Similarity in Q ratio and M&A performance

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Author: Roel ter Horst (s4481127)

Supervisor: Dr. A. Fytraki (Agapi)

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Abstract

The details and motives of global merger and acquisition (M&A) activity has been widely examined. This paper contributes to the literature by examining the influence of similarity in Tobin's Q ratio on M&A performance. Prior studies mainly examined United States merger activity in the twentieth century, this study focusses on European acquiring firms for the years 2008 until 2018. 739 M&A deals are examined based on over 20 different European countries. Tobin's Q ratio is measured as a dummy variable and as the absolute difference between two firms in Tobin's Q. M&A performance is measured using an event study with a small event window around the M&A announcement date. Furthermore, an additional analysis is done to measure the industry effect on M&A performance where the sample is divided for inter- and intra-industry trade. The results indicate a negative relation between Q dispersion and acquiring returns for both the measurements of Tobin's Q. For the target firms, a positive relation between the Q dummy measurement and the target firm returns was found, but a significant negative relation for the Q difference approach.

Keywords: Mergers and acquisitions (M&A), Tobin's Q, event study, inter- and intra-industry trade

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1. Introduction

Global Merger and Acquisitions (M&A) activity hits a new high, the Financial Times state on September 28, 2018. The first 9 months of 2018 set a record, breaking the standing record M&A peak in 2007, right before the financial crisis. Companies made use of the stock market environment, the consumer confidence and the low level of interest rates for M&A practices and use M&A to gain and cluster technological knowledge (FT.com, 2018). The global financial crisis did change the landscape for M&A and identified new M&A targets for the business practice in general. Companies can use M&A to gain access to different geographical area's or to diversify the corporate structure into different practices (Grave, Vardiabasis & Yuvas, 2012).

M&A is a form of investment and is found to come in waves, which are called merger waves. Historically, five merger waves were acknowledges and four of these were driven by profitable reallocation opportunities of capital, whereas one merger wave was caused by external market influences. (Jovanovich & Rousseau, 2002). The reallocation opportunities explained by Jovanovich & Rousseau state that firms with a high Q ratio (the ratio of the market value of the assets to the replacement cost of the assets) invests in firms with a low Q ratio. They describe a linear relationship in which a high Q ratio indicates that a firms management is performing well and vice versa for a low Q ratio. The management of the low Q rated firm is expected to be replaced in M&A to improve the performance of this firm. This reallocation of firms and management explains the occurrence of mergers and merger waves. Another view is elaborated upon by Rhodes-Kropf & Robinson (2008) who critically asses the common knowledge that a high Q rated company buys a low Q rated company. Their key results, based on merger transactions between 1980 and 2001, is that firms with similar asset valuations engage in M&A together. They state that similar assets lead to more asset complementarity and therefore the companies tend to be a better fit, leading to better merger performance.

Two existing theories tend to explain the occurrence of mergers. The Q-theory of mergers state that well performing firms merge with low performing firms, to obtain the low performing firm and replace the management with a better function one. An opposing view arises and state that firms merge with firms who have similar assets, to gain synergies out of the asset complementarity.

This research tries to examine which of the two theories hold for the recent emerging merger wave and linking the similarity in Q ratio's to M&A performance too. The aim of this research is to contribute to the existing literature on M&A, the reasons why M&A exist and the effect of M&A on the performance of firms.

Research Problem & Motivation

The Q theory of mergers state that a lower valued firm is considered to be badly managed and therefore makes a good investment opportunity for better managed, higher valued firms. This idea has it's foundations from the mid-sixties and has been widely accepted in the literature on M&A's. However an opposing view arises as empirical data shows that mergers combine firms with similarities in the Q-ratio, in contrast to the widely used assumption that high valued firms buy low valued firms (Rhodes-Kropf & Robinson, 2008).

Lang, Stulz & Walkling (1989) are one of the first studies that examine the effect of mergers on the firm value of the bidder, instead of the focus on the target. They use the Q ratio to divide firms between high and low Q rated firms and also state that the Q ratio is a measure for management performance. The results support the view that financial markets reward well-managed firms for taking over poorly managed firms. Their main contribution to the literature is that a well performing firm benefit from acquiring a poor performing firm but that their results does not hold the other way around. In general, the study concludes a negative relationship between the bidders return and the targets Q ratio. The largest gains of mergers are found in deals where high Q bidders takeover low Q targets (Lang, Stulz & Walkling, 1989).

Servaes (1991) critically asses the study of Lang, Stulz & Walkling as it does not control for external factors, according to Servaes. The study of Servaes confirms the existing relationship between the Q ratio and M&A that if a target is performing poorly and a bidder is performing well, the takeover returns are the highest. Jovanovich & Rousseau (2002) examine the Q-theory in mergers too and contribute to the literature by assessing the underlying reasons for M&A activity. Mergers are a channel through which capital flows to better firms and better management, as the Q theory in mergers support. Within their model, mergers exist because of differences between firms in terms of capital and technological state. They find that M&A activity respond to the Q ratio of firms and state that high Q rated firms indeed usually buy low Q rated firms (Jovanovich & Rousseau, 2002).

An opposing view is stated within the study of Rhodes-Kropf & Robinson (2008). They contribute to the general field of M&A studies by critically assessing the Q-theory in mergers. They state that there is no existing theory that explains why there might be a relationship between the Q ratio of target and bidding firms. They add a new path to the M&A field where it is expected that firms engage in mergers when there are similarities in market-to-book ratio's. This angle is a natural opposite of the Q-theory (Rhodes-Kropf & Robinson, 2008). Instead of the substitution of poor managed firms, their study examines the complementary power of mergers. Firms have the desire to merge with a better function partner and trade-off this desire with the reduced bargaining power in such mergers. Rhodes-Kropf & Viswanathan (2004) add to the discussion why there are periods of plentiful mergers and other periods of low merger activity. They state that the valuation of companies assets affect both the Q-ratio and the existence of mergers. Therefore, mergers are not necessarily based on the Q-ratio of companies or on

the quality of the management. Martynova & Renneboog (2008) state that, only since 1990, the geographical dispersion has been found in M&A waves. Very little M&A activity took place in Europe in the merger waves in the twentieth century. There might be an upcoming takeover wave in 2008, but it is explicitly stated that the potential upcoming crisis might slow down this takeover wave (Martynova & Renneboog, 2008).

This study contributes to the existing literature by examining the most recent period of takeovers, which occurred from 2008 and hit a peak in activity in 2018. Since most of the literature examines M&A activity based on Unites States data, this study is different as it focusses mainly on European M&A activity. As there is no consensus whether the Q-theory of mergers holds, this study contributes to the debate by examining whether well performing firms (with a high Q value) buys low performing firms (with a low Q value) or whether firms engage in mergers with similar firms. Results than should be of interest to both managers and shareholders of European firms as the study examines whether firm differences or similarities contribute to the success of M&A activities. The results can contribute to the general success in M&A activity for Europe and contribute to the existing literature debate if the Q theory of mergers can hold.

Research Objectives

The objective of this study is to re-examine whether the Q-theory of mergers hold in practice, especially for the most recent M&A activity in Europe. Existing studies mainly find a linear relationship between the Q ratio and M&A activity, and state that a high Q rated firm should engage in M&A's with a low Q rated firm. However, some literature opposed the general view of the Q-theory and state that like buys like. Therefore it is ambiguous whether the Q theory would hold in practice which is the reason for conducting this research.

Existing literature widely examined the relationship between the Q-ratio and merger success. The largest part of this literature is based on mergers of before 2001, and United States merger activity. Studies acknowledge this and state that a different sample could explore the relationship between bidder and target Q ratio even further (Lang et al., 1989). Jovanovich & Rousseau (2002) state that their sample is biased as high developed and older firms within their model are more likely to survive anyway, which their model cannot explain. More research into the relationship would add to the existing literature. Rhodes-Kropf & Robinson (2008) shed new light on the discussion as their finding suggest that like buys like – instead of high Q rated firms buy low Q rated firms – and open paths of further research. They question if there is a difference in merger success for both the theories.

Europe has not been examined widely in previous studies, whereas most studies are solely based on United States mergers (Rhodes-Kropf & Robinson, 2008; Lang et al., 1989; Servaes, 1991; Jovanovich & Rousseau, 2002). Martynova & Renneboog (2008) do incorporate European and Asian mergers too, but implicate further research opportunities for M&A over different timeframes and countries.

Europe is an ideal venue for studying M&A given the large numbers of firms and the wide range of capital markets, regulations and institutional settings. Also, the European markets operate under different rules and exhibit varying industry concentration. The U.S. data has the disadvantage that many factors are fixed over all the M&A activity and therefore might influence the results (Faccio & Masulis, 2005). This study expands the existing literature by examining a different timeframe of mergers and a different area of mergers. Focusing on Europe, therefore opens up paths of further research in the debate whether firms with similar Q ratios or firms with different Q ratio's tend to merge. The research question to address this problem is as follows:

How does Q ratio similarity affect a company's merging performance in Europe?

This research is used to learn more on the field of M&A activity and success for practitioners and adds to the literature field of M&A and Q-ratio similarity. The results for the European merger market can be examined and compared to existing studies within the US merger market to compare results. This can be interesting for even further research on the differences and similarities in the US and European merger market.

Research Methodology

To examine the relationship between the Q ratio similarities and the performance, a quantitative analysis of M&A activity under European listed companies in the period 2008 until 2018 will be conducted. This timeframe is chosen as it has not yet been examined widely, and consist of the most recent M&A activities. It can therefore provide new insights in the relationship between the Q ratio and M&A activity. A quantitative analysis was chosen to conduct empirical evidence based on a large sample of firms to conduct valid and generalizable results for European firms. Databases as Zephyr, Worldscope and FactSet will be used to address M&A data and firm specific data which then will be combined for the statistical analysis.

The Q-ratio operationalization is done following several studies such as Lang et al. (1989) and Servaes (1991) who base their model on Lindenberg & Ross (1981). The Q ratio is based on a firms market value and on replacement costs. The market value of a firm is based on common stock, preferred stock and debt. The replacement costs are defined based on total assets (Lindenberg & Ross, 1981). Whereas common stock can be recorded by year end common stock, preferred stock is slightly different and following Lang et al. (1989) the book value of the preferred stock is used because of the trivial magnitude of this. For the market value of debt, short term debt is the debt that will mature before year t+1 and is assumed to equal the book value of the debt (Lindenberg & Ross, 1981). Long term debt is often based on long-term bond prices (Lang et al., 1898) but due to data availability long term outstanding debt is used for this.

The merger performance is calculated using the stock returns of the merging companies. The Cumulative Adjusted Returns are widely used in academic research and are based on abnormal stock returns around an event, in this case the announcement date of the M&A activity. Different event windows can be used, for example 21 days, (following Ritter, 1991) or a shorter window like 7 days (following Andrew-Coutts et al., 1997; Chang et al., 2007). Different event window lengths impact the CAR calculation (McWilliams & Siegel, 1997) but for this study the 7 days event window is initially chosen, 3 days prior and after the announcement day, to see if the merger lead to significantly different returns (Ritter, 1991). This method is also in line with Lang et al. (1998) and Servaes (1991). Within the analysis, there will be controlled for multiple factors among other things firm size, mean of payment and a cross border effect (following Servaes, 1991) and for industry type (following Rhodes-Kropf & Robinson, 2008).

