M&As in the meat- and plant-based protein industry. As can be seen in Table 5.2, relatively more M&As took place for target in the meat substitute industry after the Paris Agreement (42.9%) compared to the meat industry (21.5%) in the sample. A Chi-squared test on independence showed this difference is marginally significant at 90% level, $\chi^2(1) = 2.77, p = .096$. Thus, mergers in the meat substitute industry were more frequent in recent years, after the Paris Agreement.

Table 5.2: Frequency Distribution within both samples before and after the Oct 2015

Industry Target	Paris Agreement			
		before	After	Total
Meat	<i>n</i>	51	14	65
	%	78.46	21.54	100.00
Meat Substitute	<i>n</i>	8	6	14
	%	57.14	42.86	100.00
Total	<i>n</i>	59	20	79
	%	74.68	25.32	100.00

Note. Tabulation is done over unweighted frequencies ($n = 65$) of targets in the meat industry. In Table 5.2, the rows containing ‘*n*’ in the second column from left, show the amount of deals within the meat and meat substitute samples before and after the Paris Agreement in October 2015. The ‘%’ indicates what percentage of deals were announced before and after October 2015 for both industries.

To begin with, I hypothesized that the Paris Agreement negatively impacted the meat industry due to increased awareness on the environmental harm and potential future punitive regulatory intervention regarding the unsustainable livestock industry. Additionally, the WHO publication linking cancer to meat consumption was hypothesized to worsen the reputation of meat in the financial markets. This may led to lower acquirer abnormal returns, following acquisitions of meat companies.

As for the two-sample *t*-test, which makes a comparison of the Cumulative Average Abnormal Returns (CAARs), the results are insignificant for all event windows given (see Table 5.3). The empirical outcome of the second hypothesis, is therefore inconclusive. No differences in CAARs were found before and after the Paris Agreement. Thus, the evidence is failing to reject the second hypothesis:

H2: The acquirer short-term abnormal returns from deals in the meat industry were significantly different before October 2015 as compared to afterwards.

Table 5.3: Abnormal return test statistics meat target sample before and after the October 2015

CAR	Before ($n = 51$)	After ($n = 14$)	difference	SE	t -value	p -value
RET [-3; 3]	.018	.037	.018	.025	0.75	.450
RET [-2; 2]	.028	.044	.017	.026	0.65	.505
RET [-1; 1]	.021	.032	.011	.019	0.60	.558
RET [$t = 0$]	.009	.017	.007	.013	0.55	.583
RET [-3; -1]	-.003	.015	.018	.013	1.40	.170
RET [1; 3]	.013	.023	.011	.018	0.60	.552

This Table represents the outcomes of the two-sample t -test for the meat industry. The ‘Before’ column indicates the CAARs before October 2015 and the ‘After’ column all deals thereafter. The ‘difference’ column shows the returns when subtracting the CAARs before October 2015 from the CAARs after that month. The t -statistics and p -values present the values from a test of average differences between the subsamples. In the left column, six different event windows are given for which the calculations are executed. The ‘SE’ is the standard error term for the t -test.

Even though the outcomes of the tests are insignificant, an increase is witnessed for all event windows, meaning the average CARs of meat deals are higher after October 2015 as compared to before in the sample.

5.3 Hypothesis three

Expectations are that the described events of 2015 would also impact the meat substitute industry for the better. Consequently, the bidding firms’ shareholders should obtain additional value from the acquisition of meat substitute targets. Unfortunately, the sample is very small. It consists of a control group of 6 deals before October 2015 and a treatment group of 8 deals afterwards. Because of the narrow sample size, it is especially difficult to find significant results. The third hypothesis, again, describes how the 2015 events affected the acquirers:

H3: The short-term acquirer abnormal returns from deals in the alternative meat industry were higher after October 2015 as compared to before.

