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**Investor Reactions to Corporate Merger and Acquisition  
Announcements**



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## **Investor Reactions to Corporate Merger and Acquisition Announcements**

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## ABSTRACT

This dissertation examines investor reactions to corporate press and stock exchange releases on mergers and acquisitions (M&A). Investor reactions to corporate announcements are measured in changes in the corporate stock price. The dissertation focuses on a corporate's acquisition target and its strategic intention to move within its value network, hypothesizing that different types of acquisitions create different cumulative abnormal return. Acquisition types are extended from traditional horizontal vs. vertical and related vs. unrelated acquisitions to cover all types of acquisitions. More detailed acquisition categories are needed to focus on strategic company moves and their impact on the share price.

Investor reactions have traditionally been studied by using event study on day-level analysis. Such analysis does not sufficiently reflect current stock trading, whereas algorithmic trading represents most of the total volume. Recently high-frequency trading and the overall speed of the information flow have underscored the importance of transaction-level analysis, which was adopted for this dissertation.

The hypotheses in this dissertation were tested with all stock transactions during 2006-2010 in NASDAQ OMX Helsinki. These publicly listed companies published over 30,000 releases, including 548 M&A actions.

Consistent with theory, the findings showed a positive compounded abnormal return (CAR) in all M&A actions. Additionally, transaction level analysis revealed a CAR in unrelated acquisitions representing an upstream change in the center of gravity, whereas day-level analysis produced no CAR. Finally, the multiple regression model of transaction-level analysis improved the coefficient of determination significantly over day-level analysis.

Whereas day-level analysis is too ambiguous and therefore allows possible misinterpretation of the event time, transaction-level analysis will give additional research topics such as the speed of response to press release and investors' pre-announcement reactions.

## TIIVISTELMÄ

Tämä väitöskirja tutkii sijoittajien reaktioita lehdistö- ja pörssitiedotteisiin, jotka käsittelevät yritysostoja tai fuusioita. Sijoittajien reaktioita yritysten tiedotteisiin mitataan pörssikurssien muutoksilla. Väitöstutkimus keskittyy yritysostojen kohteisiin ja yrityksen strategiseen tavoitteeseen liikkua arvoverkostossaan. Hypoteesit luodaan sillä oletuksella, että erilaiset yritysostotyypit aiheuttavat erilaisen epänormaalin tuoton. Yritysostotyyppejä laajennetaan traditionaalisesta horisontaalisesta vs. vertikaalisesta ja toisaalta samankaltaisesta vs. riippumattomista yrityskaupoista malliin, joka sisältää kaikki eri tyyppiset yrityskaupat. Tarkemmat yritysostokategoriat tarvitaan, kun tutkitaan yrityksen strategisia liikkeitä ja niiden aiheuttamaa vaikutusta pörssikursseihin.

Sijoittajien reaktioita on perinteisesti tutkittu tapaustutkimuksella käyttäen päivätason analyysia. Päivätason analyysin käyttö ei vastaa riittävästi nykyistä kaupankäyntitapaa, koska algoritmipohjainen kaupankäynti edustaa jo suurinta osaa pörssin kokonaiskaupoista. Viime aikoina algoritmipohjainen nopea kaupankäynti ja tiedonsiirron nopeus ovat nostaneet merkitystään kaupankäynnin tason analyysissa, ja tässä tutkimuksessa käytetään tapahtumatason analyysia.

Hypoteesit testattiin käyttämällä kaikkia pörssitiedotteita vuosien 2006 ja 2010 välillä. Pörssiyritykset, jotka oli listattu tutkimusajana NASDAQ OMX Helsingin pörssiin julkaisivat kaikkiaan yli 30.000 tiedotetta, joista 548 koski yritysostoa tai fuusiota.

Teorian mukaisesti kaikki yrityskauppätiedotteet aiheuttivat epänormaalin tuoton (CAR). Tutkimuksessa löydettiin tapahtumapohjaisen analyysin avulla epänormaalia tuottoa silloin, kun riippumaton yritysosto tai fuusio tapahtui arvoketjussa raaka-aineita kohti, vaikka päivätason analyysistä ei tällaista käynyt ilmi. Lineaarinen regressiomalli, jossa käytetään tapahtumapohjaista analyysia, parantaa analyysin tarkkuutta merkittävästi verrattuna päivätason analyysiin.

Päivätason perusteella tehtävä tutkimus on epämääräinen ja mahdollistaa jopa väärän tulkinnan pörssitiedotteen tapahtuma-ajan osalta. Lisäksi tapahtumapohjainen tutkimus mahdollistaa uusia tutkimuskohteita, koska investoijien reaktioiden vasteaikaa ja ennen tiedotteen julkistamista tapahtuvaa käyttäytymistä voidaan tarkasti tutkia.

## ACKNOWLEDGEMENTS

The journey of writing a dissertation over 25 years after graduation has been interesting—and that is a strong understatement. This was an opportunity of a lifetime, and my dear family and friends were supportive during all that time of collecting data, reading materials, making calculations, and writing this dissertation. I have to admit that some days were more rewarding than others, but now the work is done.

When this opportunity opened up, I was working in an inspiring environment with talented people. We were discussing company strategies and company intentions to conquer the world or simply to survive. Sometimes the difference is very small and phases may follow each other rapidly. One may just try to survive and then suddenly find a successful business model or a product, and then success is there. It may also occur the opposite way when a company has been successful all along and when it tries to conquer the world with an aggressive expansion strategy. Suddenly the next battle is a survival game.

In an environment where the pole position is the only option, and where even the second place is not good enough, management must sometimes make decisions totally different from their competitors. Strategic moves are usually expensive and impossible to reverse. Sometimes, however, there is only one opportunity.

My relatively short period of working on the CITER team at Tampere University of Technology was an inspiring and refreshing experience. Therefore, I would like to express my gratitude to my fellow research workers at CITER and especially to Jaakko Valli, whose Matlab skills made it possible for me to focus on my research and to enjoy the fancy tools he provided us timely and error free.

Associate Professors Marko Seppänen and Tomi Nokelainen helped me to understand the academic way of thinking that sometimes felt inconvenient to a person whose whole career has been made in industry.

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Tampere, April 20, 2014

Timo Hänninen

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## ABBREVIATIONS AND NOTATION

### *Algorithmic trading*

*Registrations in the form of placements, changes or cancellation of Orders in the Order Book through the use of software which automatically generates Orders in response to specific pre-programmed factors*

### *ANOVA*

*Analysis of Variance – statistical test if the means of several groups are equal*

### *AR*

*Abnormal Return*

### *Automatically Matched Trade*

*A Trade, which is executed in the Trading System by Automatic Order Matching*

### *Automatic Order Matching*

*The process in the Order Book by which Sell and Buy Orders are matched automatically when the price, volume, and other specifications for a given Order correspond with Order(s) previously entered in the Order Book*

### *Buy Order*

*An order to buy a specific instrument*

### *CAR*

*Compounded Abnormal Return*

### *Exchange Day*

*A day on which the NASDAQ OMX Helsinki Exchange is open for trading*

### *Instrument*

*Securities and other rights and obligations suitable for trading on the securities markets that are admitted to trading at NASDAQ OMX Helsinki*

### *Manual Trade*

*A Trade entered from outside the Order Book and on which the Member and the client, prior to execution, agree shall be done in accordance with the NASDAQ OMX Helsinki Member Rules*

### *Member*

*An undertaking, which has been granted membership by the NASDAQ OMX Helsinki and has signed a Membership Agreements with the NASDAQ OMX Helsinki*

*Minimum Tradable Volume*

*The smallest amount that can be matched at one and the same time*

*In this dissertation, the NASDAQ OMX Helsinki is describe as both OMX Helsinki and NASDAQ OMX Helsinki. During the study period, an acquisition occurred when NASDAQ acquired OMX Helsinki in February 2008*

*Order*

*A binding offer from a Member to buy or sell Instruments which are placed in the Order Book*