Thesis Outline

The remainder of the study is structured in the following way. Chapter 2 will provide a literature overview which leads to the hypothesis development. Chapter 3 explains the sample selection and the methodological structure of the thesis. Chapter 4 provides and analyzes the results of the statistical analysis. Chapter 5 will provide a conclusion, report the discussion and limitations and elaborate on future research.

2. Literature overview

The literature overview gives an insight in the stated literature on the main topic of this study. Tobin's Q, the relationship between the Q-ratio and M&A performance and the different measurements for merger performance are addressed. The literature reviewed is mainly based on articles from the top cited financial journals as stated by Curie & Pandher (2011) who ranked the financial journals based on quality and awareness score. However as drawing from a small sample of journals might be a limitation, all the publications within the subject are addressed for potential contributions, following the literature review guideline by Webster & Watson (2002).

2.1 Tobin's Q

The Q-ratio, or Tobin's Q, is named after the research of James Tobin who describes the Q-ratio in two quantities: the numerator and the denominator. The numerator is the market valuation, which equals the price the market is willing to pay for the firm. The denominator equals the replacement costs of the firm, or firms assets (Tobin & Brainard, 1977). The Q-ratio therefore shows if a firm is able to create value with the assets it entails, as a ratio above 1 means that the market is willing to pay more for a company compared to the replacement costs of the company. In M&A activity, the Q-ratio is often used to measure the financial differences between the acquiring and the target firm. A study by Hasbrouck (1984) examines the characteristics of target firms in the non-financial industries. The study finds that a target firm is characterized with a low Q-ratio and low financial liquidity. This is consistent with the role of Q as a signal for the quality of the management, whereas a lower Q value indicates more managerial incompetence. Other explanations however are left open for further research (Hasbrouck, 1984). Schleiffer & Vishny (2002) show that the relative valuation of firms, which the Q-ratio captures, is a factor in explaining who acquirers whom. In their model, investor sentiment can affect market valuations of firms and entire industries, and therefore influence the Q-ratio, especially in the short run. These valuation deviations are the cause of perceived synergies and M&A success, but Schleiffer & Vishny use the simplified assumption that this success does not hold in the long-run. The Q based measure is critically assessed by Custódio in 2013. The Q based measure of diversification between firms is tend to be upward-biased because of M&A activity and the market sentiment. As the pre-merger Q value is upward biased, the post-merger Q value for the combined entity often seems lower, showing a negative impact of the M&A activity (Custódio, 2013). Despite the limitations on the Q measurement, several studies implement the Q value as a measurement for a firms performance and do not seem to suffer the stated upward bias. As for example Lang et al (1989) show that a bidder Q ratio is not dramatically changed around a takeover and a target firm Q ratio tends to decrease slightly around a takeover. Other studies that examine M&A activity use Tobin's Q too and do not find negative consequences of potential limitations (Lang et al., 1989; Jovanovich & Rousseau, 2002; Rhodes-Kropf & Robinson, 2008).

2.2 M&A performance

M&A performance has been a research topic for decades, studies examine the outcome of the mergers and acquisition. In general, these studies examine whether M&A lead to increased performance after the merger or acquisition took place. Since merger performance is examined in this study it is interesting to review some literature on earlier contributions to merger performance.

Agrawal et al. (1992) look at mergers from 1955 to 1987 and examines the merger performance. Based on the NYSE their results find that stockholders of the acquiring firm undergo an average 10% decrease in share value over the five years following a merger. The M&A market does not appear to become more efficient or learn over time and they do not find significant reasoning why the market show negative results for a longer period after a merger. Firms are often successful in acquisitions but still can have a bad acquisition deal, even after several successful acquisitions. This can be because of overvaluation within the market or because the firm's growth strategy was wrong (Moeller et al., 2005). Melicher & Rush (1974) examine the merger waves for NYSE listed firms in the 1960's and oppose the view that there is no learning in the market. Their results indicate that firms who acquired other firms before show higher levels of profitability after the merger compared to firms who are involved in their first merger. Moeller et al. (2005) examine the wealth gained or lost by mergers over the merger wave from 1998 through 2001. A lot of firms are initially successful before the acquisition, and show a relatively high firm value. However, after the merger a negative synergy gain emerges and decreases the total firm value. Striking in the results is that a few big mergers show these negative synergy values, and therefore decrease the overall returns of the whole merger wave. M&A performance was generally good, but the aggregate performance of some large deals overwhelms that of thousands of other acquisitions leading to a net negative results for the market (Moeller et al., 2005). Campa & Hernando (2006) examine M&A performance in the European financial industry in the period 1998-2002. Merger performance is measured using shareholders returns before, around and after the merger announcement. Positive excess returns were found in the three-month period before the announcement, whereas the returns around and one year after the announcement were essentially zero. Long run M&A performance in the industry was shown to significantly improve, especially two years after the transaction. Martynova & Renneboog (2006) examine the European merger market in 1990 until 2001 and see that the cross-border interaction and the general M&A activity is increasing in Europe. In terms of performance, the larger part of M&A activity in Europe improved efficiency and ultimately increased the share prices of both the bidder and the target firm. When the difference between friendly and hostile takeovers are accounted, friendly takeovers are increasing the share price more than hostile takeovers do.

Similar studies have been conducted about the Asian and developing countries. M&A transactions are more intense in the developed countries, because of the higher numbers of opportunities and level of technology. However, as M&A's are increasing rapidly in developing countries due to post-crisis economic reforms (Ferraz & Hamaguchi, 2002), this market is of interest in the M&A literature too.

Rao-Nicholson et al. (2016) look at M&A performance in ASEAN countries, their M&A data goes from 2001 until 2012. Their results state a decrease in merger performance, measured for the combined firms. However, their results are influenced by the financial crisis and they state that different measurement within a model can lead to different results, what might explain the inconsistent findings across M&A studies (Rao-Nicholson et al., 2016). A study by Gu & Reed (2012) examine the Chinese cross-border M&A market between 1994 and 2009. Chinese domestic market showed incomparable growth and joined the M&A market in a later stage. Using share price returns they find evidence that Chinese M&A activity does not lower the shareholders wealth, in contrast to their expectations, the results show a slight positive effect of M&A activity on returns. Developing countries are affected by global M&A activity and tend to become more internationalized in their firm structure. Firms from developing countries are also acquiring other domestic companies for competitive reasons and corporate restructuring (Ferraz & Hamaguschi, 2012).

M&A performance has been examined widely, using United States firms. Different studies who examined the M&A performance state somewhat different results and there is no general conclusion that M&A automatically lead to increasing M&A performance. Different results arise when the Unites States historic M&A activity, starting in the twentieth century, is compared to more recent European and Asian data. As shown, M&A performance is a worldwide investigated topic where this study can contribute too as it examines merger performance in Europe over a very recent timeframe.

2.3 Tobin's Q ratio and M&A performance

The performance of M&A activities is a concept which is difficult to generalize. M&A is a multifaceted construct based on firm-level constructs. There is no overarching factor capturing all the different ways to proxy the performance (Zollo & Meier, 2008). Within the wide empirical literature on M&A activity, historically little has been written about the determinants of a decision to engage in M&A activity. A study by Chappel & Cheng (1984) tries to seek an alternative reasoning for M&A activity besides the traditional hypothesis that it should lead to profits and efficiency. From the perspective of the acquiring firm, M&A activity can be seen as an investment. There should be a theory or method that signals whether a potential investment opportunity is favorable or not. The Q ratio measures the market value to the cost of replacement and therefore implies that a Q ratio exceeding 1 signals a desirable investment opportunity. The Q ratio provides a plausible link between the valuation of a firm and the decisions in its M&A activity. Although stock price fluctuations can influence the Q ratio, a firm with a particularly efficient management will have a relative high Q ratio, at any given time (Chappell & Cheng, 1984). An efficient market would expect to see efficient managed firms to acquire less efficient firms as in that way the efficient management can increase the target firms management performance and therefore the combined value after the M&A deal.

Lang et al., (1989) studied the effect of M&A on the firm value. They examine if the gains of a takeover of a well-managed firm is dependent on the Q ratio of the target firm based on United States data from 1968 through 1986. The Q ratio is used to divide between well- and poor-performing firms. Performance is measured as shareholder gains, and the shareholder of the bidder often have gains because the combined value of the two merged companies increase. This is most likely due to the better management performance of the combined firm, after the merger. Their results imply that a high Q rated firm benefits from taking over a low Q rated firm, but that relationship does not hold the other way around. This can be because a low Q rated bidder lacks the managerial knowledge or because a low Q rated bidder signals that the internal investment opportunities are lacking and therefore they have to invest outside the firm (Lang et al., 1989). Kim et al. (1993) examine the Tobin's Q for firms in M&A activity and compares them to firms not involved in any activity. Their results state that the Q value of acquirers is higher compared to a group of control firms but the target firms Q values are not lower compared to the control group. Within their sample, firms that are the acquirer thus show a higher Q value before the M&A activity. The target firms however, are not per se bad performing firms since their Q values are not significantly different from the control group of firms. This is in contrast with their hypotheses that target firms have a lower Q.

Servaes (1991) elaborate on the relationship between the Q value and performance by adding more control variables compared to earlier studies such as Lang et al (1989). Adding controlling factors to a merger database consisting of United States mergers from 1972 until 1987 lead to results in line with the expectations. The highest merger gains are found in deals where a well-performing firm takes over a poor performing firm, in line with Lang et al (1989). Toxvaerd (2008) confirm that well managed firms show higher levels for the Q ratio. The results shows that acquiring firms usually have a higher Q than the target firms. Well performing, high Q rated firms are also more likely to launch takeover attempts compared to the low rated firms. Jovanovich & Rousseau (2002) examine M&A performance and incorporate only Unites States mergers until 2001. The results contribute to the underlying reasons for M&A activity. Their results show that mergers exist because of inter-firm differences and that high Q rated firms buy low Q rated firms.

The general accepted view in the literature so far states that a well-managed firm shows a relatively high Q-ratio and engages in M&A activity with a less performing firm with a lower Q-ratio. This view, the Q theory of mergers, has been critically assessed. Rhodes-Kropf & Viswanathan (2004) is one of the first studies who incorporate over and undervaluation in the market into M&A behavior. They state that merger waves can be rationally driven by periods of over- and undervaluation of the assets and the stock market. The quality of the management is therefore not the only influential factor for the Q ratio. A period of undervaluation in the market can therefore lead to a dispersion in the Q ratio's and affect the M&A activity of firms. Their conclusion is that market overvaluation increase the occurrence of mergers, but this is not (yet) linked to the M&A performance. A follow-up study by Rhodes-Kropf et

al. (2005) test the existing theories and especially how valuation errors can affect M&A activity. Their study examines whether short- and long-run price deviations can influence company valuations and therefore influence the M&A decision. They conclude that higher valued firms acquire lower valued firms, which is in line with the Q-theory of mergers. However, the underlying reasoning differs from the conventional reasoning that it would simply lead to a better M&A performance. Rhodes-Kropf et al. (2005) state that the deviations in valuation lead to this result and that managers tend to choose for a merger opportunity which increases the short-run results, and their personal gain. The results show that high buys low is somewhat exaggerated and that high buys less high might be a better way to state the relationship between the merging firms. Rhodes-Kropf & Robinson (2008) built further on the two aforementioned studies and state that theories exist to explain M&A but none of them imply the convergence of the Q ratio's for either bidding or target firms. Their study is one of the first to hypothesize similarity in Q ratio's. Firms do not necessarily seek a target firm with a lower Q ratio as similarity in assets can lead to complementary power and better merger performance. Firms even tend to merge with an equal or better performing firm to benefit from the knowledge and financial stability of the partner firm. The potential merger will then be a success if there is a high degree of complementarity between the two firms. Their data, based on United States mergers in the period of 1980 until 2001 confirm the theory that firms with similar assets purchase one another (Rhodes-Kropf & Robinson, 2008). Martynova & Renneboog (2008) examine the global M&A activity. Since 1990, European firms were eager to participate in M&A activity too and this can possibly impact M&A activity and the reason why M&A happens. There has been no acknowledgement that the post-crisis M&A activity is a real merger wave but Martynova & Renneboog did expect a takeover wave in 2008. However, a potential crisis might be the reason for slowing down a merger wave and therefore the peak of the recent M&A activity wave is just behind us making it an interesting M&A time period.