To test for H3, a two-sample t -test is used. The results are insignificant for all event windows given (see Table 5.4). Therefore, the equality in mean of the acquirer CARs between the before and after the Paris Agreement cannot be rejected at the 10% level, with a slightly higher sample mean acquirer CAR before October 2015, except for the window before the merger was announced [-3; -1]. Thus, the third hypothesis cannot be rejected.

Table 5.4: Abnormal return test statistics alternative meat target sample before and after the October 2015

CAR	Before ($n = 8$)	After ($n = 6$)	difference	SE	t-value	p-value
RET [-3; 3]	.012	-.012	-.024	.035	0.70	.503
RET [-2; +2]	.016	-.004	-.019	.030	0.65	.543
RET [-1; +1]	.024	.011	-.013	.029	0.45	.663
RET [t = 0]	.016	-.005	-.021	.020	1.05	.308
RET [-3; -1]	.001	.007	.007	.013	-0.55	.599
RET [+1; +3]	.012	-.020	-.031	.033	0.95	.364

This Table represents the outcomes of the two-sample t-test for the alternative meat industry. The ‘Before’ column indicates the CAARs before October 2015 and the ‘After’ column all deals thereafter. The ‘difference’ column shows the returns when subtracting the CAARs before October 2015 from the CAARs after that month. The t-statistics and p-values present the values from a test of average differences between the subsamples. In the left column, six different event windows are given for which the calculations are executed. The ‘SE’ is the standard error term for the t-test.

In addition, comparing both periods for both target-types at once might give interesting insights as well. In Table 5.5, regression results are presented including a two-way interaction between Target Type (0 = meat industry, 1 = meat substitute) and a Paris Agreement dummy-variable, indicating if the announcement took place before October 2015 (=0) or after (=1). If the Paris Agreement had effects on the returns of the announcements, the interaction effect (dMeatSubstitute * ParisAgreement) is significant. All the 6 models, the coefficient of the interaction term was negative, indicating lower expected CAARs after the Paris Agreement for meat substitute targets, compared to meat industry targets (*ceteris paribus*). However, the negative coefficients were not significant.

Table 5.5: Regression analysis on two-way interaction of Target Type and Paris Agreement

VARIABLES	Model					
	(1)	(2)	(3)	(4)	(5)	(6)
	CAARs [-3; 3]	CAARs [-2; 2]	CAARs [-1; 1]	CAARs [t = 0]	CAARs [-3; -1]	CAARs [1;3]
dMeatSubstitute	-0.00479 (0.0253)	-0.0106 (0.0223)	0.00691 (0.0194)	0.00598 (0.00934)	0.00254 (0.00890)	0.00243 (0.0229)
dParisAgreement	0.0208 (0.0202)	0.0186 (0.0232)	0.0164 (0.0181)	0.00934 (0.0137)	0.0136 (0.00948)	0.0171 (0.0170)
dMeatSubstitute * ParisAgreement	-0.0413 (0.0366)	-0.0312 (0.0338)	-0.0294 (0.0334)	-0.0224 (0.0195)	-0.00667 (0.0160)	-0.0435 (0.0321)
Constant	0.0170 (0.0113)	0.0263** (0.0114)	0.0172* (0.00906)	0.00970 (0.00587)	-0.00213 (0.00617)	0.0103 (0.00817)
R-squared	0.023	0.020	0.013	0.012	0.021	0.028

This Table represents the results of the regression analysis on the two-way interaction between Target Type and Paris Agreement. By 'Target Type' either meat or the dummy coded meat substitute target(dMeatSubstitute) is meant. By 'Paris Agreement' the dummy coded variable dParisAgreement is meant which indicates the deal was announced after October 2015. The sample contains 84 deals. Note: the robust standard errors are in parentheses. *, **, *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels respectively.

5.4 Hypothesis four

Since we have already discussed the acquiring firm's shareholder value creation following an M&A announcement for a meat target, we shall now do the same for meat substitute acquisitions. As can be seen in Table 5.6, a simple t-test was executed to test whether average CARs significantly deviated from zero between the 1st of January 2000 and December 31st 2020. All outcome yield p-values of 0.1 or above. As for the fourth hypothesis:

H4: The announcement of an M&A deal in the alternative meat industry yields positive abnormal returns for the acquirer.