*Order Book*

*The arrangement of Sell and Buy Orders or Interests placed in the Trading System, as well as other information related to a particular Instrument such as information regarding the clearing system where relevant, number of decimals for the price, size of Round Lots, Minimum Tradable Volumes etc*

*RBV*

*Resource Based View*

*Round Lot*

*The minimum number or the minimum nominal value of an Instrument*

*SAR*

*Standardized Abnormal Return*

*Sell Order*

*An Order to sell a specific Instrument*

*SCAR*

*Standardized Compounded Abnormal Return*

*Shares*

*Shares and depository receipts*

*SIC*

*Standard Industrial Classification, a four digit code used to classify industries*

*Spread*

*The range between the highest Buy Order and the lowest Sell Order*

*Tick Size*

*The smallest possible price change that can be entered into the Trading System*

*Time of Trade*

*The time, at which an Automatically Matched Trade is matched or a Manual Trade has been entered into*

*Trade*

*An agreement for the purchase and sale of Instruments registered either as an Automatically Matched Trade or as a Manual Trade*

*Trading System*

*The electronic system(s) for trading on the NASDAQ OMX Helsinki, providing order entry, member's private information, and related reference data and market data*

*VIF*

*Variance Inflation Factor*

# 1. INTRODUCTION

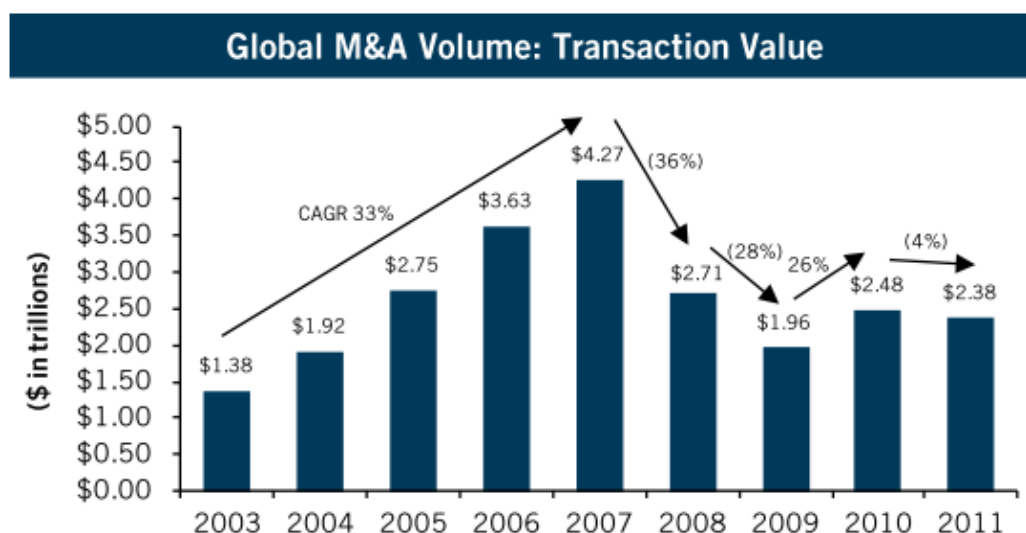
## 1.1. Background

Companies exist to make profit for their shareholders. In Finland, this has been stated also in the law on limited liability companies (Osakeyhtiölaki, 2006). Other corporate missions are corporate social responsibility, which takes other stakeholders into account (Carroll & Buchholz, 2006), but a company's first reason is to produce wealth for its shareholders with a secondary target to cover other stakeholders' interests (Sundaram & Inkpen, 2010; Godfrey et al., 2009). Shareholders gain wealth through dividends and increased value of the company's securities (Rappaport, 1998). Dividends can be paid from the company's results produced through profitable business operations. Increases in share price come from the stock market's evaluation of the company's value as an indirect effect from the company's past performance and future predictions. Investors making investments in the stock market evaluate the company's current success and predict its future success. Evaluating the future, investors prefer growth in terms of revenues and profits that may be paid out as dividends or additional investments in the company's growth.

Growth through mergers and acquisitions is called acquired growth. Acquired growth is one way to grow with external resources. When a company is growing using external resources it is called inorganic growth and its opposite is called organic growth. Organic growth occurs when companies grow by increasing productivity through, e.g., investments and recruitments. Inorganic growth is normally a faster way for a corporation to expand its business than growing organically. However, the risk of making an unsuccessful investment increases along with an increasing speed of growth. Although the risks of making an unsuccessful acquisition are higher, acquired growth is normally rewarded positively on the stock market. In previous studies, acquisitions could increase the economic value of successful bidding firms (e.g., Salter & Weinhold, 1979).

Because the main target is growth that makes the company's business bigger and more profitable, the intention to grow is expected to be positively rewarded on the stock market. M&A has become a popular way for corporations to expand their operations rapidly; for example, in the United States, the number of acquisitions doubled in each decade in the 1970s, 1980s, and 1990s (Oler et al., 2011; Loughran & Vijh, 1997). The value of acquisitions grew even faster, and when the number of acquisitions grew twofold, the value of total acquisitions increased fourfold in each decade.

This study measures investor reactions to corporate merger and acquisition announcements. The value of company acquisitions is under constant debate, and it is important to understand if such actions are rewarded with an increased market value, and, more precisely, what type acquisitions have the highest impact on the market value.

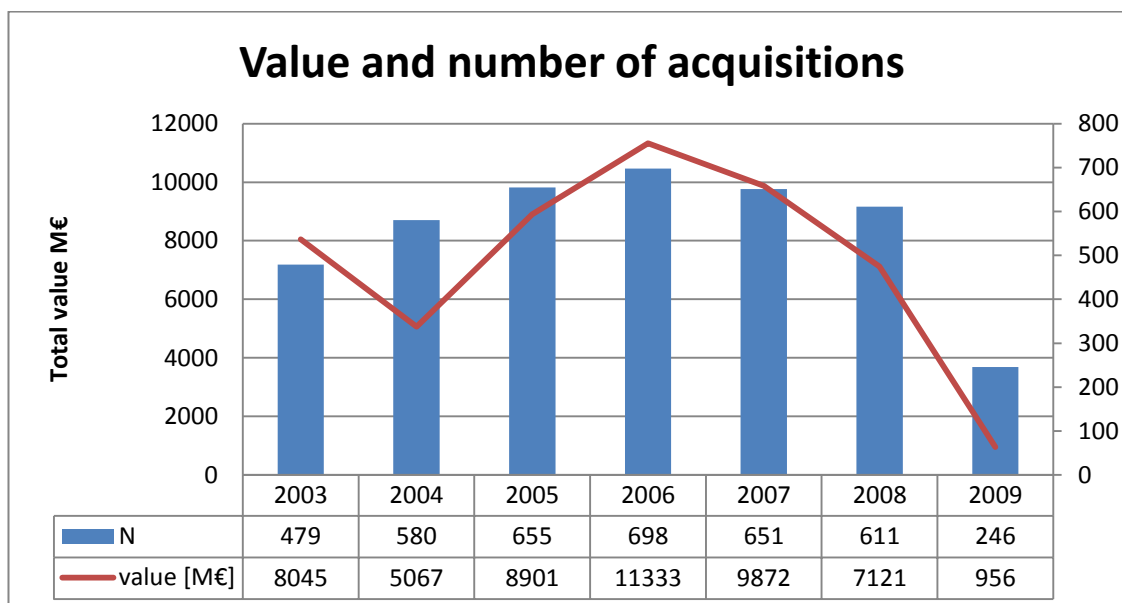


Source: Thomson Reuters, as of 12/31/11.