2.4 The moderating role of firm industry

One of the major factors often controlled for in examining M&A performance is the firm industry effect. According to Rhodes-Kropf & Robinson (2008) the effects of the Q-theory on M&A performance should be stronger if there is control for different explanations such as the industry effect. They state that two firms in the same industry may have similar financials and therefore show similarity in the Tobin's Q ratio. This is because the two merging companies are in the same line of business and therefore show more complementarity in their assets. This would then lead to increasing M&A performance, as they hypothesize that similarities in assets increase the implementation of the two firms engaging in the M&A activity. Firm industry therefore can be an impactful factor in M&A. Martynova & Renneboog (2005) state that among other value-relevant information, the industry-relatedness is taken into account in M&A, as it influences the potential value creation of the takeover deal. They contribute by emphasizing that industry relatedness can be a major factor in the potential target selection and

therefore affect the success of the M&A deal. Firm industry effect has a broader history within the M&A literature.

Montgomery & Hariharan (1988) examine industry deals and diversification among firms. Based on data from 258 industries over the years 1974-1977, 266 individual firms are taken into account for this study. They state that firms choose to employ excess resources or invest in other firms with similar settings. That is, firms choose to engage in activity with other firms that have the same resource characteristics and are similar to their own resource profiles. This is an early example of a study that states an existing relationship between type of industry and M&A activity. The preference for similarity roots for the argument that firms tend to choose for firms within their own industry. However, this study did not yet relate to M&A performance. Mitchell & Mulherin (1995) examine restructuring activities on industry level for 1982 until 1989. The differences between industries are found in takeover frequency, the rate of restructuring activities, the timing of takeovers and the industry variation of takeover activity. Their results support significant differences across industries, and a link between a certain industry shock and takeover activity. These results support the stated relationship that M&A activity can be industry specific, and therefore an interesting factor to examine and to control for. Relating it to performance, Mitchell & Mulherin state that a merger in theory will create value and enhance performance, the industry adjusted change in performance (thus controlling for industry effect) may indicate otherwise. Because of the impact of industry type on M&A performance it is an interesting factor to take into account. Mulherin & Boone (2000) compare the M&A activity among 59 United States industries and a total of 1305 firms for the period 1990-1999. The findings are that M&A does create wealth, especially in the 1990s and that M&A activity plays a role in all sorts of industries but it is larger in some industries compared to other industries. The results indicate that among other reasons, industry type and industry shocks affect the M&A market as a whole and they find that M&A clusters in some industries which means that it is difficult to state that every M&A is independent. In addition, there is room for further research into the M&A activities and the difference in gains among industries (Mulherin & Boone, 2000).

As several studies indicate, there is an existing relationship between industry type and M&A activity. Whereas some industries are found to have more M&A activity, it is also found that intra-industry deals are more comfortable for companies since it is less bound to uncertainty. Fuller et al. (2002) examine M&A deal characteristics; how bidders are influenced by target characteristics and the study incorporates the industry type in the deals. Their data is based on 3135 takeovers in the United States for 1990 until 2000 and suggests that certain industries have more intra-industry trade than others. A dummy variable is used to examine whether deals involve intra-industry activity or inter-industry activity. Secondly, it is used to find if industry type significantly impacts the M&A transaction. This is because if a target is in the same industry as the bidder, the bidder is more likely to know the value of the target and therefore adjust the bid and method of payment in the deal. In their data, bidders are found

to have both greater gain and loss in absolute values when there is intra-industry M&A activity (Fuller et al., 2002). This is most likely because intra-industry M&A activity leads to more familiarity between firms and therefore more risky behavior in M&A deals and therefore to more excessive returns, either positive and negative. Baker & Kiymaz (2008) examine the relationship between performance and industry type in an M&A environment. Their research is based on the 100 largest mergers per year for the period 1989 until 2003 and examines the short-term effect of industry influence on M&A performance. When the data is partitioned by industry, it is revealed that wealth effects differ for acquirers and targets. Acquirers are found to have both significant positive and negative wealth effects, depending on industry. Targets earn positive returns in the short run, across all the industries, but the size of the return differs per industry. Their results support the synergy motive for M&A, that companies tend to merge because of the increasing value due to potential synergies of both firms. As synergies are found to be higher in intra-industry M&A, this positively effects the M&A performance. Finally, Baker & Kiymaz suggest that further research can focus on examining the correlation between industry type and target and bidder gains from M&A activity. Reuer & Ragozzino (2008) examine the effect of industry type within the adverse selection problem for acquirers when selecting a target in a M&A design. They incorporate firm industry effects as a controlling factor in their study based on M&A deals in the years 1992 to 2002. Intra-industry transactions and M&A activity have an advantage over inter-industry transactions. In M&A deals which take place within one industry, acquirers are better positioned to examine and investigate the value of the target. As a comparison to inter-industry deals, where companies are less familiar and more asymmetric information is expected to exists. The results confirm the expectations on the asymmetric information, and indicate that if targets and acquirers are working in the same industry, risks are better understood leading to a better deal. This study confirms a relationship between industry type and M&A deals, but especially focus on the selection process and not necessarily on the performance after the M&A deal, this is still open for research.

Some contradicting results are presented by Ahern & Harford (2013). the paper critically examines the magnitude of inter-industry M&A activity within the US. They examine how M&A activity can initiate a merger wave through the industry in which the M&A takes place. Using a network model of the United States economy based on data from 1986 until 2010, they suggest that stronger industry connection leads to more inter-industry M&A activity. Their results show that cross-industry mergers only occur in a very small number of the industries. 94% of the industries do not show cross-industry merger behavior, as the remaining 6% involves every cross-industry merger within their dataset. Their paper mainly contributes to the discussion as it finds that cross-industry mergers occur in only a small part of the industries within their sample, thus it is good to take into account if there is significant inter-industry activity. Also, the link between the industries and M&A performance is not examined and therefore left open for further research.

2.5 Hypothesis development

Tobin's Q and M&A performance

Overall, literature is inconclusive about the relationship between Tobin's Q and M&A performance. Whereas most of the studies examine a linear relationship, some other recent studies find that similarity in Tobin's Q lead to better M&A performance (e.g. Rhodes-Kropf & Robinson, 2008). Rhodes-Kropf & Viswanathan (2004) is one of the first studies which find that the difference in valuation ratios between merging companies is not as big as the Q-theory state. Their study examines the reason for M&A activity and this is based on misevaluation and the influence of managers and their desire for personal gain. Rhodes-Kropf & Robinson (2008) also state that the theory that similarity leads to better performance is not guided by any existing theory. There is no theoretical reason why similarity exists in the valuation ratio of targets and acquirers. Based on different data samples mainly from the twentieth century, the majority of the studies suggest a linear relationship. Following some studies (Lang et al., 1989; Servaes, 1991) who examine a difference in results for target and bidder firm, this study incorporates both target and bidder firm in the hypothesis too, to see if there are M&A performance differences for the target and the bidder. Lang et al. (1989) suggest further research based on different samples, to see if the stated relationship still holds and Rhodes-Kropf & Robinson (2008) suggest that new empirical tests may shed better light on the motives for mergers and the level of complementarities in M&A activity. Following the examined literature on the relationship between the Q ratio and M&A performance, a linear relationship is expected. This is because the discussed studies performed in the twentieth century (based on the US) market all examined and proved this relationship, whereas studies that examine similarity in Q ratio admit that there is not yet an underlying theoretical approach why that relationship might hold. This leads to the first two hypothesis to answer the research question and examine the relationship between Tobin's Q and M&A performance.

H1a: High Q rated firms buying low Q rated firms in M&A enhances the M&A bidder firm performance

H1b: High Q rated firms buying low Q rated firms in M&A enhances the M&A target firm performance

This hypothesis will provide insight whether the stated linear relationship between Tobin's Q and M&A performance holds in this study. The difference in Q ratio will be measured using a dummy variable which states a 1 for high Q rated firms and a 0 for low Q rated firms. The hypothesis can be tested following the dataset and the research method explained later in this paper.

Because a dummy variable does not capture the real difference in Q ratio, another measure for the difference in Q ratio will be taken into account. The real difference in Q ratio will be taken to see if there is a relationship between absolute difference in Q ratio and the M&A performance. This measure has not yet been widely used, as the majority of the previous study use a dummy, but might lead to different results. Following the reasoning behind the first two hypothesis, it is still expected that a higher difference in Q ratio would increase M&A performance. The relationship mentioned in Rhodes-Kropf

& Robinson (2008) that high might buy less high can then be seen in the absolute difference in Q ratio. Where a dummy variable only captures high and low, the absolute difference can give insight if high rated firms buy low rated firms, or less high rated firms.. This leads to the second two hypothesis to answer the research question and examine the relationship between Tobin's Q and M&A performance.

H2a: Higher difference in the Q ratio between the M&A firms enhances the M&A bidder firm performance

H2b: Higher difference in the Q ratio between the M&A firms enhances the M&A target firm performance

This hypothesis will provide insight in the relationship between the Q ratio of firms and their M&A performance. Also, comparing results with hypothesis 1a and 1b can give insight in how different operationalization's for Tobin's Q might lead to different results which can be interesting as an opening path for further research.

The effect of industry type on M&A performance

Overall, literature confirms a relationship between industry type and M&A activity whereas multiple studies examined the impact of intra- and inter-industry M&A's. In general, it is for acquirers easier to acquire a target firm in the same industry. This is because there is more knowledge about the target firm, and acquiring firms can easier access and assess the targets financial characteristics (Reuer & Ragozzino, 2008; Fuller et al., 2002). The deal therefore incorporates less asymmetric information which makes the whole process easier and cheaper. Intra-industry deals are therefore expected to take place more often and are favored over inter-industry M&A activity. This leads to the expectation that for this study, intra-industry M&A generate higher M&A performance compared to inter-industry M&A. This leads to the third set of hypothesis to see whether this expectation holds:

H3a: Intra-industry M&A's show higher M&A bidder firm performance compared to inter-industry M&A's.

H3a: Intra-industry M&A's shows higher M&A target firm performance compared to inter-industry M&A's.