Based on the abovementioned results, I cannot reject the fourth hypothesis, that takeovers in the alternative meat industry yield positive abnormal returns for the acquirer due to insignificant results. However, for the [-1; 1] event window, the average CAR is 2.2% and is almost statistically significant at the 10% level.

Table 5.6: One-sample t test for Returns and two-sample T-tests for target type comparisons

CAR	Meat substitute merger ($n = 14$)				Meat vs substitute	
	<i>Mean</i>	<i>sd</i>	1-sample t-test		2-sample t-test	
			<i>t-val</i>	<i>p-val</i>	<i>t-value</i>	Hedge's <i>g</i>
RET [-3; 3]	.004	.060	0.23	.826	0.65	0.193
RET [-2; 2]	.011	.049	0.79	.445	0.50	0.196
RET [-1; 1]	.022	.046	1.76	.101	-0.20	-0.057
RET [t = 0]	.011	.023	1.77	.100	-0.40	-0.116
RET [-3; -1]	.003	.023	0.55	.593	-0.45	-0.138
RET [1; 3]	.002	.053	0.14	.893	0.70	0.203

This table shows the one-sample t test results for acquirer CAARs from meat targets. In the left column, six different event windows are given. The 'Mean' column gives the mean of the cumulative abnormal returns for a specific event window. The sample size is 65. The 'S.E.' represents the standard error. Additionally, a two-sample T-test for target type comparisons has been done. The t-statistics, given in the 't-value' column, for all event represent the values from a test of mean differences between the subsamples.

In the M&A market for meat substitute targets, the listed acquirers are rarely in the business already. The same goes for my sample, the bidding parties diversify by merging with plant-based meat companies. According to research by Morck et al. (1990), diversifying M&As are value destroying. Since in those cases, the acquirer and the target do not operate in the same industry, which means the acquirer will have to invest more resources to get acquainted with the target industry. This might explain the results above and the rejection of H4. It is possible that shareholders in the agriculture industry are risk-averse investors, because it is a very steady market. Disruptive alternative meat manufacturers could be very lucrative but also loss-making projects. The plant-based meat firms are racing to be the first to come up with a new technological advancement. Their priority is to be the first to reach taste-parity, or lower production cost to reach price parity with actual meat. Companies that fail to do so in time will go bankrupt and lose all their investments spent on research and development (R&D). Therefore, I think the acquirers' typical risk-averse investors are reluctant for their portfolio firm to acquire an alternative meat manufacturer. This in turn results in a negative announcement effect.

5.5 Relative industry comparison

As the research question is actually about the outperformance of M&A in meat substitutes over regular meat, we must make a two-sample t-test as well. This way we can actually analyze the outcomes of acquiring targets in both industries relative to each other instead of apart.

As given in Table 5.7, for event windows [-1; 1], [t=0], [-3; -1], a negligible difference between both industries was found, as Hedge's *g* is below 0.20. These three windows all have a negative Hedge's *g*, meaning the alternative meat targets have a slightly larger CAARs compared to a meat deal. Yet, for the remaining event windows, the Hedge's *g* is either very close to, or above 0.20, implying a small

effect. Additionally, these effects are all positive, indicating the meat deals outperform meat substitute deals in the context of short-term shareholder value.

5.6 Hypothesis five

Hypothesis five considers both target industries whilst also considering the acquirers' social environmental rating.