*Figure 1. Global M&A volume in 2003–2011 (Houlihan&Lokey, 2012).*

Though the total number of corporate acquisitions decreased during the economic downturn in 2008 and 2009, the number of acquisitions started to grow again after 2008, as shown in Figure 1. For example, in 2012 the number of mergers and acquisitions grew by 30% from 2011, and the total value reached USD 2.6 trillion in 2012, according to the *Wall Street Journal* on January 28, 2013. Regionally, the volume was USD 871 billion in the United States, USD 737 billion in Europe, and USD 584 billion in Asia. In these three regions, the volumes were slightly lower than in 2011, and even globally the M&A volumes have not yet reached the same level as before the 2008 economic crisis. In 2007, the M&A volume reached a record high of USD 4.27 trillion (WSJ / Dealogic, Houlihan & Lokey / Thomson & Reuters).

In Finland, the decline followed the global stock markets, but the drop was even faster, and the recovery has been even slower (Figure 2). When the volume of M&A dropped globally by 57% between 2007 and 2009, it dropped over 90% in Finland over the same period.



*Figure 2. Corporate acquisitions and buyout in Finland in 2003–2009 (Katramo, 2011).*

The research period is from January 1, 2006 to December 31, 2010. This is an interesting period as it witnessed both a strong increasing trend on the stock exchange and in M&A activities in 2006, followed by a rapid decline both in 2008 and 2009. The research period is therefore an interesting combination of large corporate value changes and many M&A activities. Additionally, this period is of particular interest not only due to a large total volume, but also because some of the largest acquisitions in Finnish history took place at this time. Therefore, quick changes in stock prices can be expected as a result of this dissertation, too.

## 1.2. Objectives and scope

This study sought to determine how stock markets react to corporate-initiated stock exchange releases and press releases on mergers and acquisitions. An additional objective was to study how different types of mergers affect the abnormal return of the corporate share price. All acquiring companies in this study are listed on the NASDAQ OMX Helsinki, and both press and stock exchange releases were used to define the M&A actions and their impact on company stock prices.

Mergers and acquisitions are normally very complex transactions: the impact of a merger may not be acknowledged at all, or a merger or acquisition may have either a positive or negative impact on the company's stock price, depending on the terms of the acquisition. Researchers have found basically three common patterns in acquisitions:

- 1) The target company's shareholders earn significantly positive abnormal returns from all acquisitions. Finance studies from the 1990s showed that the premiums paid to target firms' shareholders averaged 19% in the 1960s, 35%

in the 1970s, and 30% in the 1980s (e.g., Lubatkin, Srinivasan & Merchant, 1997).

- 2) The acquiring company's shareholders earn little or no return from tender offers, and they are not statistically distinguishable from zero (e.g., Zollo & Singh, 2004).
- 3) The acquiring company's shareholders earn negative abnormal returns from mergers (e.g., Loughran & Vijh, 1997).

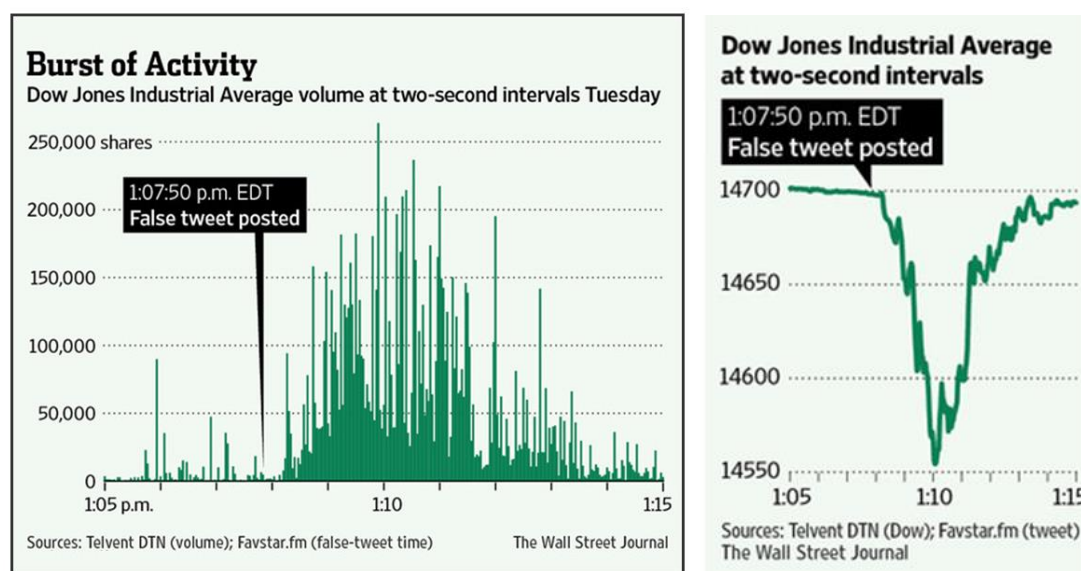
This study focused on mergers and acquisitions and their impact on the company's short term share price value. A company's action to make an acquisition was evaluated based on their press or stock exchange release and how investors reacted to it. Based on Meglio & Risberg (2011) definition, this dissertation measured the type of market performance in the market value dimension. In this domain, a market reaction is measured using the event study methodology, and abnormal return is calculated. *Event study* is based on stock price changes that measure the financial impact of a change in corporate policy (McWilliams & Siegel, 1997). *Abnormal return* is briefly described as an unanticipated return that cannot be predicted based on the index and the company's share price evolution.

In scope, the dissertation studied empirically investors' short term reactions to corporate announcements on M&A action, whether any or no reaction occurred and whether the reaction was positive or negative. There is no unanimous definition of a successful acquisition nor a correct time span for measuring the success of M&A. The time span between an M&A action and measuring the impact is called an *event window*. For example, Dann et al. (1977) found that the market price of a stock fully adjusts within 15 minutes of the release of firm-specific information. Ryngaert & Netter (1990) proved empirically that a short event window would usually capture the significant effect of an event. Significantly longer event windows have been used, and McWilliams & Siegel (1997) showed that even 181 trading-day (approximately 9 months) event windows are not uncommon in research.

Traditionally, event studies have used daily closing share prices rather than transaction-level data. Transaction-level data analysis takes into account all transactions after the event is announced and not only one stock price level defined by the stock closing time. Use of a closing value poses some challenges to analysis, as it may not be able to pinpoint the exact causal relation between an event and its impact due to many other events possibly occurring at the same time. Additionally, the response time to new information is shortened due to more and more popular fast trading on the stock exchange. In 2007, algorithmic trading accounted for 38% of all transactions on the NYSE, and in 2009, it represented already about 70% in the whole United States (Clark, 2010). In Finland, algorithmic trading equaled about one third in 2007 (Erola, 2007). One practical example of fast movements happened on April 23, 2013, when the News agency AP's Twitter account was hacked. Erroneous news about two explosions in the



White House caused a huge number of stock transactions, and the whole incident was over in five minutes. In those five minutes, the incident erased two hundred billion US dollars of value from the United States stock exchange—mainly because of algorithmic trading when computers started to sell and buy stocks in large numbers (WSJ, April 24, 2013). This incident shows how fast reactions can take place today and why even short-term studies are needed (Figure 3).



*Figure 3. News may have a very wide and rapid effect on the stock market (WSJ, 2013).*

In current stock trading the increased volumes, faster trading, increased amount stock market information and increased amount of algorithm trading have caused that traditional analysis method is not enough to measure investor reactions on corporate announcements. This research will contribute to the methods as event studies can be used to measure reactions, however it needs to take into account investors' current stock market behavior. The quick reactions like illustrated in Figure 3. are totally unrecognized with traditional methods. As more people are moving into the space of trading shares, an increasing number of private investors are interested in these methods that help analyzing stock market reactions. In September 2012, the number of households investing in publicly listed shares reached its record of 824,900 (Pörssisäätiö, 2013). This has increased the importance of rightful and timely investor communications from publicly listed companies as well as accurate methods for analysis.