For Tobin's Q and M&A performance it is hypothesized that a high Q rated firm engages in M&A with a low Q rated firm and this enhances the merger performance. The industry effect however might undermine this relationship as explained by Rhodes-Kropf & Robinson (2008) who state that similarity in the industry will lead to higher M&A performance regardless of the Tobin's Q effect. To contribute to the literature about the industry effect in takeovers, this study will examine whether the Q theory of mergers is subject to a moderating role of industry type. This would indicate that the stated relationship as examined under hypothesis H1A and H1B would differ when industry effect is taken into account. To measure the moderating effect of same industry on Tobin's Q similarity on performance, the sample

will be divided into two separate samples using a dummy for same industry deals. Then examine whether results for same industry M&A activity are significantly different from the results of different industry M&A activity. It is expected that intra-industry M&A activity is less sensible for the Q theory of mergers. The underlying reasoning for this explanation is twofold. First, it is in line with several studies stating the like buys like effect (Rhodes-Kropf et al., 2005; Rhodes-Kropf & Robinson, 2008). The like buys like effect is greater in intra-industry M&A activity where firm similarity is often greater compared to firm similarity in the inter-industry M&A activity. Second, intra-industry M&A is less bound to asymmetric information and firms are better able to search and select a target firm, leading to less valuation errors is intra-industry M&A. This leads to the expectations that the Q theory of mergers shows weaker presence in intra-industry M&A activity, leading to the final set of hypotheses:

H4a: For intra-industry M&A's, the effect of Tobin's Q on M&A bidder firm performance is less strong compared to inter-industry M&A's

H4a: For intra-industry M&A's, the effect of Tobin's Q on M&A target firm performance is less strong compared to inter-industry M&A's

This hypothesis will provide insight in the effect of inter industry M&A activity on the relationship between Tobin's Q and M&A performance. Examining this might lead to evidence on the expected role of industry type as a mediator. Results can potentially open up paths to see whether the relationship between M&A and performance in general might be completely different among different industries. The sample selection and the methodological approach to test all the hypotheses will be explained in the following section.

3. Research methodology

3.1 Sample

To answer the stated research question, a quantitative data research will be conducted. Data on M&A deals will be retrieved from Zephyr and firm specific data will be collected using Thomson Reuters Eikon. The initial sample of deals is retrieved from Zephyr, which collects comprehensive data on M&A activity from 1997 until the present day. To conduct the M&A dataset, the following criteria are used:

(1) The deal type is either an Acquisition, Merger or Joint-venture

(2) The Acquirer is located in Europe

(3) The Acquirer is listed, whereas the target can either be listed or delisted

(4) The deal is completed-confirmed or completed-assumed in the period 1/1/2008 to 1/1/2018

Based on these assumptions, the total number of deals incorporated in the initial sample is 1989 completed or completed-assumed deals. However, after controlling for data availability 739 deals remain for which the complete dataset was available. Europe has been chosen as it is yet underrepresented in the M&A literature but has increasing M&A activity over the past 3 decades. It is believed that a more European focus on M&A contributes to the literature as it allows further research to evaluate the impact of a wider range of institutional settings, a different regulatory environment and a different legal setting on M&A activity (Martynova & Renneboog, 2005). The pattern of M&A activity in Continental Europe is much less explored in the empirical literature compared to the US (and to lesser extent, the UK). The UK and Continental Europe are two of the most dynamic markets for M&A activity and therefore can use greater attention (Mateev, 2017). The following two pages show some summary statistics of the data sample and afterwards the variables of this study will be discussed.

Figure 1 will provide an overview of the deals for each year, based on the date of announcement. This shows that the deals for each year fluctuates and does not show any remarkable values. Looking at the average value per deal, during the years 2008-2013 a lower value occurred compared to the average (average deal value of 1.500m). Logically, this is because of the financial crisis which knew its peak in the years 2008-2013 and the corresponding financial restraints companies faced. In contrast, starting in 2014 more and more economic factors started to show positive indicators and the crisis was find to come to an end (Gogstad et al., 2017). As the crisis resolved around 2014 companies were more confident to engage in M&A activity and that can be seen as the total and average deal value shows strong increase.

Year of deal (Announced date)	Number of deals	Aggregate deal value (m EUR)	Average deal value (m EUR)	% of deals from total
2006	2	€ 13.709.681,00	€ 6.854.840,50	0,27%
2007	38	€ 107.134.308,55	€ 2.819.323,91	5,14%
2008	94	€ 90.793.796,36	€ 965.891,45	12,72%
2009	71	€ 73.099.977,91	€ 1.029.577,15	9,61%
2010	65	€ 62.967.358,46	€ 968.728,59	8,80%
2011	83	€ 61.721.703,72	€ 743.634,98	11,23%
2012	75	€ 71.192.082,32	€ 949.227,76	10,15%
2013	57	€ 48.802.996,14	€ 856.192,91	7,71%
2014	85	€ 198.894.620,85	€ 2.339.936,72	11,50%
2015	68	€ 209.971.374,68	€ 3.087.814,33	9,20%
2016	63	€ 88.242.267,99	€ 1.400.670,92	8,53%
2017	38	€ 89.638.719,56	€ 2.358.913,67	5,14%
Total	739	€ 1.116.168.887,54	€ 1.510.377,39	100%

Figure 1: Overview of deals divided per year (source: Zephyr)

As this study tends to examine the whole of Europe, figure 2 shows the origin of the deals based on the country of the acquirer. As can be seen, over 20 countries are included in the dataset from all parts of Europe. As shown in the last column, Great Britain is relatively high represented in the dataset being at almost 16%. This however does not needs to be controlled for as many countries are incorporated, the dataset is a good representation of the subject of study.

Acquiring countries	Number of deals	Aggregate deal value (m EUR)	% of deals from total
Great Britain	118	€ 255.667.406,75	15,97%
France	95	€ 146.902.206,28	12,86%
Germany	76	€ 77.556.565,00	10,28%
Russia	72	€ 42.897.427,37	9,74%
Switzerland	50	€ 135.483.978,91	6,77%
Italy	40	€ 34.557.539,85	5,41%
Sweden	40	€ 8.202.818,31	5,41%
Spain	35	€ 57.368.425,29	4,74%
Poland	32	€ 3.356.900,74	4,33%
Netherlands	31	€ 88.343.591,09	4,19%
Norway	28	€ 5.648.371,89	3,79%
Ireland	22	€ 146.129.008,93	2,98%
Turkey	14	€ 984.004,03	1,89%
Belgium	13	€ 52.192.048,75	1,76%
Finland	13	€ 23.932.039,57	1,76%
Denmark	12	€ 2.236.035,21	1,62%
Greece	11	€ 4.253.299,05	1,49%
Austria	9	€ 1.043.350,83	1,22%
Other	28	€ 29.413.869,69	3,79%
Total	739	€ 1.116.168.887,54	100%

Figure 2: Overview of the deals divided per country (source: Zephyr)

3.2 Variables

Independent variable

Tobin's Q. To examine the research question, Q ratio similarity needs to be operationalized. The Q ratio will be measured on the basis of the model by Lindenberg & Ross (1981) but with slight adaptations as explained by Chung & Pruitt (1994). Within the research of Lindenberg & Ross the Q ratio of a firm is based on the market value of the firm divided by the asset value of the firm sometimes called the replacement costs. The replacement costs are defined by Lindenberg & Ross as total assets, inventories and net property, plants & equipment (PPE). However, as Chung & Pruitt describe, a simplified procedure will lead to easier data-collection and is therefore a compromise between precision and computational effort. Their suggestion is to derive the market value of the firm by the total assets of the firm, leaving out the less available data on inventories and PPE. The value for Tobin's Q in this research will therefore be as shown in equation (1).

(1) $$Tobin's\ Q = \frac{Market\ Value + Preferred\ stock + Debt}{Total\ assets}$$

The market value is the product of the firm's share price and the number of common stocks, the preferred stock is the value of the outstanding preferred stock (Chung & Pruitt, 1994). For the value of debt, short term debt is the debt that will mature before year t+1 and is assumed to equal the book value of the debt. Long term debt is based on long-term outstanding debt, as long term bond data often is not sufficient (Lindenberg & Ross, 1981; Lang et al., 1998). Total assets refers to the total asset value of the company and all this data is collected using Thomson Reuters DataStream. The Q ratio will be calculated over the year-end data of the year prior to the initial announcement of the takeover and the Q ratio is considered to be high if it is larger than one (Servaes, 1991).

The Q ratio is used in two ways, first to measure if firms engage in M&A activity with firms who have a similar Q ratio or whether high Q rated firms buy low Q rated firms and the effect of this on M&A performance. The M&A data will be examined to see whether the majority of the deals incorporate similarity in Q ratio or difference in the Q ratio. To measure whether the like buys like effect holds or high Q rated firms buy low Q rated firms, a dummy variable will be used. The dummy variable will measure whether the acquirer Q ratio is high and the target Q ratio is low, stating 1 if this is the case and 0 otherwise, to measure the high buys low effect. For the second test, the distance in Q ratio between firms will be taken as the independent variable for the M&A performance. This is calculated by simple deducting the Q ratio of the target from the bidder to see if there is a significant relationship between the distance in Q ratio between firms and the M&A performance. Since a dummy variable does not report difference between firms with a Q ratio of e.g. 1.2 and 3 (as they are both high), this test might provide new insights in the relationships between Q distance between firms and M&A performance.

Dependent variable

CAR. The M&A performance will be the dependent variable and measured as the cumulative abnormal returns (CAR) from the takeover announcement date until the end of the merger, the resolution. This is in line with multiple studies like Lang et al. (1989) and Servaes (1991). For the calculation of the abnormal returns, an event study methodology will be used which is initially introduced by Fama et al. in 1969. For an event study, both an estimation window and an event window need to be chosen. The estimation window decides on which historical period prior to the event – the announcement of a merger in this study – is chosen as the benchmark for normal returns of the firm. The event window is a smaller period around the event, and is expected to show abnormal returns compared to the chosen benchmark.

An estimation window can differ highly in days and may have empirical implications, however often lies between 100 and 200 trading days prior to the event date. This study focusses on European stock market, and many modifications for event study techniques were based on US stock markets. Bartholdy et al. (2007) take smaller stock exchanges into account when examining trade and the estimation window, based on smaller European stock indices. Their recommendation is a standard estimation period between 200 and 250 observations, which covers the larger part of a year prior to the event. Other studies as Goergen & Renneboog (2002) examine abnormal returns in a European setting too and also take around 200 trading days. For this study, 200 days prior to the event window is therefore chosen as the estimation window. The event window is a period of days prior and post to the event. In this study the announcement day is chosen as the date of the event as this is officially the day on which new information comes to the market and therefore a price-reaction is expected. It is usual to choose an event window larger than the specific period of interest, so the event window is expanded to multiple days including at least the announcement day and the day after the announcement (MacKinlay, 1997). This study will choose an event window of 7 days, meaning 3 days prior and 3days post the announcement day, 7 days in total (following Andrew-Coutts et al., 1997; Chang et al., 2007). Also, a small gap in trading days between the estimation and the event window may be required to cover any relation between the estimation window trading days and the event window following too shortly after. Another study examining event studies shows that different lengths of an event window significantly impacts the CAR calculations (McWilliams & Siegel, 1997). Therefore, event windows of (-10,10), (-5,5) and (-1,1) have been incorporated too for the robustness checks, whereas the estimation window did not change.