Table 5.7: Direct effects of ESG-score and interaction effects with Target Type on CAARs

<i>Panel A</i>	(1)	(2)	(3)	(4)	(5)	(6)
<i>Direct effects</i>	RET	RET	RET	RET	RET	RET
	[-3; 3]	[-2; 2]	[-1; 1]	[t = 0]	[-3; -1]	[1; 3]
dMeatSubstitute	0.0107 (0.0203)	0.00961 (0.0174)	0.0152 (0.0162)	0.00597 (0.00917)	0.00422 (0.00870)	0.00709 (0.0179)
ESG	0.000105 (0.000430)	-0.000238 (0.000265)	0.000123 (0.000254)	5.20e-06 (0.000195)	0.000397 (0.000252)	-0.000381 (0.000333)
Constant	-0.00310 (0.0175)	0.0157 (0.0113)	0.00127 (0.0109)	0.00217 (0.00769)	-0.0213** (0.0104)	0.0221 (0.0160)
R-squared	0.008	0.015	0.026	0.009	0.067	0.021
<i>Panel B</i>	RET	RET	RET	RET	RET	RET
<i>Interaction Effects</i>	[-3; 3]	[-2; 2]	[-1; 1]	[t = 0]	[-3; -1]	[1; 3]
dMeatSubstitute	0.00527 (0.0186)	0.00277 (0.0149)	0.00768 (0.0161)	0.00326 (0.00967)	0.00366 (0.00937)	0.00281 (0.0168)
ESG	-0.000200 (0.000483)	-0.000573** (0.000273)	-0.000255 (0.000258)	-0.000131 (0.000223)	0.000432 (0.000342)	-0.000641* (0.000369)
dMeatSubstitute*ESG	0.00226** (0.00101)	0.00246*** (0.000689)	0.00265*** (0.000698)	0.000985* (0.000500)	0.000202 (0.000573)	0.00201** (0.000795)
Constant	0.000556 (0.00976)	0.00716 (0.00827)	0.00330 (0.00791)	0.00145 (0.00506)	-0.00585 (0.00620)	0.00650 (0.00861)
R-squared	0.068	0.110	0.132	0.051	0.068	0.078
R-squared change	0.060	0.095	0.106	0.042	0.001	0.057

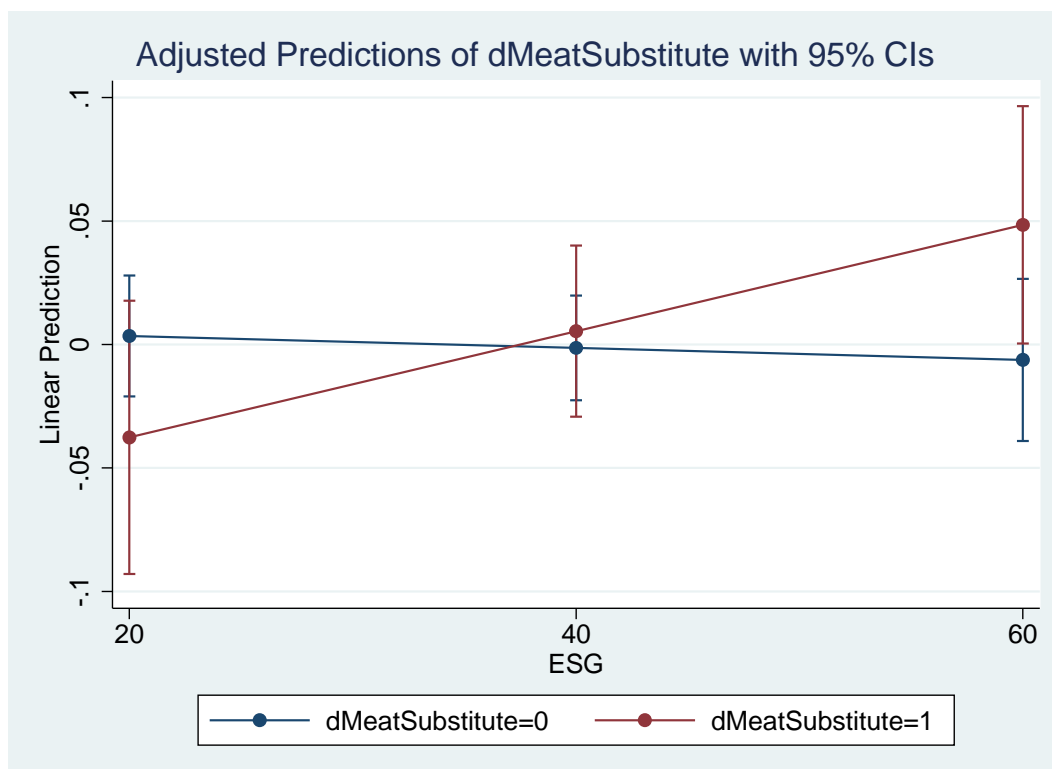
Table 5.7 shows the direct results regression results of ESG-score and target type on CAARs. Furthermore, it represents the results of the regression analysis on the two-way interaction between Target Type and ESG-rating on CAARs. By 'Target Type' either meat or the dummy coded meat substitute target(dMeatSubstitute) is meant. By 'ESG' a continuous variable is meant which indicates the acquirer either has a low or a high ESG-score. The sample contains 48 deals. Note: the robust standard errors are in parentheses. *, **, *** indicate statistical significance at the 0.10, 0.05 and 0.01 levels respectively.