According to Zollo & Meier (2008), the short-term financial performance section of M&A analysis has been the most popular topic among researchers: 35 studies, representing 40% of the total research volume in M&A. Zollo & Meier (2008) studied all M&A publications in top management and finance journals between 1970 and 2006, and analyzed a total of 88 articles and divided them into twelve categories listed below.

The categories were not mutually exclusive, and hence some studies appear in several categories:

• Integration Process Performance	8 (9%)
• Overall Acquisition Performance	12 (14%)
• Employee Retention	6 (7%)
• Customer Retention	0 (0%)
• Accounting Performance	25 (28%)
• Long-Term Financial Performance	17 (19%)
• Short-Term Financial Performance	35 (40%)
• Acquisition Survival	4 (5%)
• Innovation Performance	5 (6%)
• Knowledge Transfer	1 (1%)
• Systems Conversion	1 (1%)
• Variation in Market Share	1 (1%)

In these 35 studies on Short-Term Financial Performance, the event window was about one year or less. The short term covered the first phases of the integration process, which was faster in companies in high tech and longer in companies working in a less dynamic environment such as electric utility and chemical industries.

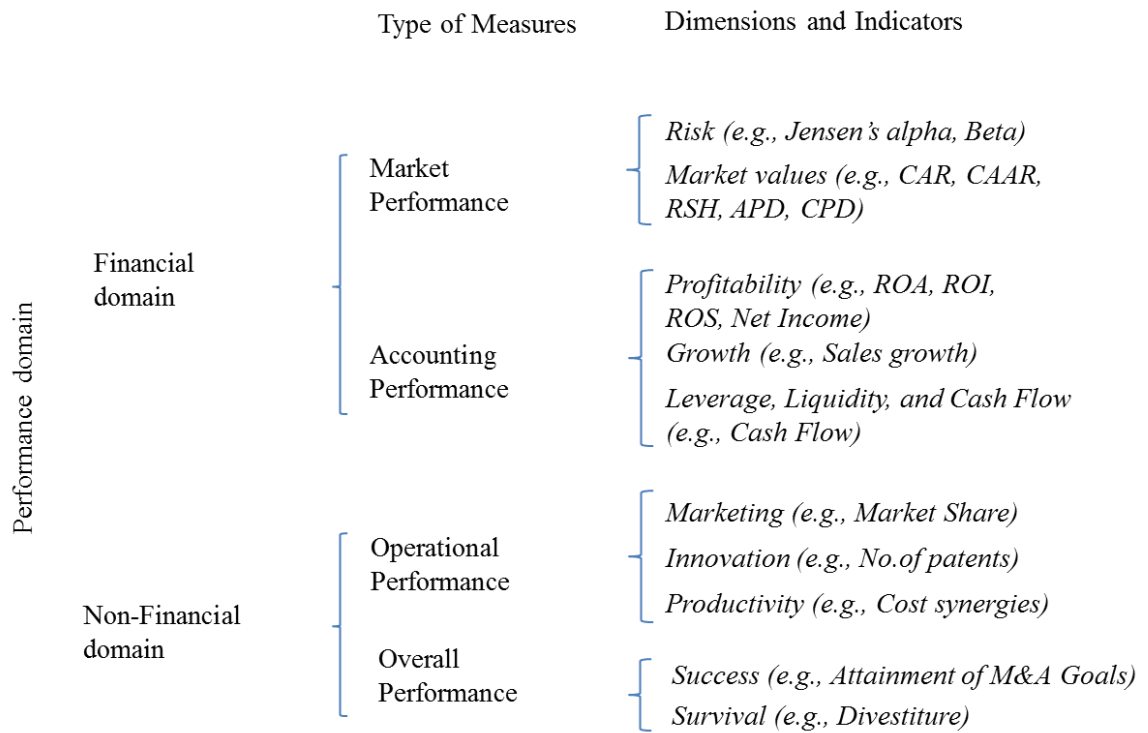
Zollo & Meier (2008) define the first level as “the level of analysis” with three levels (task level, transaction level, and the firm level) and the other dimension as the “time level” (Table 1.). The time level dimension has two levels: short- to medium-term analysis and long-term analysis. Their short term covers days to a maximum of one year. This dissertation employed event study but sought to extend the approach to an even shorter time, i.e., from days to minutes and to individual trade level information.

*Table 1. Zollo & Meier (2008) categorized M&A studies in two dimensions: level of analysis and time horizon.*

	Time Horizon	
	Short-Term	Long -Term
Level of analysis	<ul style="list-style-type: none"> <li>• Integration process performance</li> </ul>	<ul style="list-style-type: none"> <li>• Customer retention</li> <li>• Employee retention</li> </ul>
Task	<ul style="list-style-type: none"> <li>• Knowledge transfer</li> <li>• Systems conversion</li> </ul>	
Acquisition	<ul style="list-style-type: none"> <li>• Short-term financial performance (event study)</li> </ul>	<ul style="list-style-type: none"> <li>• Overall acquisition performance</li> <li>• Acquisition survival</li> </ul>
Firm		<ul style="list-style-type: none"> <li>• Accounting performance</li> <li>• Long-term financial performance</li> <li>• Innovation performance</li> <li>• Variation in market share</li> </ul>

Zollo & Meier (2008) found three main components using Principal Component Analysis (PCA) and constructed a model where *Integration process performance*, *Employee retention*, and *Overall acquisitions performance* formed the first component. *Customer retention*, *Accounting Performance*, and *Long term financial performance* formed the second component and *Short-term financial performance* (event study) the third. They concluded that event studies show no significant connection with other metrics used, and that event studies do gauge something different than actual acquisition performance. Their view was that event studies gauge the collective cognitive heuristic, the overall market “sentiment” about how a given typology of acquisitions should perform. The typology was defined as moves in the market moves (e.g., “*horizontal acquisition in industry X done by domestic acquirers with competitors in neighbouring locations*”), which refers to the market expectation of a firm’s performance rather than to an acquisition as such (Zollo & Meier, 2008). This was the main dimension of M&A event research in this study.

M&A research can be categorized otherwise as well. For example, Meglio & Risberg (2011) used as the first performance dimension Financial vs. Non-Financial M&A actions. In their categorization, the non-financial domain includes long-term measures such as innovation, marketing, and productivity. Consequently, Meglio & Risberg (2011) used a considerably different approach to categorize M&A research than Zollo & Meier (2008).



**Figure 4. Meglio & Risberg (2011) classified different M&A studies into financial and non-financial domains.**

Figure 4 illustrates how Meglio & Risberg (2011) categorized M&A studies. Based on their definition, this dissertation is categorized under Financial domain using the market performance type measures in the market value dimension. In this definition, accounting performance measures such as profitability improvements and sales growth are in the same domain, but under accounting performance. These accounting performance measures need a longer time span for analysis.

According to the above categories, this study addressed the most common area of M&A research, covering short-term analysis on both acquisitions and firm level but extending research to a shorter time span of minutes and individual trades after an M&A announcement rather than days or years. This represents a collective market judgment (Meglio & Risberg, 2011) at the time of the announcement of a transaction on the likelihood of success of the strategic move (Zollo & Meier, 2008). Therefore, a short event window gives a rapid response from the market. This response indicates an investor reaction generated without comprehensive analysis of the parties of the merger and acquisition announcement or detailed terms of the agreement.

Previous studies have focused on longer event windows using daily closing prices. Though fast stock trading has become popular, research using a short time window has been minimal compared to studies using the daily analysis method. From a practical point of view, intraday forecasting is particularly relevant for finance practitioners, i.e., shareholders, because they gain high returns in daily trading (Reboredo et al., 2012).

Also non-linear modeling and more complex mechanisms such as Artificial Neural Networks (ANN) have been used to secure better tools for online analysis of company announcements (Kyoung-Jae, 2002; Reboredo et al., 2012).

Reboredo et al. (2012) compared several non-linear models to study volatility dynamics in time intervals of 5, 10, 30, and 60 minutes. They studied both linear and non-linear models, and one finding was that a 60-min period yielded the best out-of-sample profitability for both high and low volatility sample periods. This was the reason why this time interval was also used in this study, though Reboredo et al. focused on volatility dynamics and not abnormal return as such.