Knowing the estimation and the event window, a choice for the right model to calculate the normal returns has to be made. Several options exist to calculate normal returns for a company based on the market returns, like the Capital Asset Pricing Model (CAPM). This model, based on work of Linter (1975) & Sharpe (1964) assumes that the price of an asset is reliant on the asset and its connectedness to the market portfolio. The model assumes that a part of the risk of an asset depends on systematic risk (non-diversifiable) and a part of the risk is specific for an asset (diversifiable). However, deviations of

the CAPM model have been found. This then implies that the validity of the restrictions within the CAPM model are questionable leading to the possibility that results might be sensitive to the specificity of the CAPM model (MacKinlay, 1997). Following MacKinlay, these restrictions can be avoided at very low cost by simply using the market model.

The market model has been chosen in several previous studies, which substantiates the choice for the model (Brown & Warner, 1985; Lang et al., 1989; Servaes, 1991). A study by Dyckman et al. (1984) especially examined the different event study methodologies using a simulation approach and conclude a slight preference for the market model to correctly detect the presence of abnormal returns. The market model uses the market return outside the event window period to estimate the stock's expected returns. Then, in the event period the stock's returns are measured against the expected stock returns given the market returns in the event period, to calculate the stocks abnormal returns (Fama, 1998). Using multiple European countries, the local index for every firm is used as the benchmark returns which is proven to be a sufficient index (compared to a world-wide index), as the study of Campbell et al (2010) shows.

Control variables

Various control variables will be included to control for different factors which might influence the performance of the M&A activity. The control variables will be explained below.

Cross border. M&A has been growing worldwide, but compared to M&A within a country some extra frictions can impede. Cross-border M&A can signal confidence for the acquiring company whereas it aims to extend the working field and potentially exploit foreign markets. However, as examined by Erel et al. (2012) frictions can occur. Cultural or geographical difference can increase the costs imposed with the M&A activity and governance interference can complicate the M&A process, making it longer and more costly. To control for the potential impact of cross-border M&A, a dummy variable is included which will indicate if a M&A is cross-border. The dummy variable will state a 1 if the acquirer and target firm are from the same countries and 0 otherwise.

Deal size. In line with research done by Alexandridis et al., (2013), there is evidence that larger M&A's destroy more value for acquiring companies. This is due to a general higher level of overconfidence among managers of larger firms, leading to more overpayment. Carline et al., (2002) examine the effect of deal size on M&A performance too and find a significant negative relationship between deal size and performance. Therefore, the deal size is incorporated using the Euro denominated deal value according to the Zephyr M&A database.

Firm industry. According to Hasbrouck (1985) and Rhodes-Kropf & Robinson (2008) firms in similar industries tend to perform better in M&A activity. To control for the effect of the firms industry, this is included as a control variable with a dummy variable based on the US 4-numbered SIC code for both acquirer and target firm. Following Heron & Lie (2002) the dummy variable will indicate that the two firms are operating in the same industry with a score of 1, and 0 otherwise. However, as explained in

the hypothesis development, this control variable will be used in the first two sets of hypothesis, as it will be used to separate the sample afterwards.

Firm size. In line with Servaes (1991) and Rhodes-Kropf & Robinson (2008) firm size can be a explaining factor in M&A and therefore is added as a control variable. As examined by Moeller et al. (2004) smaller firms tend to perform better in M&A than large firms when there is an M&A announcement which can be due to the differences in alignment of interests between small and large firms. Smaller firms managers' are often closer related to their shareholders and therefore are less subject to misalignment which is found to be linked to worsening the performance of M&A. Therefore, controlling for firm size should lead to a better insight in the relationship between Tobin's Q and the M&A performance. The size can be measured as the year-end market value for the year prior to the year in which the M&A was announced.

Means of payment. According to Martynova & Renneboog (2009) the means of payment is an influential factor in the M&A performance. Different ways of financing a takeover are found to differently impact the M&A returns. A prominent view in the literature is that M&A performance is negatively related to payment made with equity, whereas cash and debt are not found to highly impact the M&A performance (Martynova & Renneboog, 2009). To control for the impact of means of payment on the M&A performance, this is included as a control variable following Servaes (1991) who incorporate a dummy variable whereas a majority of the payment in cash equals 1 and 0 otherwise. In this research, the dummy will state 1 if the majority of the transaction is based on cash and state 0 otherwise.

Relative size. Examined by Asquith et al. (1983) there is an expected positive effect between the relative size of the target to bidder company and the M&A performance. Therefore it is a factor which is controlled for, following several other studies. Jarrell & Poulsen (1989), Servaes (1991) and Alexandridis et al., (2010) control for relative size whereas it is measured as the target size divided by the bidder size. The size can be measured as the year-end market value for the year prior to the year in which the M&A was announced.

A total overview of the variables, their measurement and the source can be found in the included Appendix 1.

3.3 Model

To examine the relationship between Tobin's Q and the merger performance, a multivariate OLS regression is used. This type of method is often used whereas multiple observations and multiple statistical outcomes are analyzed at one point in time. Separate regressions are conducted as multiple hypotheses are examined. The first model will examine how the similarity in Tobin's Q affect both acquirer and target CAR. The second model will examine the relationship between the absolute difference in Tobin's Q and acquirer and target CAR. For the third set of hypothesis a t-test is conducted to examine the different impact of Tobin's Q on acquirer and target CAR for intra- and inter industry M&A. For the fourth set of hypothesis, the relationship between Tobin's Q and CAR is examined for the intra- and inter industry M&A using the first model. The total sample is therefore divided using a dummy variable and the different sets of regression results are compared. The regression models are a based on the models presented by Servaes (1991) and Lang et al. (1998) and are shown below.

Model 1:

$$CAR\ (-3,3) = \alpha + \beta_1 * (Q\ high\ buys\ low\ dummy\ ) + \beta_2 * (Crossborder\ dummy) + \beta_3 * (Log\ dealsize) + \beta_4 * (Industry\ dummy) + \beta_5 * (Firmsize) + \beta_6 * (Means\ of\ payment\ dummy) + \beta_7 * (Log\ Relative\ size) + \varepsilon$$

For the acquiring company, both the CAR and the firm size of the acquiring are taken into account, whereas this changes to the target company to examine the target company M&A performance. For the fourth set of hypothesis, the sample is divided based on the industry dummy score.

Model 2:

$$CAR\ (-3,3) = \alpha + \beta_1 * (Q\ distance\ ) + \beta_2 * (Crossborder\ dummy) + \beta_3 * (Log\ dealsize) + \beta_4 * (Industry\ dummy) + \beta_5 * (Firmsize) + \beta_6 * (Means\ of\ payment\ dummy) + \beta_7 * (Log\ Relative\ size) + \varepsilon$$

For the acquiring company, both the CAR and the firm size of the acquiring are taken into account, whereas this changes to the target company to examine the target company M&A performance.

4. Results

4.1 Descriptive statistics

In preparing the dataset for the regression, all the variables are checked. For every variable, a histogram is drawn and based on the histogram adjustments are made for some of the variables. *Deal size* is adjusted by taking the logarithmic values of the initial variable, because of the skewness of *Deal size* as a variable. The same is done for the *Firm size* and *Relative size,* leading to better normal distributed variables and lesser single outlying values. For the values for CAR, some outliers were found. To control for this, the upper and lower 1% of the data was cut off, also known as Winsorizing the data. The same was done for the Q distance variable and for the combined CAR in order to decline the influence of outliers.

Variable	Obs	Mean	Std. Dev.	Min	Max
CAR_Acq3	739	-.11	6.16	-20.1	19.56
CAR_Target3	703	11.14	21.21	-19.6	111.93
Weighted_CAR	645	5.82	112.8	-54.85	2859.11
Q_Dummy_Like	739	.69	.46	0	1
Q_High_Low	739	.16	.37	0	1
Q_DIST	739	-.11	1.07	-5.51	3.32
Crossb_Dummy	739	.53	.5	0	1
Log_DEALSIZE	739	4.88	2.46	-4.14	11.11
IND_Dummy	739	.41	.49	0	1
Log_MVACQ	702	7.95	2.12	1.65	12.35
Log_MVTARGET	711	5.91	2	-2.48	11.08
MoP_Dummy	739	.51	.5	0	1

Figure 3: Summary statistics

After using the logarithm of the data and Winsorizing some of the variables, the summary statistics are shown in figure 3. The figure shows that for target firms the mean CAR after engaging in M&A is 11.14%, whereas the acquiring firms show a loss of 0.11%. The combined weighted CAR is 5.82% and based on the market value of the acquirer and the target. This value of 5.82% suggests that in total the M&A activities of this sample increase shareholder value on average. 69% of the deals show similarity in the Q ratio for both the target and the acquirer, meaning either a high or low Q ratio for both firms. 16% of the deals show that high buys low, and therefore the remaining 15% of the deals is a deal where a low Q rated firm buys a high Q rated target.

Notable is that, where the high buys low effect is examined more often in past literature, this dataset shows almost equal numbers of high buys low and low buys high deals. Furthermore, 53% of the deals is within the same country and 41% of the deals are in the same industry.

To ensure that the usage of an OLS regression can be conducted, the underlying assumptions of an OLS regression have to be met. Therefore, several tests are conducted to control for potential influential data or unusual data. First, using Cook's D score potential influential M&A deals in the dataset are filtered out. The lowest value for Cook's D is zero, the higher the value the more influential the data-point. Only one observation was found to have an exceptional Cook's D and leverage impact and therefore that particular observation is left out of the dataset. Secondly, the normality of the residuals is examined and found to show no extraordinary results, therefore leading to no adjustments.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) CAR_Acq3	1.00											
(2) CAR_Target3	0.05	1.00										
(3) Weighted_CAR	**0.79**	0.36	1.00									
(4) Q_High_Low	-0.04	0.05	-0.03	1.00								
(5) Q_DIST	-0.03	-0.09	-0.03	0.40	1.00							
(6) Crossb_Dummy	-0.08	-0.17	-0.09	0.03	0.07	1.00						
(7) Log_DEALSIZE	-0.01	0.04	0.04	-0.10	-0.12	-0.17	1.00					
(8) IND_Dummy	0.05	-0.12	0.02	0.02	0.06	0.02	0.11	1.00				
(9) Log_MVACQ	0.00	0.10	-0.08	-0.14	-0.16	-0.33	0.47	0.08	1.00			
(10) Log_MVTARGET	-0.01	-0.12	0.01	-0.20	-0.21	-0.13	**0.63**	0.16	**0.62**	1.00		
(11) MoP_Dummy	0.04	0.17	0.05	0.05	-0.05	-0.20	0.02	-0.06	0.21	0.02	1.00	
(12) Log_Relsize	-0.01	-0.25	0.11	-0.06	-0.04	0.24	0.14	0.09	-0.49	0.39	-0.23	1.00

Figure 4: Correlation matrix

Figure 4 shows the Pearson correlation matrix. Correlation between variables is expected for values exceeding -0.5 and 0.5, which indicates moderate multicollinearity. High collinearity is indicated if the values exceed -0.7 or 0.7 (Pallant & Manual, 2010). As shown in the figure, only in a few cases the threshold of 0.5 is exceeded. For the weighted CAR (3) this makes sense as it is a combined variable of both the acquirer and target CAR.. The logarithm of the target market value (11) is relatively high correlated to both the deal size and the acquiring market value. This makes sense as M&A deals tend to occur between firms which are of comparable size. To control for this, the target and acquirer market value are used separately in the model.