Regression results are presented in Table 5.7. The CAARs were subsequently regressed on the direct effects of Target Type and ESG (Panel A), and also including its interaction (Panel B). From Panel A, no direct effects of ESG were significant. As can be seen in Panel B, the R-squared increases in most models from 4.2% at the announcement date up to 10.6% for the [-1; 1] window. The highest R² is

found for the event window [-1; 1], which is 0.132 (13.2% explained variance), followed by the event window [-2; 2], with 11.0% and post-announcement [1; 3] with 7.8%. This is caused by the increase of explanatory power through addition of the interaction effect. As seen in Panel A of Table 5.7, no direct effects are found for the ESG-score or the target type. On the other hand, Panel B shows a significant interaction effect, which indicates that the difference in CAARs between target types of highly ESG-rated acquirers is significant. Meat substitute target types with high ESG-scores yield more positive returns around the announcement date and after the event date at the 5% level for [1; 3] and [-3; 3] and at the 1% level for [-2; 2] and [-1; 1], compared to targets in the livestock industry. No difference was found across the three days prior to the announcement [-3; -1] in this respect.

Below, the results are graphically displayed. The CAARs from -1 to 1 are given on the vertical axis and the ESG score is on the horizontal axis. The blue line represents the observations within the meat industry whereas the red line represents the meat substitute targets. As for the deals with meat targets, the ESG score barely affects the CAARs whereas the meat substitute deals are positively related with CAARs for acquirers with high ESG ratings.

Figure 5.1: Interaction effects of ESG score and target type



In the Figure, the red line represents the sample with meat substitute targets whereas the blue line represents the meat-deal sample. The vertical axis tells us how high the CAARs are for the two lines relatively. On the horizontal axis the environmental social governance score is given.

H5: The abnormal returns around alternative meat M&A announcements are larger for acquirers with a high ESG score as compared to acquirers who have a low ESG score.

Consequently, I do find evidence for a significant positive effect of the ESG score on the acquirer average CAR, following a takeover of a meat substitute firm, which indicates I cannot reject hypothesis H5. The ESG-score plays a different role in the abnormal returns of meat substitute targets in comparison to the meat industry.

6 CONCLUSION

6.1 Conclusion & Discussion

The objective of this study is to answer the question:

To what extent do acquirer short-term abnormal returns following M&A announcements of firms in the alternative meat industry outperform the acquisitions of regular meat industry world-wide?