Chordia et al. (2011) estimated that the speed of convergence to market-efficiency-based pricing is due to a widespread use of quantitative trading strategies. This has also caused more sensitivity to turnover returns and lower cross-sectional predictability of returns. During the 15-year period from 1993 to 2008, the value-weighted average turnover of shares increased from 5% to 28%, but the number of transactions grew ninetyfold during the same period. One more finding was that the securities with institutional holdings increased turnover associated with greater information-based trading. This study proves a fast increase in the number of transactions and small order sizes.

Among current research articles on intra-day reactions, only one article focused on M&A, covering increase in pre-announcement value (Rodrigues et al., 2012). The researchers found that most previous financial market studies relied on collecting data at discrete and equally spaced points in time. A high frequency study needs to measure a reaction as measurements in variable time intervals. They focused on intraday market behavior before a takeover announcement and studied both bidder and target companies in periods of six to four months before the announcement and then three months after the announcement. However, they did not study the reaction after the announcement was made. They found that the intraday trading behavior of takeover targets was affected by traders who held private information at least three months before the official announcement. The sample data consisted of stocks traded on the Australian Stock Exchange (ASX) and was sourced between 2004 and 2008.

*Table 2 List of previous studies using intraday analysis*

Aitken, M.J.; Frino, A; McCorry, M.S.; Swan P.L.	Journal of Finance	1998
Kawaller, I.G.; Koch, P.D.; Peterson, J.E.	Journal of Futures Markets	2001
Töyli, J.; Sysi-Aho, M; Kaski, K.	Quantitative Finance	2004
Fehle, F; Tsyplakov, S.; Zdorovtsov, V	European Financial Management	2005
Kanagaretnam, K.; Lobo, G.J.; Whalen, D.J.	Journal of Business Finance and Accounting	2005
Chou, R.K.; Wang, G.H.K	Journal of Futures Markets	2006
Entorf, H.; Steiner, C.	Jahrbücher für Nationaleconomie und Statistik	2007
Tookes, H.E.	Journal of Finance	2008
Lee, B.S., Rui, O. & Wu W.F.	Asia-Pacific Journal of Financial Studies	2008
Gu, G.F.; Chen, W., Zhou W.X.	Physica A-Statistical Mechanics and its Applications	2008
Wagener, M.; Riordan, R.	Value Creation in E-business management	2009
Ren, F.; Gu, G.F.; Zhou, W.X.	Physica A-Statistical Mechanics and its Applications	2009
Muntermann, J.	Decision Support Systems	2009
Cont, R.; Stoikov, S.; Talreja, R.	Operations Research	2010
Jayaram, K.R.; Jayalath, C.; Eugster, P.	Middleware 2010	2010
Mu, G.H.; Zhou, W.X.; Chen, W.; Kertesz, J.	New Journal of Physics	2010
Kappou, K.; Brooks, C.; Ward, C.	Journal of Banking and Finance	2010
Yu, H.C.; Wu, C.Y.; Hsieh, D.T.	African Journal of Business Management	2011
Rosa, C.	Journal of Empirical Finance	2011
Bollerslev, T.; Todorov, V.	Journal of Finance	2011
Axioglou, C.; Skouras, S.	Journal of Empirical Finance	2011
Groth, S.S.; Muntermann, J.	Decision Support Systems	2011
Asharian, H.; Holmfeldt, M.; Larson, M.	Quantitative Finance	2011
Walter, T & Coronos, Z.	Jassa-The Finsia Journal of Applied Finance	2012
Rodrigues, B.D.; Souza, R.C.; Stevenson, M.J.	International Review of Financial Analysis	2012
Fushing, H.; Chewn, S.C.; Hwang, C.R.	Quantitative Finance	2012
Zhou, H.G.; Zhu, J.Q.	Pacific-Basin Finance Journal	2012
Songyoo, K	Asia-Pacific Business Innovation and Technology Management	2012
Garcia, C.J.; Herrero, B.; Ibanez, A.M.	European Journal of Finance	2012
Tsai, C.L.	Energy Economics	2013
Bollerslev, T.; Todorov, V.; Li, S.Z.	Journal of Econometrics	2013
Boehmer, E.; Wu, J.	Review of Financial Studies	2013

As shown in Table 2, the publications vary, e.g., between finance, physics, operations management, economics, and innovation management; hence the topic is becoming popular in various research fields. An increasing trend is to use intraday data to study market reactions; however, most studies concentrate on the index level and do not

measure the impact on the individual company level. In this study, intraday data and each transaction were examined.

Because of the increasing trend to measure intraday data, the first research question when using transaction-level data is to measure investor reactions to M&A announcements.

***Research question 1:*** *Does moving to transaction-level analysis reveal new information compared to day-level analysis in measuring investor reactions to M&A announcements?*

Mergers and acquisitions are strategic moves with a long-term impact on company operations and profitability. They are called strategic actions because they are actions with great implementation requirements and difficult to reverse (Smith et al., 1992; Chen et al., 1992; Smith et al., 2001; Chen & Miller, 2012). They are also perhaps the most expensive strategic decisions (Rappaport, 2006) management will ever make. Acquisitions can also be categorized as defensive M&A actions to protect existing business or offensive M&A actions to achieve a more competitive position. In addition to strategic acquisitions, there are also financial acquisitions, e.g., by investment companies that are conducted only to bring earnings to investors at the time of selling companies or during company development before selling it to the next investor.

One common topic in current studies has been to research related mergers' and horizontal mergers' abnormal returns. A *horizontal merger* occurs when an acquiring company acquires a direct competitor. In a *related merger*, the connection can be both vertical and horizontal, i.e., the target company is related when it operates as the supplier or customer of an acquiring company. Related companies can also operate in the same position in the value chain, although they are not direct competitors. Hence they can share either their suppliers or customers. These two strategic moves partially overlap, because all horizontal mergers are also related mergers.

*Table 3 M&A studies in Zollo & Meier's (2008) research*

Wansley, J.W., Lane, W.R., & Yang, H.C.	Financial Management	1983
Jensen, M.C., & Ruback, R.S.	Journal of Financial Economics	1983
Eckbo, B.E.	Journal of Financial Economics	1983
Chatterjee, S.	Strategic Management Journal	1986
Travlos, N.G.	Journal of Finance	1987
Lubatkin, M.	Strategic Management Journal	1987
Shelton, L.M.	Strategic Management Journal	1988
Seth, A.	Strategic Management Journal	1990
Slusky, A.R., & Caves, R.E.	Journal of Industrial Economics	1991
Harris, R.S., & Ravenscraft, D.	Journal of Finance	1991
Franks, J., Harris, R. & Titman, S.	Journal of Financial Economics	1991
Chatterjee, S.	Academy of Management Journal	1991
Travlos, N.G., & Waegelein, J.F.	Managerial & Decision Economics	1992
Chatterjee, S., Lubatkin, M.H., Schweiger, D.M., & Weber, Y.	Strategic Management Journal	1992
Markides, C.C., & Ittner, C.D.	Journal of International Business Studies	1994
Berger, P.G., & Ofek, E.	Journal of Financial Economics	1995
Lubatkin, M., Srinivasan, N., & Merchant, H.	Journal of Management	1997
Kroll, M., Wright, P., Toombs, L., & Leavell, H.	Strategic Management Journal	1997
Holl, P., & Kyriazis, D.	Strategic Management Journal	1997
Hayward, M.L.A., & Hambrick, D.C.	Administrative Science Quarterly	1997
Barber, B.M., & Lyon, J.D.	Journal of Financial Economics	1997
Haleblian, J. & Finkelstein, S.	Administrative Science Quarterly	1999
Walker, M.M.	Financial Management	2000
Palich, L.E., Cardinal, L.B., & Miller, C.C.	Strategic Management Journal	2000
Seth, A., Song, K.P., & Pettit, A.R.	Strategic Management Journal	2002
Hayward, M.L.A.	Strategic Management Journal	2002
Capron, L., & Pistre, N.	Strategic Management Journal	2002
Beckman, C.M., & Haunschild, P.R.	Administrative Science Quarterly	2002
Pangarkar, N. & Lie, J.R.	Strategic Management Journal	2004
Moeller, S.B., Schlingemann, F.P., & Stulz, R.	Journal of Financial Economics	2004
Feea, C.E., & Thomas, S.	Journal of Financial Economics	2004
Carow, K., Heron, R. & Saxton, T.	Strategic Management Journal	2004
Shahrur, H.	Journal of Financial Economics	2005
Harrison, J.S., Hitt, M.A., Hoskisson, R.E., & Ireland, R.D.	Unpublished manuscript	2005
DeLong, G., & DeYoung, R.	Journal of Finance	2007