To make sure there is no multicollinearity, the variance inflation factor (VIF) is examined too. The results are shown in figure 5 where a value for VIF between 1 and 5 means the variance is moderate, a VIF value between 5 and 10 can be problematic and a VIF value exceeding 10 indicates high multicollinearity (Kutner et al., 2004). Although there are two cases of slightly high correlation, the VIF values show no problematic values and therefore there is no need to control for this.

Variable	VIF	1/VIF
IND_Dummy	3.63	.28
Log_MVTARGET	2.24	.45
Log_MVACQ	1.93	.52
Log_DEALVALUE	1.71	.59
Q_Dummy	1.66	.6
Crossb_Dummy	1.17	.86
MoP_Dummy	1.09	.91
Q_DIST	1.06	.94
Weighted_CAR	1.02	.98
Mean_VIF	1.99	.98

Figure 5: VIF values

Before examining the results the calculated CAR results are compared to prior empirical results. This studies CAR for an event window of (-3,3) are shown below in figure 6. Whereas the acquirer overall lose value of 0.11%, the target firms gain an average of 11.14% leading to an overall weighted combined gain of 5.82%. Comparing these results to other studies, Serveas (1991) show a negative acquirer return of -1.07% and a target return of 23.64%. Lang et al (1998) show positive abnormal returns for the acquirers, but only 1% and Alexandridis (2013) show target returns of 20.32%. Bruner (2002) conducted a meta-study in which 130 studies from 1971 to 2001 on M&A performance are combined and examined. The conclusion is that the majority of the studies show the same results for target and acquirer returns. Whereas target firms earn significant large positive market-returns, acquiring firms earn around zero for adjusted returns and overall M&A leads to positive combined adjusted returns. As this study also shows acquiring returns around zero (-0.11%) and relatively large target returns (11.14%), the calculated CAR are in line with earlier empirical results and therefore can safely be used in the analysis.

Variable	Obs	Mean	Std. Dev.	Min	Max
CAR_Acq3	739	-.11	6.16	-20.1	19.56
CAR_Target3	703	11.14	21.21	-19.6	111.93
Weighted_CAR	645	5.82	112.8	-54.85	2859.11

Figure 6: CAR statistics

4.2 Test of hypotheses

Hypothesis 1

For the first set of hypothesis, the relationship between the Tobin's Q and the CAR of both the acquirer and the target are examined. Tobin's Q is incorporated as a dummy variable stating a 1 if the acquiring firm has a Q higher than 1 and the target firm a Q lower than 1. Based on the literature, in the hypothesis it was expected that M&A activity between a high valued acquirer and a low valued target would increase the performance for both the target and the acquiring firm. As shown in figure 7, the effect of the Q difference is negative for acquiring firms (R^2=.016, β = -1.099, p = n.s.) and positive for target firms (R^2=.127, β = 1.486, p = n.s.) however both coefficients are not significant. The direction of the coefficients is interesting to look at, as it partly counters the expectations. Since acquiring firms CAR is negatively related to the high buys low effect, acquirers are expected to not engage in M&A activity with low Q rated targets anymore.

For the target firms, merging with a high Q rated firm is rather positive, as it shows a positive link to the target firm CAR, although this relationship is also insignificant. Looking at the control variables, there is more significance for the target CAR, and the target model shows a higher R-squared too (R^2=.127 > R^2=.016). Looking at other studies, the target return model is more often found to have a higher explanatory power (e.g. Servaes, 1991; Lang et al., 1989). As there are no significant effects visible for the Q measurement and the CARs of both acquiring and target firm, there is no evidence to accept hypothesis 1a and 1b.

Variable	CAR_ACQ	CAR_Target
Q_High_Low	-1.099	1.486
	(0.678)	(2.325)
Crossb_Dummy	-1.156**	-4.707***
	(0.526)	(1.649)
Log_DEALSIZE	0.0593	1.648***
	(0.130)	(0.358)
IND_Dummy	0.918*	-3.596**
	(0.504)	(1.563)
Log_MVACQ	-0.168	
	(0.174)	
MoP_Dummy	0.318	4.789***
	(0.507)	(1.537)
Log_Relsize	-0.0746	-2.026***
	(0.181)	(0.560)
Log_MVTARGET		-1.649***
		(0.525)
Constant	1.010	9.757**
	(1.169)	(3.798)
Observations	676	644
R-squared	0.016	0.127

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 7: Regression high-buys-low on CAR

Hypothesis 2

For the second set of hypotheses a different approach for the Tobin's Q measurement was taken into account. As mentioned earlier, the absolute difference between the acquirer and target Tobin's Q is measured and used as an explanatory factor for both acquirer and target CAR. The expectation is, based on the literature and the high buys low effect, that a higher difference in Tobin's Q will lead to an enhancement of performance of both the acquiring and target firm. The results are shown below, in figure 8. For the acquiring CAR there is no significant relationship between the absolute difference in Tobin's Q and the CAR (R^2=.014, β = -0.190, p = n.s.). Looking at the direction of the coefficient, it shows a somewhat surprising negative relationship. This would imply that firms that are closer related in terms of Tobin's Q, show higher CAR for the acquiring firm, however this is not significant. For target firms the direction of the relationship is the same, meaning that M&A activity between two similar Q rated firms would enhance target firm CAR (R^2=.136, β = -1.924, p<.05), and this relationship is significant on the 10% and 5% interval level.

As the acquiring CAR does not show a significant relationship with the Q distance measurement, hypothesis 2a cannot be accepted. The target firm CAR does show a significant relationship with the Q distance measurement, although it is in the opposing direction of the hypothesis, leading to a rejection of hypothesis 2b. Interestingly the widely used dummy approach for Tobin's Q in the first set of hypotheses show no significance whereas the Q distance approach of the second set of hypothesis shows significance for at least the target firms CAR. It would be interesting to further look into this approach of Tobin's Q.

Variable	CAR_ACQ	CAR_Target
Q_DIST	-0.190	-1.924**
	(0.235)	(0.746)
Crossb_Dummy	-1.139**	-4.586***
	(0.526)	(1.686)
Log_DEALSIZE	0.0595	1.684***
	(0.130)	(0.444)
IND_Dummy	0.915*	-3.159*
	(0.506)	(1.620)
Log_MVACQ	-0.146	
	(0.174)	
MoP_Dummy	0.253	4.742***
	(0.507)	(1.632)
Log_Relsize	-0.0545	-1.980***
	(0.182)	(0.511)
Log_MVTARGET		-1.978***
		(0.563)
Constant	0.704	11.44***
	(1.151)	(3.729)
Observations	676	644
R-squared	0.014	0.136

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 8: Regression Q distance on CAR

Hypothesis 3

The third part of the hypothesis is based on the difference between inter- and intra-industry trade. To examine whether there is significant difference in CAR for acquiring and target firms, a two sided t-test is performed and the results are shown below in figure 9. A two sided t-test examines whether two groups significantly differ from each other and is more often used to examine two different groups (e.g. La Porta et al., 2002; Kim et al., 1993). In total, 40% of the data sample show deals that take place within the same industry and the other 60% is between two different industries.

Looking at the t-test outcomes for acquiring firms, inter-industry deals show a small negative relationship with CAR whereas intra industry deals show a small positive relationship. This is in line with the literature that state that deals within the same industry show higher results due to easier contact and overall higher complementarity between firms (Rhodes-Kropf & Robinson, 2008; Martynova & Renneboog, 2005). Examining the t-test, inter industry M&A (M = -.11, SD = 9.30) and intra industry M&A (M = .24, SD = 6.02) does not differ significantly on acquiring performance (t(737) = -0.6, p = n.s.). As the p value is not significant, hypothesis 3a stating that intra industry deals outperform inter industry deals significantly cannot be accepted. Although the coefficients do confirm the expectations, there is no significant relationship.

For the target firms the performance is more heavily influenced, with values of 13.21% and 8.23% for inter- and intra-industry deals, respectively. This surprisingly indicates that for target firms deals involving two different industries are leading to a better performance compared to deals in the same industry. The t-test shows that inter industry M&A (M = 13.21, SD = 23.31) significantly outperform intra industry M&A (M = 8.23, SD = 17.47) in terms of target firm returns (t(701) = 3.1, p<0.05). This is in contrast with the expectation that, like the acquiring firms, deals within the same industry outperform deals in different industries. Therefore hypothesis 3b can be rejected, as there is significant proof that inter-industry M&A outperform intra-industry M&A, in contrast to the expected relationship stated in hypothesis 3b.

Variable	Inter Industry	Intra Industry	Inter ind. mean	Intra ind. mean	dif	St. Err	T value	P value
CAR ACQ3 by Industry	435	304	-.11	.24	-.35	.61	-.6	.56
CAR Target3 by Industry	411	292	13.21	8.23	4.98	1.61	3.1	.002

Figure 9: T-test by industries

Hypothesis 4

For the final set of hypotheses, four regression models are conducted and compared as shown in figure 10. The stated expectation was a less present effect of Tobin's Q on CAR for intra-industry deals. For acquiring firms this however does not hold, looking at the results. For acquiring firms the effect of high buys low is stronger and significant for intra-industry M&A (R^2=.026, β = -2.027, p<.05), whereas it shows a smaller and insignificant relationship for inter-industry M&A (R^2=.028, β = -0.287, p = n.s.). However both the coefficient show a negative relationship to CAR, meaning that for the acquiring firm the high buys low effect negatively impacts the M&A performance, as shown under hypothesis 1 too. Interestingly, the effect is stronger and significant for intra-industry deals, but not significant for inter-industry deals. Therefore there is not enough evidence to reject hypothesis 4a as only one of the two regressions show significance.

For the target firms the general explanation power of the model again is higher compared to the acquiring firms. The relationship for the Tobin's Q measurement is as expected, stronger and positive for inter-industry M&A (R^2=.135, β = 1.763, p = n.s.) compared to intra-industry M&A (R^2=.102, β = 0.894, p = n.s.). This is in line with the hypothesis that intra-industry is less subject to the effect of Tobin's Q. However, both for inter- and intra-industry the effect shows no overall significance and therefore hypothesis 4b cannot be accepted nor rejected.