To facilitate answering this question I considered five hypotheses and conducted extra explorative regression analyses on interaction effects. The first hypothesis – that the acquirer post-meat deal announcement abnormal returns are negative – was rejected. The CAARs were actually very high around the announcement date. The empirical findings on the shareholder value creation through M&A in the meat industry were surprising, given the findings in the literature review. However, research by Doukas et al. (2002) states that industry related M&As, meaning both target and acquirer operate in the livestock industry, yield significant synergy effects and thus increase shareholder welfare. In order to see whether the abnormal returns for both target types changed throughout the year I split each target group in two subsamples. In 2015, two major events took place that I hypothesized to have had a negative effect on acquirer CARs for meat target deals, and a positive effect for alternative meat target deal announcements. However, the empirical outcomes for both H2 and H3 were statistically insignificant thus the hypotheses were inconclusive. Consequently, I cannot tell whether there is a positive or negative trend over time in my sample. As such, I cannot predict whether, based on my sample, the one industry is likely to outperform the other in future years. Even though the outcomes of the tests regarding H2 are insignificant, an increase is witnessed for all event windows, meaning the average CARS of meat deals are higher after October 2015 as compared to before in the sample. Perhaps due to population growth and growing meat consumption in Africa and Asia, reactions to meat M&As are still optimistic. While we may not know how long it will last, meat certainly remains a major source of global protein intake. As for the fourth hypothesis, which uses the alternative meat target sample from 2000 to 2020, no near significant results were found except for the [-1; 1] and the [t=0] event window. The CAR means are 2.2% and 1.1% respectively and are almost statistically significant at the 10% level. This acquirer CAR is much higher than the negative acquirer CAR of -1.16% of Aktas et al. (2011). Addition of the interaction effect of ESG-score caused a large increase of explanatory power. No direct effects are found for the ESG-score or the target type. But the ESG-score gives a significant interaction effect and empirical results show that the difference in CAARs between target types of highly ESG-rated acquirers is significant. Meat substitute target types with high ESG-scores yield more positive returns, compared to targets in the

meat industry. Therefore, I cannot reject the fifth hypothesis. In conclusion, the empirical results do not provide evidence for the outperformance of acquirers when acquiring meat substitute targets as compared to regular meat targets. Additionally, statistical results have not shown a trend, indicating alternative meat deals creating more shareholder value as compared to meat deals. However, in case the acquirer has a high ESG rating, acquisition of meat substitute targets does lead to higher abnormal returns compared to meat deals, thus outperforms M&A in the regular meat industry.

6.2 Limitations

The main limitation of this research has been the limited available data. In order to obtain data, acquirers had to be listed in order to find their abnormal returns. The alternative meat branch is still an infant industry in which few acquisitions have been done. Most M&A has been conducted by venture capitalists and private equity firms. Most targets are small start-ups, mainly occupied with R&D to optimize the taste or minimize production costs. It is a race against the clock for the meat substitute manufacturers to reach price- and taste parity to regular meat. Investing in the right firm could be extremely lucrative for the acquirer's shareholders as there is a lot of growth potential in the industry. However, as many of these start-ups are not the first to make the important technological advancements it may be considered a risky investment. Many listed big firms; see the risk of the acquisition and perhaps the risk averse investors in meat industry therefore refrain from purchasing alternative meat targets. In order to obtain data, acquirers had to be listed as to find their abnormal returns and only few listed firms engaged in these deals. Additionally, the deal sizes for these targets are oftentimes small, meaning at times, the needed variables could not be collected because the deals were undisclosed. This has resulted in a narrow sample of deals, deal characteristics and abnormal returns which are not necessarily representative for the entire meat substitute sector. The inclusion of more deals would have augmented the reliability and power of the results. This thesis can therefore be considered more of an explorative analysis with indications for listed acquirers.

6.3 Suggestions for further research

Since this study is the first to research the alternative meat industry in the M&A context, There is a clear niche for further research to be done. Firstly, the difference in abnormal returns or acquisition premiums could be compared based on geographical criteria such as: acquirer and target nations, or continents. Secondly, from the abnormal returns, acquirer premiums could be researched too in order to calculate the meat substitute target outperformance as compared to the meat industry. Furthermore, the gains made from alternative meat acquisitions could be researched in the private context. As high-frequency data on abnormal returns is not available, a couple of deals could be thoroughly analysed on the pre- and post-acquisition acquirer financial statements. The results might be completely

different from the results in this study and may indicate a strong incentive to engage in plant-based meat M&A, as I had hoped for in my own thesis.