None of the listed studies makes a difference between vertical mergers and horizontal mergers, because by definition a non-horizontal merger also encompasses related mergers from another value chain as well as vertical mergers. The same also applies to the direction of integration in vertical mergers. Therefore, the new type categories of M&A action fill the research gap while they also give us an opportunity to cover traditional horizontal vs. non-horizontal and related vs. unrelated research topics. In



Table 3, M&A studies have been listed as those by Zollo & Meier, 2008. The list encompasses 35 studies published in top management and financial journals.

The second research question covers the analysis of reactions to different types of M&A actions and company strategic moves in its value network. The different types of M&A are further explained in the theory section in chapter 2.

***Research question 2: Do announcements of different M&A types create investor reactions and do the reactions differ?***

Exact motives for taking M&A action are normally missing in press and stock exchange releases; therefore, it is not possible to explicitly measure the results of a company's strategic moves. As illustrated in Figure 2, acquisitions have been common during the times of active stock markets. Therefore, the market trend may affect investor reactions to M&A announcements. It is also possible that large companies may make more acquisitions than small companies, because they can easily afford to acquire new resources and effectively digest acquired companies. The profitability of a company may have an impact, for investors may think that successful management that has previously made good strategic moves can also make them in the future; therefore, they rather invest in companies that take M&A actions. Some companies' core business is to acquire a company, develop it further, divest some of the business, possibly merge with similar companies, and finally sell out the stocks.

In the above few cases, the motives could be implicitly estimated based on the company's original business domain. The goal in this study was not to make assumptions about possible buying motives but to concentrate on the official press release or stock exchange release and what it explicitly said. Additionally, other variables studied in the past were taken into account to further investigate possible factors beyond the different types of M&A action, factors mostly related to, e.g., the profitability, size, and nationality of both the acquiring and target company.

***Research question 3: What other independent factors influence investor reactions to M&A announcements?***

As explained above, the first research gap comes from different types of M&A action. Many studies have focused on either related vs. unrelated or horizontal vs. non-horizontal acquisition types but overlooked how different moves in a corporation's strategic position change the abnormal return. The second research gap comes from adapting a proven method to accurate data on the transaction level and narrowing the event window radically from one day to one hour. These two areas form the research gap covered in this dissertation.

### 1.3. Research approach and methods

The implication of corporate actions was studied using quantitative analysis on changes in security prices after an event was announced by the corporation taking the action. This nomothetic study using a hypothetico-deductive scientific method to either support or reject a hypothesis is often used in these studies. Hypothesis creation relies on previous research on the same topic or similar research on the market impact of corporate action.

Quantitative research exploits three main methods. The first is content analysis, in which M&A events are collected and categorized into different merger types. Merger type is defined based on the corporation's move in its strategic position. The second method is event study, which is used to calculate the abnormal returns of the corporation's security price. The third method is statistical analysis, which compares the abnormal returns of different merger types. The present study followed a typical nomothetic research approach, whereby hypotheses are verified against statistical analysis in stock value.

#### Content analysis

Research collects initial data from corporations' official press and stock exchange releases and filters only items related to mergers and acquisitions, and then categorizes the filtered releases into ten different types according to content analysis. Thereafter, the time stamp of the release is used to calculate the abnormal return of the corporation's security price.

This study exploited two different data sources: press releases and stock exchange releases. Stock exchange releases were collected both from the Kauppalehti website, which announces all corporate stock exchange releases, and from corporate websites. In case of a difference between these two sources, the earlier time stamp was selected. Stock exchange releases were all in Finnish, but press releases were collected in both Finnish and English from company websites. Normally, stock releases give both a date and time. Company press releases given in other countries or different languages were not included in this study.

Press and stock exchange releases were printed and stored electronically to preserve them for later study and to retain the data if they disappeared from the Web. After collection, the releases were categorized into M&A events by three observers according to a guidebook. The final process stage was classification, conducted independently by three persons.

## Event study

Popular in research on corporate public releases, the event study method is used to analyze official releases' impact on stock value (Oler et al., 2008). With this method, the researcher determines whether an "abnormal" stock price effect is related to an unanticipated corporate event (McWilliams & Siegel, 1997). Commonly, changes are related to mergers and acquisitions (Lubatkin, 1987; Singh & Montgomery, 1987; Chatterjee et al., 1992; Seth, 1990; Shelton, 1988; Chatterjee, 1986), divestitures, changes in executive positions (Worrell et al., 1993; Davidsson et al., 1993; Lubatkin et al., 1989; Friedman & Singh, 1989; Beatty & Zajac, 1987; Worrell et al., 1986; McQuire et al., 1988), anticipated layoffs (Worrell et al., 1991), plant closures (Clinebell & Clinebell, 1994), product recalls (Davidson & Worrell, 1992), joint ventures and strategic partnerships (Koh & Venkatraman, 1991; Madhavan & Prescott, 1995), profit warnings, and other significant announcements reflected in the company's stock price. In all event studies, the impact on a company's stock price is measured after the event is published. In this study, the event time was defined as the announcement time of the press release or stock exchange release by the acquiring company.

Traditionally, event analysis has used the daily closing price, and the width of the event window has been multiple days. This study exploited both the daily analysis method of a three-day event window and a new method using transaction-level data. In addition to individual transactions, corporate announcements were tracked on a minute level.

Despite its popularity, event analysis has also been criticized for measuring strategic events (Oler et al., 2008). Criticism has mainly focused on the complexity of merger and acquisition events, which may result in biased or incomplete analysis and investor preference for horizontal acquisitions over the more complex non-horizontal acquisitions, which require more time for analysis. This would also mean that an initial positive abnormal return of a horizontal acquisition is contradicted by a negative long-term post-acquisition return (Oler et al., 2008). Oler et al further proposed that short-term stock price adjustments should not be interpreted as completely accurate predictions, but rather as collective opinions of investors. In fact, some scholars have proposed that in event studies the dependent variable should be called *market expectation about firm performance* rather than acquisition performance (Zollo & Meier, 2008). Whether called dependent variable market expectations or acquisition performance, it is a factual event when a company's security gets an abnormal return due to a published event. Clearly, acquisition performance is not a suitable term to measure the total impact of such a strategic event, but it reflects the initial response to a corporation's strategic activity on the stock market. Therefore, in this dissertation, abnormal return is called investor reactions to corporate announcements.

Because event studies measure only a short-term impact, it is obvious that long-term, market-based measures should be included alongside event studies or through other

studies to justify a strategic action such as a merger or an acquisition. The use of very long windows in many management studies implies that some researchers do not believe that the effects of events are quickly incorporated in stock prices (e.g. McWilliams & Siegel, 1997). On the other hand, this can be seen as a violation of efficient markets, which is the pre-requisite of the Efficient Market Hypothesis (Fama, 1970). Long-term studies face challenges to capture an acquisition's long-term impact, when a company makes hundreds of annual announcements. Therefore, the total impact of one event is difficult to measure, because other events cloud the results. This is also a threat in short time span analysis, because other events may affect the event to be measured. Other events that interfere with measured events are called confounding events. Consequently, this study sought to improve the event study methodology especially for short-term analysis to capture abnormal returns without major interference from confounding events.