Variable	CAR_ACQ (subsample: Inter-industry)	CAR_ACQ (subsample: Intra-industry)	CAR_Target (subsample: Inter-industry)	CAR_Target (subsample: Intra-industry)
Q_High_Low	-0.287	-2.027**	1.763	0.894
	(0.920)	(1.005)	(3.396)	(3.193)
Crossb_Dummy	-2.073***	0.0625	-5.750**	-3.613*
	(0.707)	(0.775)	(2.487)	(1.990)
Log_DEALSIZE	0.257	-0.0922	2.447***	1.079***
	(0.191)	(0.173)	(0.542)	(0.414)
Log_MVACQ	-0.404	0.0161		
	(0.254)	(0.240)		
MoP_Dummy	-0.389	1.138	4.295*	5.504***
	(0.687)	(0.745)	(2.290)	(1.987)
Log_Relsize	-0.245	0.0385	-2.366***	-1.429*
	(0.268)	(0.243)	(0.761)	(0.827)
Log_MVTARGET			-2.767***	-0.916
			(0.784)	(0.624)
Constant	2.283	0.531	12.23**	4.861
	(1.543)	(1.811)	(5.672)	(4.361)
Observations	401	275	380	264
R-squared	0.028	0.026	0.135	0.102

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 10: Regression for inter- and intra-industry

Control variables

Looking at the results, some control variables do show overall significance. Looking at the significant control effects, the cross-border dummy negatively impacts both acquiring and target firm CAR overall. As expected, cross border M&A can give frictions and therefore lower the overall performance of the deal. Following research of Huizinga & Voget (2009) the negative impact can be due to international taxation but other reasons as frictions (Erel et al., 2012) or cultural distance (Morosini et al., 1998) can negatively impact the CAR too, both for the acquiring and the target firm.

The deal size does not show significance in relation to the acquiring firm CAR, therefore no conclusions can be drawn between deal size and acquiring M&A performance. For the target firms however, the deal size shows a significant positive effect on the CAR. This would imply that as the deal grows in size the target generates more returns around the announcement date of the deal. These findings are in line with Reuer et al. (2012) who find a positive relation between deal size and target gains.

For the industry dummy, results are somewhat contradictory. Acquirers returns show a positive relationship with the industry dummy, implying that acquiring a firm in the same industry earns more returns. Most studies find that industry-matched deals show more returns, as intra-industry deals can lead to favorable valuation effect for the whole industry (Custodio 2014; Bley & Madura 2003). For the target firms the relation is opposite, as it turns out to be more favorable for target firms to be taken over by an acquirer of a different industry, in line with Ahern & Harford (2013) who find that industry links can positively affect M&A.

Means of payment, measured as a dummy showing a 1 if the majority of the payment is in cash, shows significance for the target CAR. Several studies examined the relationship between the means of payment and the M&A performance with various results. This study results indicate a significant positive relationship between a payment in cash and the target firm CAR, in line with Franks et al., (1988). However different studies find that debt and equity is often preferred over cash due to the uncertainty about the true value of the target Martynova & Renneboog (2009). Looking at the acquiring firms, no significant relationship exist between means of payment and acquiring CAR.

For the relative size, again only significance is shown for the target firms CAR. The relationship is negative, meaning that for a target firm it is more favorable to be taken over by a larger acquirer. This results are in line with Servaes (1991) who find a similar but smaller negative relationship. Ramaswamy & Waegelein (2003) examine the effect of relative size on merger performance and also find that acquiring relative smaller sized firms lead to better merger performance for both the acquirer and the target.

Finally, the firm size for both acquirer and target are used as control variables. For the target firms there is a negative relation between the size of the target and the returns for the target. This is in line with the reasoning for the relative size, as larger deals tend to be more difficult and therefore less profitable. It is

therefore negatively related to the size of the target, as larger targets are more difficult to takeover. For Acquiring firms the relationship is also negative but less strong, however this shows no significance and therefore no conclusion can be drawn upon those results.

4.3 Robustness checks

Event window effect

Choosing an event-window to examine CAR is difficult as there is uncertainty about the right number of days in an event window. Krivin et al. (2003) hypothesize that larger surprises, thus more unexpected merger announcements, take longer for the market to process and therefore need a longer event window to capture the effect. Doukas & Travlos examine acquisitions performance and use both (-10,10) and (-5,5) as an event window to examine the performance whereas Morck et al., (1990) use a less traditional event window of (-2,1), 4 days in total. As a robustness check, the regression results for three different event windows are incorporated and compared to the results presented. The results are re-tested using a 23-day event window (-11,11), a 11-day event window (-5,5) and a 3-day event window (-1,1).

The results for the event window (-11,11) are incorporated in appendix 2. Compared to the original results, the direction of the relationship does not change however all the coefficients are slightly larger using the (-11,11) event window. For the intra-industry sample, the Q measurement changes to insignificant for the acquiring firms, meaning that the chosen event window of (-3,3) might be more useful. This already shows that the event window choice has implications and therefore is evidence against the robustness of the results. For the event of an M&A announcement in the current globalized market, a 23-day event window might be too long to capture the real effect of the announcement only.

The results for the event window (-5,5) are incorporated in appendix 3. Similar to the (-11,11) window, all the directions of the coefficients do not change, but some are shown to be slightly larger. Again, the Q measurement in the intra industry sample changes to insignificant for the acquiring firms. As the results slightly change when choosing this event window, it is evidence against the robustness of the event window choice, however the results are less different than they were using the (-11,11) window.

For the event window (-1,1) the results are somewhat different compared to the other two robustness checks, as can be seen in appendix 4. For the Q variable to measure if high buys low, the (-1,1) event window shows a significant negative relationship to acquiring CAR whereas the (-3,3) did not show significance. The target firms however are insignificant. For the Q distance measurement the results are almost similar. Looking at inter- and intra-industry, the acquiring CAR is significantly related to the Q measurement, in contrast to the event window (-3,3). For the target firms, the coefficient changed from positive to negative but the results are not significant.

In total, a shorter event window such as the 5-day and 3-day event window show the most significant results. As the two options with a longer event window lower the significance it is difficult to draw conclusions on the right choice for an event window. However, it seems that a shorter event window better captures the effect of a merger announcement and therefore lead to better explanation of CAR results for acquiring and target firm. In line with Krivin et al. (2003) who state that the market needs some time to process surprising announcements, the event window (-3,3) looks like the right option for this model.

Control variable effect

Rhodes-Kropf & Robinson (2008) examine the effect of Tobin's Q on M&A performance too, expecting a like buys like effect. They predict that including firm industry in a sample might destroy the effect of Q similarities on performance, as two firms in the same industry might be financially equal and thus weaken the effect of Tobin's Q on the results. Furthermore they state that controlling for size and relative size also can negative influence the relationship between Tobin's Q and M&A performance. This is because similarity in Tobin's Q might be driven by the size of two firms and therefore controlling for size weakens the possible effect of Tobin's Q on M&A. An earlier study by Servaes (1991) leaves out all the control variables too, initially. This is done to capture the effect of only Tobin's Q on M&A performance, measured as CAR. Following these two studies who question the positive effect of incorporating control variables, a robustness check is executed with the effect of only the Tobin's Q measurement on CAR, leaving out all the control variables. The results are shown in appendix 5.

For the acquiring firm, the Q measurement variable now shows significant at the 10% interval level, whereas the target still remains insignificant. For the Q distance measurement the results are similar to the original results although the coefficient slightly changed. More importantly, the R-squared of the model without control variables heavily declined. Looking at the inter- and intra-industry regression the results are similar, as is the significance for the coefficients. Only the intra-trade target CAR coefficient turned negative, but does not show significance. The R-squared again declined heavily and therefore leaving out control variables does not lead to better results or explanatory power. Also, in line with the majority of literature on M&A performance and statistical analysis, control variables are needed to control for external factors influencing the model.

5. Conclusion and discussion

After the financial crisis M&A activity has set a new high in volume during 2018. M&A is widely used by firms who see potential in co-operating or adopting other firms in the market. A growing research body has examined the reasons for M&A and both the acquiring and target firm specifications are examined as possible reasons for M&A. Tobin's Q measurement is one of the specifications, whereas studies found that firms with a high Q value often takeover firms with a low Q value (Lang et al., 1998; Servaes, 1991) other studies found a like-buys-like effect, firms with similar Q ratios engage in M&A activity together (Rhodes-Kropf & Robinson, 2008). This study adds to the literature as it examines the effect of Tobin's Q on both acquirer and target firm performance, specified for European acquiring firms.

The results overall show no significant proof that high Q valued firms engage in M&A activity with low Q valued firms, if the Q dummy measurement is used. This is in contrast with the expectation that high Q valued firms would engage in M&A activity with low Q valued firms. Whereas the main body of literature does see a significant effect between Tobin's Q difference and M&A performance, this study does not find such results. This study results are in contradiction with previous studies (e.g. Jovanovich & Rousseau, 2002) who find a strong relationship between Tobin's Q dispersion and M&A. Such difference can occur because of difference in sample selection. Jovanovich & Rousseau (2002) examine US firms in the twentieth century and historically, different motivations for M&A activity can exist which can drive differences in results. Examining a more recent time period might give new insights in current M&A activity and why the M&A's occur.

Looking at the second set of results, the Q distance measurement does show significance in relation to the target firm performance. The Q distance measurement is relatively new and measures the absolute difference in the Tobin's Q for the acquirer and the target. This leads to the finding that more distance between two firms Tobin's Q negatively affects the target firm performance, measured with the CAR, leading to a rejection of hypothesis 2b. For the acquiring firm, the direction of the relation is negative too, indicating a like buys like M&A would generally lead to better M&A performance. Although, for the acquirer this variable shows no significance. This results are difficult to compare to previous studies as the Q distance variable is relatively new. However the stated relationship indicates that a like buys like effect occurs in M&A's which is in line with Rhodes-Kropf & Robinson (2008) early study on the like buys like effect.

Furthermore, this paper examined whether the relationship between Tobin's Q and M&A performance would differ for inter- and intra-industry trade. Expectation was that the effect of Tobin's Q would be less strong for intra-industry trade as firms are more found to be alike and therefore less difference in Tobin's Q exist. Secondly, less asymmetric information exist for intra-industry trade and therefore less valuation errors occur. The results show that for intra-industry there is a significant negative relationship between high Q firms engaging in M&A with low Q firms, confirming existing literature (Rhodes-Kropf

et al., 2005; Rhodes-Kropf & Robinson, 2008) that the like buys like effect improves M&A performance more for intra-industry trade. This results confirm the expectation of this study that industry has a moderating effect on M&A activity. However since the rest of the results to examine the moderating effect of the industry show no significance, overall no conclusions can be drawn on the difference between inter- and intra-industry trade.

Based on the results several lessons can be drawn from this study. Notable difference where found between this study results and the findings in the main body of literature. This might be due to a different timeframe and geographical area. Several studies examined different results for different merger waves and generalizing M&A behavior over time might be very difficult. Therefore, examining every merger wave as separate might increase understanding on M&A behavior and motivation over different periods of time or different geographical areas. Also, using Tobin's Q measurement differently might lead to new insights too. It is common to use Tobin's Q as a dummy variable but this limited insight in the relationship between Tobin's Q and M&A performance. This study contributes to the existing literature as multiple measurements for Tobin's Q are taken into account, each leading to different results and therefore opening paths for further research. For further research it would be interesting to implement the Tobin's Q measurement -where the absolute distance between two firms is calculated - into other samples to investigate the implications of the measurement and to see whether different results occur. Also, examining the whole of Europe adds to the existing body of literature which is mainly focused on the United States and the United Kingdom. Europe, more and more becoming an important player in the worldwide financial market is not highly represented in the M&A literature and therefore interesting to examine. Difference between this study results and the results discussed in the literature might be due to differences between Europe and the United States, which can further be examined.