REFERENCES

- Aksak, E., Duman, S. & Ferguson, M. (2016). Corporate social responsibility and CSR fit as predictors of corporate reputation: A global perspective. *Public Relations Review* 42, 79-81.
- Aktas, N., de Bodt, E., & Cousin, J. (2011). Do financial markets care about SRI? Evidence from mergers and acquisitions. *Journal of Banking and Finance* 35(7), 1753-1761.
- Alexandridis, G., Fuller, K., Terhaar, L., & Traylor, N. (2013). Deal size, acquisition premia and shareholder gains. *Journal of Corporate Finance* 20, 1-13.
- Barber, B.M., Lyon J.D. (1997). Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics* 43 (3), 341-342.
- Berchicci, L., Dowell, G., King, A. (2012). Environmental capabilities and corporate strategy: exploring acquisitions among us manufacturing firms. *Strategic Management Journal* 33, 1053-1071.
- Berkovitch, E., Narayanan, M. (1993). Motives for takeovers: an empirical investigation. *Journal of Financial and Quantitative Analysis* 28(3), 347-362.
- Bower, J.L. (2001). Not all M&As are alike- and that matters, *Harvard Business Review March*, 93-101
- Brown, S., Warner, J. (1985). Using daily stock returns: the case of event studies. *Journal of Financial Economics* 14, 3-32.
- Campa, J. M., & Hernando, I. (2004), Shareholder Value Creation in European M&As. *European Financial Management* 10, 47-81.
- Cao, Y., Just, D., Turvey, C., Wansink, B. (2015) Existing Food habits and Recent Choices Lead to Disregard of Food Safety Announcements. *Canadian Journal of Agricultural Economics* 63(4), 491-551.
- D'agostino, R.B. (1998). Propensity score matching for bias reduction in the comparison of a treatment to a non-randomized control group. *Statistical Medicine* 17, 2265–2281.
- Deng, X., Kang, J., Low, B. (2013). Corporate social responsibility and stakeholder value maximization: evidence from merger. *Journal of Financial Economics* 110 (1), 87-109.
- Doukas, J., Holmen, M., Travlos, N. (2002). Diversification, ownership and control of Swedish corporations. *European Financial Management* 8 (3), 281-314.
- Downs, J. S., Loewenstein, G., Wisdom, J. (2009). Strategies for promoting healthier food choices. *The American Economic Review* 99(2), 159-64.
- Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance* 25(2), 383–417.