Though strategy is information on a company's longer-term target, we can assume that a change in company strategy can markedly affect its share price. Based on the efficient market hypothesis (Fama, 1970; Fama, 1991), a company's current strategy is visible in the available information and reflected in the company's current share price. On the other hand, a change in strategy becomes visible when a company announces something that indicates a change in its strategy. This new information is then reflected in the new share price, and the delta can be measured through the abnormal return. This justifies event study also for measuring strategic moves, because a change in strategy may have a major impact, as scholars have observed in the past.

### Research process and data

The data in this study included all corporate stock exchange releases and Finnish press releases collected from stock exchange and company web pages. Such releases signal the first time of a merger and acquisition announcement  $T_0$ .

The announcement time  $T_0$  was used to calculate abnormal return right after the announcement. Announcements were divided into different merger categories by triangulating their content.

When the company name and stock quote are known, the company's International Securities Identification Number (ISIN) is also known and used as the key for the announcement, together with the date and time of the event. An event study requires an estimation window to describe the current value of the stock price and its trend  $\beta_i$ . Another important factor is the market index OMXHPI, which represents the variable  $\alpha_i$  and describes a normal market trend. With these two trends, we can calculate the market model

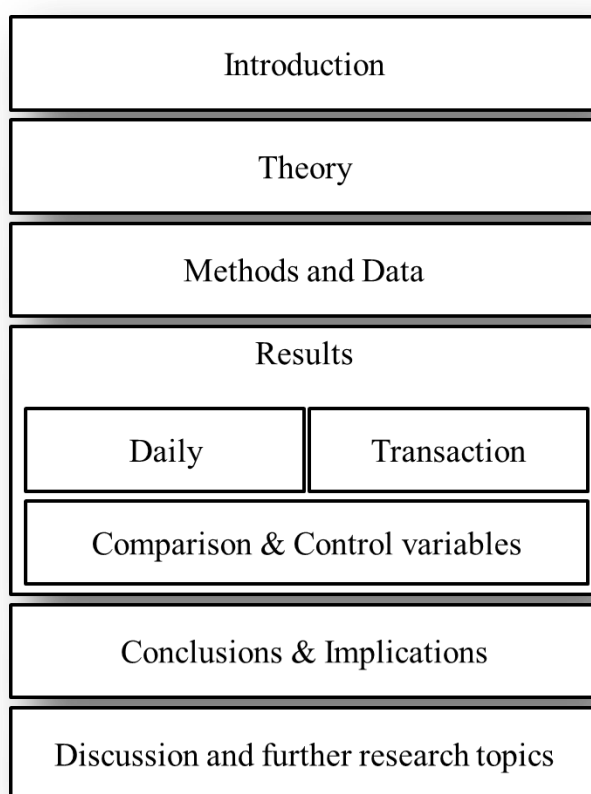
$$R_{it} = \alpha_i + \beta_i R_{Mt} + \varepsilon_{it}$$

Calculations are described in detail in section 3.2.6.

In brief, this dissertation employed the daily analysis and the transaction-level method in parallel. The daily analysis method gives a benchmark to global research on merger and acquisition events, and, additionally, enables comparison between the transaction-based method and the daily analysis method to assess its contribution to research methods. Finally, the different merger types were compared using statistical analysis.

#### 1.4. Outline of the dissertation

The outline of the dissertation is illustrated in Figure 5.



*Figure 5. Outline of the dissertation.*

The introduction is followed by a theoretical background on mergers and acquisitions. This chapter is followed by a chapter on the main methods used in the dissertation and a description of the data collected and analyzed. This chapter justifies the methodology as useful and applicable to merger and acquisition events and reviews of similar studies from other stock markets and their findings. Chapter four reports results by both daily closing price analysis and transaction-based analysis, compares the two, and tests the effect of the control variable on the results. Chapter five makes a conclusion and

suggests possible implications. Finally, chapter six introduces topics for further study and discussion topics for merger and acquisition research.

## 2. THEORETICAL FOUNDATION

This chapter discusses the theoretical foundation of the study. The first step is to examine why corporations exist and what their main mission is. After the main mission is discovered, a brief description follows on the ways shareholders can gain value from their stock ownership. There are only two main ways for this, i.e., dividends and increased security value, which afford opportunities to sell corporate shares at a higher than their purchase price. Company management seeks to both increase the value and their ability to pay dividend—at least that should be their main task. Therefore, management takes action to increase their short-term profitability and ability to pay out dividends.

The next section 2.2 focuses on possible strategic decisions to improve the corporate's strategic position. One decision is to make an acquisition or merger. These are probably the most expensive strategic decisions (Rappaport, 2006) management ever makes. Hence the interest in studying the impacts of M&A action.

The following section 2.3 discusses different types of M&A action in terms of improving the company's strategic position in its value chain or value network. In this context, hypotheses are created and reasons are given for different M&A actions increasing the security prices differently.

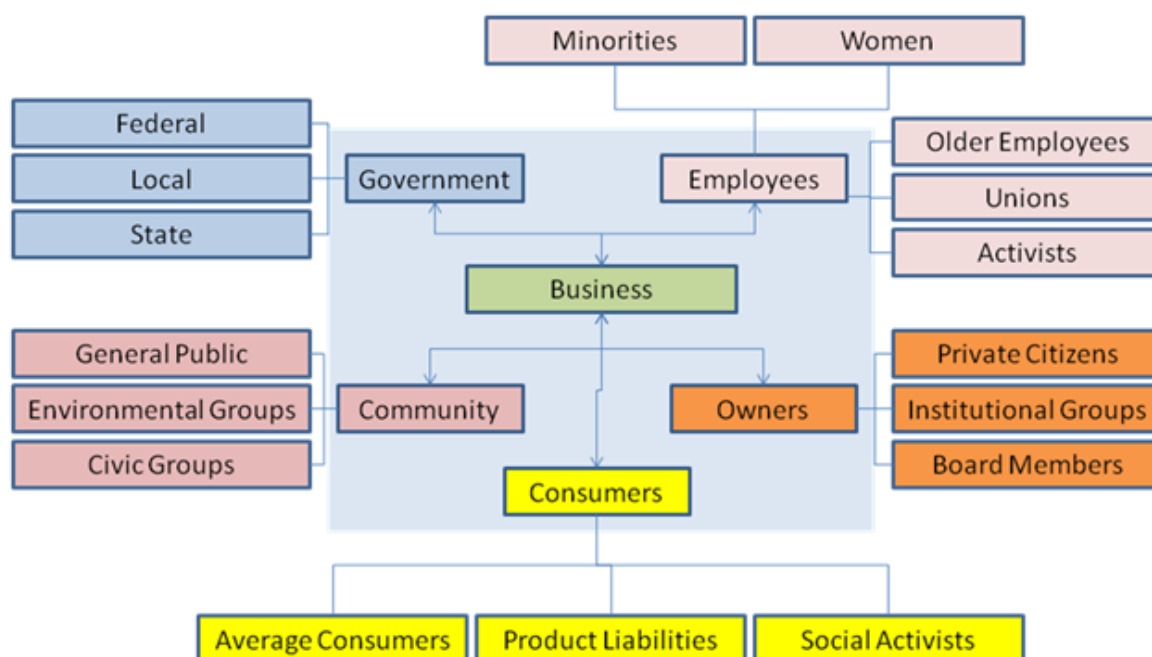
Section 2.4 combines market information and its implications with share price under the Efficient Market Hypothesis theory. This theory combines action (information) and reaction (share price) and clarifies why the market reacts to corporate announcements.

Section 2.5 summarizes the theory part and concludes with five hypotheses examined in this dissertation.