Various limitations are noted by this research. The sample that is used is highly dependent on the availability of data regarding Tobin's Q. M&A activities with several smaller companies are difficult to examine as less information about the financials is found and therefore calculating the Tobin's Q was impossible. As both the acquirer and target firm Tobin's Q needed to be calculated, deals with small companies were more often excluded. Therefore, the generalizability of the results for M&A deals in the whole of Europe is limited. A second limitation of the selection of deals is the criteria for firms to be listed. This limits the generalizability of the results for private companies. Whereas a major part of the financial market in Europe is in hands of private held companies, studies on such takeovers are limited (Draper & Paudyal, 2006). Even though Draper & Paudyal do make a good effort to increase attention for private companies, due to data availability it was impossible to incorporate M&A activities with private held acquirers or targets to this study, and therefore limits the results. For further research it would be interesting to investigate the relationship between Tobin's Q and M&A performance for private held companies.

This research examines short term M&A performance around the announcement date of an M&A activity. As shown in the robustness check, event-window choice can influence results, as goes for the estimation window choice. Furthermore, the type of event study in this study focuses on the short term effects of an M&A announcements. Different approaches, such as a long term event study (e.g. André et al., 2004) might lead to different results on the M&A performance of firms and maybe increase significance of the relationship between Tobin's Q and M&A performance.

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Appendix

Appendix 1: variable overview

Variable Name	Name	Measurement	Source
Independent:			
Tobin's Q	Q value for ACQ/TARGET	(Market value+preferred stock+debt) / TA, data based on the end of year prior to announcement date	Worldscope + own calculations
	Q_High_Low	Dummy states a 1 if acquiring firm Q>1 and target firm Q<1	Worldscope
	Q_DIST	Q value of acquiring company minus Q value of target company	Worldscope
Dependent:			
M&A Performance	CAR_ACQ(x)	Cum abn. Return with x being the days prior and post the announcement day	Thomson Reuters Datastream
	CAR_TARGET(x)	Cum abn. Return with x being the days prior and post the announcement day	Thomson Reuters Datastream
Control:			
Cross border	Crossb_Dummy	Dummy states 1 if both firms are from the same country	Zephyr
Deal size	Deal_Size	Value of the deal in millions of euro's	Zephyr
Firm industry	IND_Dummy	Dummy states 1 if both firms operate in the same industry, based on 4 digit SIC	Zephyr
Firm size	MV_ACQ	Market value of acquiring company in millions of euro's, end of year prior to announcement	Worldscope
	MV_TARGET	Market value of target company in millions of euro's, end of year prior to announcement	Worldscope
Means of payment	MoP_Dummy	Dummy states 1 if majority of payment is based on cash	Zephyr
Relative size	Rel_Size	Market value of target divided by market value of acquirer	Own calculations

Appendix 2a: Robustness check using event window (-11,11)

VARIABLES	CAR_ACQ	CAR_Target	CAR_ACQ_2	CAR_Target_2
Q_High_Low	-1.454	1.709		
	(1.205)	(2.777)		
Crossb_Dummy	-1.211	-4.547**	-1.193	-4.381**
	(0.937)	(1.930)	(0.938)	(1.928)
Log_DEALSIZE	0.139	1.694***	0.137	1.734***
	(0.230)	(0.411)	(0.231)	(0.511)
IND_Dummy	-0.194	-4.900***	-0.220	-4.460**
	(0.895)	(1.794)	(0.897)	(1.848)
Log_MVACQ	0.155		0.196	
	(0.308)		(0.309)	
MoP_Dummy	1.425	7.895***	1.352	7.839***
	(0.903)	(1.743)	(0.902)	(1.864)
Log_Relsize	0.301	-1.464**	0.341	-1.418**
	(0.322)	(0.647)	(0.323)	(0.584)
Log_MVTARGET		-2.039***		-2.408***
		(0.602)		(0.643)
Q_DIST			-0.148	-2.170**
			(0.418)	(0.854)
Constant	-1.850	11.30***	-2.296	13.18***
	(2.080)	(4.331)	(2.049)	(4.260)
Observations	658	629	658	629
R-squared	0.015	0.118	0.013	0.126

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 2b: Robustness check using event window (-11,11)

VARIABLES	CAR_ACQ_ Inter	CAR_ACQ_ Intra	CAR_Target_ Inter	CAR_Target_ Intra
Q_High_Low	-1.268	-1.229	2.333	0.460
	(1.620)	(1.792)	(3.933)	(3.745)
Crossb_Dummy	-1.429	-1.414	-4.771*	-4.434*
	(1.241)	(1.406)	(2.848)	(2.426)
Log_DEALSIZE	0.672**	-0.353	2.398***	1.237**
	(0.333)	(0.313)	(0.606)	(0.511)
Log_MVACQ	-0.314	0.472		
	(0.441)	(0.431)		
MoP_Dummy	-0.684	4.525***	8.645***	6.908***
	(1.208)	(1.335)	(2.526)	(2.387)
Log_Relsize	-0.382	1.013**	-1.815**	-0.840
	(0.467)	(0.439)	(0.858)	(0.987)
Log_MVTARGET			-3.153***	-1.319*
			(0.894)	(0.721)
Constant	-0.955	-2.158	13.07**	6.079
	(2.699)	(3.271)	(6.394)	(5.185)
Observations	393	265	370	259
R-squared	0.021	0.065	0.123	0.083

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 3a: Robustness check using event window (-5,5)

VARIABLES	CAR_ACQ	CAR_Target	CAR_ACQ_2	CAR_Target_2
Q_High_Low	-1.370	2.176		
	(1.169)	(2.186)		
Q_DIST			-0.311	-1.884**
			(0.405)	(0.739)
Crossb_Dummy	-1.127	-4.653***	-1.103	-4.597***
	(0.906)	(1.637)	(0.907)	(1.654)
Log_DEALSIZE	0.150	1.398***	0.151	1.433***
	(0.223)	(0.328)	(0.223)	(0.408)
IND_Dummy	-0.155	-4.423***	-0.147	-4.030**
	(0.868)	(1.530)	(0.871)	(1.589)
Log_MVACQ	0.0729		0.0906	
	(0.300)		(0.300)	
MoP_Dummy	1.329	5.830***	1.244	5.835***
	(0.875)	(1.505)	(0.873)	(1.594)
Log_Relsize	0.150	-2.095***	0.167	-2.051***
	(0.313)	(0.539)	(0.313)	(0.495)
Log_MVTARGET		-1.407***		-1.751***
		(0.510)		(0.548)
Constant	-1.698	9.379***	-2.036	11.29***
	(2.015)	(3.560)	(1.981)	(3.616)
Observations	676	676	676	676
R-squared	0.013	0.137	0.011	0.144

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 3b: Robustness check using event window (-5,5)

VARIABLES	CAR_ACQ_Inter	CAR_ACQ_Intra	CAR_Target_Inter	CAR_Target_intra
Q_High_Low	-0.663	-1.746	2.031	1.789
	(1.552)	(1.781)	(3.183)	(3.081)
Crossb_Dummy	-1.677	-0.779	-5.278**	-4.109**
	(1.194)	(1.374)	(2.428)	(2.002)
Log_DEALSIZE	0.544*	-0.197	1.914***	1.024***
	(0.322)	(0.307)	(0.519)	(0.392)
Log_MVACQ	-0.255	0.294		
	(0.428)	(0.426)		
MoP_Dummy	-1.015	4.644***	5.441**	6.619***
	(1.160)	(1.320)	(2.205)	(1.979)
Log_Relsize	-0.278	0.618	-2.651***	-1.098
	(0.452)	(0.431)	(0.718)	(0.832)
Log_MVTARGET			-1.977**	-1.226**
			(0.789)	(0.602)
Constant	-0.481	-2.667	9.510*	6.998*
	(2.603)	(3.210)	(5.302)	(4.047)
Observations	401	275	401	275
R-squared	0.018	0.057	0.133	0.114

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 4a: Robustness check using event window (-1,1)

VARIABLES	CAR_ACQ	CAR_Target	CAR_ACQ_2	CAR_Target_2
Q_High_Low	-1.531***	-1.285		
	(0.502)	(2.713)		
Q_DIST			-0.268	-1.883*
			(0.175)	(0.963)
Crossb_Dummy	-0.665*	-6.461***	-0.641	-6.349***
	(0.389)	(2.334)	(0.391)	(2.174)
Log_DEALSIZE	0.0179	1.707***	0.0183	1.727***
	(0.0959)	(0.434)	(0.0965)	(0.573)
IND_Dummy	0.574	-2.714	0.569	-2.392
	(0.373)	(1.895)	(0.376)	(2.090)
Log_MVACQ	-0.114		-0.0839	
	(0.129)		(0.130)	
MoP_Dummy	0.526	6.866***	0.435	6.679***
	(0.376)	(1.912)	(0.377)	(2.105)
Log_Relsize	-0.139	-2.133***	-0.111	-2.111***
	(0.134)	(0.785)	(0.135)	(0.659)
Log_MVTARGET		-2.524***		-2.724***
		(0.785)		(0.726)
Constant	0.599	14.00*	0.174	14.65***
	(0.866)	(7.696)	(0.855)	(4.809)
Observations	676	644	676	644
R-squared	0.025	0.114	0.015	0.119

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 4b: Robustness check using event window (-1,1)

VARIABLES	CAR_ACQ_Inter	CAR_ACQ_Intra	CAR_Target_Inter	CAR_Target_intra
Q_High_Low	-1.380**	-1.513*	-1.731	-0.879
	(0.655)	(0.785)	(4.179)	(2.975)
Crossb_Dummy	-1.479***	0.441	-7.937**	-4.565**
	(0.504)	(0.606)	(3.698)	(2.022)
Log_DEALSIZE	-0.00841	0.0320	2.119***	1.479***
	(0.136)	(0.135)	(0.701)	(0.395)
Log_MVACQ	0.0175	-0.210		
	(0.181)	(0.188)		
MoP_Dummy	-0.356	1.620***	7.074**	6.622***
	(0.490)	(0.582)	(3.025)	(2.027)
Log_Relsize	0.0659	-0.338*	-2.288***	-1.928
	(0.191)	(0.190)	(0.881)	(1.466)
Log_MVTARGET			-3.503***	-1.740***
			(1.314)	(0.627)
Constant	1.009	0.391	17.94	6.966
	(1.099)	(1.415)	(12.15)	(4.874)
Observations	401	275	380	264
R-squared	0.036	0.058	0.109	0.119

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 5a: Robustness check leaving out all control variables

VARIABLES	CAR_ACQ	CAR_Target	CAR_ACQ_2	CAR_Target_2
Q_High_Low	-1.080*	2.207		
	(0.614)	(2.160)		
Q_DIST			-0.236	-1.657**
			(0.212)	(0.724)
Constant	0.0615	10.65***	-0.139	10.82***
	(0.248)	(0.859)	(0.228)	(0.790)
Observations	738	702	738	702
R-squared	0.004	0.001	0.002	0.007

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix 5b: Robustness check leaving out all control variables

VARIABLES	CAR_ACQ_Inter	CAR_ACQ_Intra	CAR_Target_Inter	CAR_Target_intra
Q_High_Low	-0.319	-2.112**	4.613	-0.171
	(0.852)	(0.870)	(3.185)	(2.698)
Constant	-0.291	0.576	12.29***	8.258***
	(0.335)	(0.363)	(1.218)	(1.127)
Observations	434	304	410	292
R-squared	0.000	0.019	0.005	0.000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1