- Fama, E. F., Fisher, L., Jensen, M. C., & Roll, R. (1969). The adjustment of stock prices to new information. *International Economic Review* 10(1), 1-21.
- Fuller, K., Netter, J., Stegemoller, M. (2002). What do returns to acquiring firms tell us? Evidence from firms that make many acquisitions. *Journal of Finance* 57 (4), 1763-1793.
- Ghosh, D., & Vogt, A. (2012). Outliers: An evaluation of methodologies. In *Joint statistical meetings* 2012.
- Gregory, A., Tharyan, R., Whittaker, J. (2014). Corporate social responsibility and firm value: disaggregating the effects of cash flow, risk and growth. *Journal of Business Ethics* 124, 633- 657.
- Harper, P. (2012). Two essays on firm strategy and corporate social responsibility. *PhD. Rensselaer Polytechnic Institute, New York.*
- Hamilton, J.T. (1995). Pollution as News: Media and Stock Market Reactions to the Toxics Release Inventory Data. *Journal of Environmental Economics and Management* 28(1), 98-113
- Jensen, M., & Ruback, R. (1983). The market for corporate control: the scientific evidence. *Journal of Financial Economics* 11(1), 5-50.
- Konar, S., & Cohen, M. A. (1997). Information as regulation: The effect of community right to know laws on toxic emissions. *Journal of Environmental Economics and Management* 32, 109.
- Lubatkin, M. (1987). Merger strategies and stockholder value. *Strategic Management Journal* 8, 39-53.
- MacKinlay, A. (1997). Event studies in economics and finance. *Journal of economic literature* 35(1), 13-39.
- Malik, M. (2014). The impact of targets' social performance on acquisition premiums. *PhD. Boston University Theses and Dissertations, Boston.*
- McGuire, J., Sundgren, A., Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. *The Academy of Management Journal* 31(4), 854-872.
- Meckl, R., Theuerkorn, K. (2015). Corporate social responsibility as a success factor for M&A transactions. *European Journal of Business and Social Sciences* 4(1), 213-226.
- Mitchell M.L., Mulherin J.H. (1996) The impact of industry shocks on takeover and restructuring activity. *Journal of Financial Economics* 41(2), 193-229.
- Morck, R., Shleifer, A., & Vishny, R. (1990). Do managerial objectives drive bad acquisitions? *The Journal of Finance* 45(1), 31-48.
- Niinivaara, T. (2010). Role of psychological reference points in mergers and acquisitions: 52- week high as a reference price in European takeover activity. *Unpublished working paper. Aalto University, Finland.*

Powel, R. (2004). Takeover prediction models and portfolio strategies: a multinomial approach. *Multinational Finance Journal* 8(1, 2), 35-72.

Rani, N., Yadav, S.S., & Jain, P.K. (2014). Impact of corporate governance score on abnormal returns and financial performance of mergers and acquisitions. *Indian Institute of Technology (IIT) Research Paper, New Dehli* 41(4), 371-398.

Rocheleau, M. (2015). In wake of study on processed, red meats, what should you do? *The Boston Globe*.

Shleifer, A., & Vishny, R.W. (2003). Stock Market Driven Acquisitions. *Journal of Financial Economics* 70 (3), 295-31.

Shuler R., & Jackson S. (2001). HR issues and activities in mergers and Acquisitions. *European Management Journal* 19 (3), 239-253.

Unknown., (2015). IARC Monographs evaluate consumption of red meat and processed meat. *World Health Organization. International Agency for Research on Cancer* (240).

APPENDIX

Table A1: Sample criteria

The criteria of this research sample summarized:

- Date announced from 1st of January 2000 – 31st of December 2020
- Minimum of 1M deal value
- Public Acquirers
- Private Targets
- Public Targets
- US SIC (primary codes): 01 - Agricultural production-crops, 013 - Field crops, except cash grains, 019 - General farms, primarily crop, 02 - Agricultural production-livestock and animal specialities, 20 - Food and kindred products, 5153 - Grain and field beans wholesale dealing in, 5154 - Livestock wholesale dealing in.
- Availability of Acquirer weighted comprehensive ESG score in year of M&A announcement

Appendix A2: Tabulation of year sample

year	sample		
	0	1	Total
2000	13	0	13
2001	17	1	18
2002	5	1	6
2003	14	1	15
2004	8	1	9
2005	16	1	17
2006	24	0	24
2007	26	0	26
2008	18	1	19
2009	25	0	25
2010	25	0	25
2011	27	1	28
2012	27	0	27
2013	25	0	25
2014	19	0	19
2015	26	2	28
2016	18	0	18
2017	23	0	23
2018	17	3	20
2019	15	0	15
2020	11	2	13
Total	399	14	413

Appendix B1: Probit regression estimation used for propensity score matching

sample	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
Value of Transaction (mil \$)	-0.000	0.000	-0.450	0.656	-0.000	0.000
dComplete	0.188	0.241	0.780	0.434	-0.283	0.660
constant	-1.904	0.176	-10.790	0.000	-2.250	-1.558
N	413					
Log likelihood	-60.72					
Log-likelihood ratio χ^2	0.85					
p-value	.65					
Pseudo-R ²	.0069					