### 2.1. Corporation's main mission

Though a lot has been said about corporate missions along with corporate social responsibility or shared value to other stakeholders in a corporate operational environment (Porter&Kramer 2006), it remains a fact that corporations exist to make profit to their shareholders (Sundaram&Inkpen, 2004). The main reason is that when management focuses on shareholder value, they also indirectly serve other stakeholders. *Stakeholder* is a homogenic, clearly identifiable individual or group of individuals interested in the corporation's business. By definition, stakeholders include, e.g., customers, employees, government, and suppliers. Carroll & Buchholtz (2006) divided

stakeholder groups into five categories: government, employees, owners, consumers, and community (Figure 6).



*Figure 6. Different stakeholder groups (Carroll & Buchholtz, 2006, p. 70)*

The company's social responsibility increases its importance. Porter & Kramer (2011) used the term Creating Shared Value rather than Corporate Social Responsibility in their article in *Harvard Business Review* (Porter & Kramer, 2011). Already in 2006, they detected an evolution in corporate ethics when they proposed a link between corporate social responsibility and competitive advantage (Porter & Kramer, 2006).

Porter & Kramer (2011) claimed that the whole capitalist system is under siege due to some recent incidents that have caused severe damage to its business image. Today, there are more than enough examples such as Enron, Lehman Brothers, Arthur Andersen, even Martha Stewart, to name a few. "The more business has begun to embrace corporate responsibility, the more it has been blamed for society's failures," claimed Porter in the article.

Though corporate social responsibility has been emphasized recently, one basic stakeholder group, corporate shareholders, has gained precedence over other stakeholder groups. Sundaram & Inkpen (2004) gave the following five reasons why maximizing shareholder value is the top item on management's agenda:

- 1) The goal of maximizing shareholder value is pro-stakeholder.
- 2) Maximizing shareholder value creates appropriate incentives for managers to take entrepreneurial risks.
- 3) Having more than one objective function makes governing difficult, if not impossible.



- 4) It is easier to make shareholders out of stakeholders than vice versa.
- 5) In the event of breach of contract or trust, stakeholders, compared to shareholders, are protected (or can seek remedies) by contracts and the legal system.

Though their management priorities are clear, Sundaram & Inkpen also reject the view that management might shirk their moral and even legal duty to stakeholders, if they actively pursued their responsibility to shareholders. Therefore, management's task is to create value first to shareholders, and by doing that, they can fulfill all other stakeholder needs as well.

This logic is based on the residual nature of dividends and other monetary value of owning shares. Residual value comes from all other stakeholders having received their stake, like employees their wages, suppliers their payments, landlords their rents, and government its taxes. Therefore, only residual claimants have an incentive to maximize the total value of the firm. This also reflects on risk taking, because shareholders have the greatest incentive for the success of risky activities, while fixed claimants gain nothing extra if the company performs "extremely well" or just "well enough."

And, finally, the fifth reason stems from the legal rights if the risks become reality, because stakeholders have explicit contracts with the firm, whereas a shareholder's contract is implicit. The relation is implicit and represented only by a claim on the firm's residual cash flows. These reasons lead to the next section on increasing profitability.

Corporate mission has been studied extensively and its role in creating wealth to its shareholders vs. all stakeholders has been continuously debated. When corporations' main shareholders are public authorities such as governments, the debate is more understandable, because taxpayers can voice an opinion on how decisions are made in publicly owned corporations. In privately owned corporations and especially publicly listed companies, the priorities should be clear, because investors invest in corporate securities to gain a return either through receiving dividends or increased value.

To emphasize the importance of shareholders' role in management decisions, legislation has been introduced to guide management. Accordingly, Finnish law helps with the right priorities regardless of company theories on creating value. For example, the Finnish legislation on limited companies (Osakeyhtiölaki, 2006; Ministry of Justice, 2012) states that "*the purpose of a company is to generate profits for the shareholders, unless otherwise provided in the Articles of Association.*" This is clearly stated in the law for a corporation's part 1, chapter 1, section 5, and it provides the basic guidelines for this study. Based on section 5, the main purpose of a company is to make profit to its shareholders. Shareholders' wealth is the driver that a company is trying to follow. Legislation gives also other guidance to corporate management, and in the following

section two other major principles are selected to clarify the limits legislation sets to management. They include, e.g., the definition of which members of corporate management are included in “management” and how shareholders should be treated. This clarification is necessary when motives are discussed and why official releases are announced at the same time for all shareholders.

The law gives also reminds company management of its mission to create wealth to its shareholders. In company governance, the shareholders’ aim to gain profits is implemented through a Board of Directors, elected by the shareholders. The Board of Directors selects the managing director to take care of the operational duties within the company. Both the Board of Directors and the managing director seek to maximize shareholder value as stated by the law. This task is also written in the same part 1, chapter 1 in the law on publicly listed companies. Section 7 states that “*The General Meeting, the Board of Directors, the Managing Director or the Supervisory Board shall not make decisions or take other measures that are conducive to conferring an undue benefit to a shareholder or another person at the expense of the company or another shareholder.*” Though this is written under the section on equal treatment, it describes the main decision makers and their obligation to all shareholders equally. Treating shareholders equally means also that information on company activities must be distributed to all shareholders at the same time, and, further, that though management owns shares in the company, they cannot use their insider information to their own benefit.

To further clarify management responsibilities and equal treatment of all shareholders, the short section 8 on management’s duty explains management’s obligation to the company itself and its success. It specifies that “*The management of the corporation shall act with due care and promote the interests of the company.*” These three sections in the Finnish law provide the basis for company management and shareholder expectations (Ministry of Justice, 2012).

Legislation is discussed in this context because this dissertation examines how Finnish publicly listed corporations operates and how they—as corporate citizens of Finland—follow this legislation regardless of the theory discussed in this section. As shown, there is no contradiction between legislation and theory, because the purpose of a company is to generate profits to its shareholders, and because all management action should thus focus on creating shareholder value (Rappaport, 1998; Sundaram & Inkpen, 2004).

### **2.1.1. Corporation’s possibilities to increase shareholder value**

The task of management has been defined to first prioritize shareholders over all other stakeholders and treat all shareholders equally. The next step is to maximize shareholder value. First, we need to define shareholder value and if it can be measured in some way. Second, we should understand the right timing of comparing today’s shareholder value

with yesterday's value. Is shareholder value about dividends the company pays based on annual results, or is it about continuous increase in the share price? These are the only two components of shareholder value, and in estimating shareholders' return, there are only two ways for a company to increase the profit of its shareholders (Rappaport, 1998): either by *increasing the value of the stock* or *increasing the dividend paid by the company*. We can now calculate the total shareholder return (TSR) with the following formula:

$$\text{TSR} = P_e - P_s + D$$

which produces the absolute value and similarly the normative value by

$$\text{TSR \%} = (P_e - P_s + D) / P_s$$

where  $P_e$  is the stock price at the end of the period, and  $P_s$  is the stock price at the start of the period, and  $D$  is the dividend paid during the period.

The formula is very simple and also valid, because all other value creation possibilities stem from it. For example, another possibility such as issuing bonus shares, whereby the shareholders receive more shares, is implemented in such a way that the *market cap* (total value of all the shares) remains constant. However, if the number of total shares is increased, the real value of one share should decrease by the relational value of all shares released. Thus issuing new shares to current shareholders reduces the value of all shares at the same time. This is the simple mathematical explanation, but there is also an extra increment in share value based on bonus shares issuance (Sarma, 1993).

When the opposite happens, i.e., a company acquires its own shares, the company uses its capital to increase the value of old shares, but the capital reduces the company's ability to pay out dividends, thus reducing the  $D$  in the formula. As explained above, share price and dividend are the main instruments for increasing shareholders' profit, and they are related, as TSR shows, in that if there is a dividend payout in the period,  $P_e$  should be reduced by  $D$  correspondingly to maintain the same TSR. This study concentrated on the share price, which affects shareholder return in the short term.

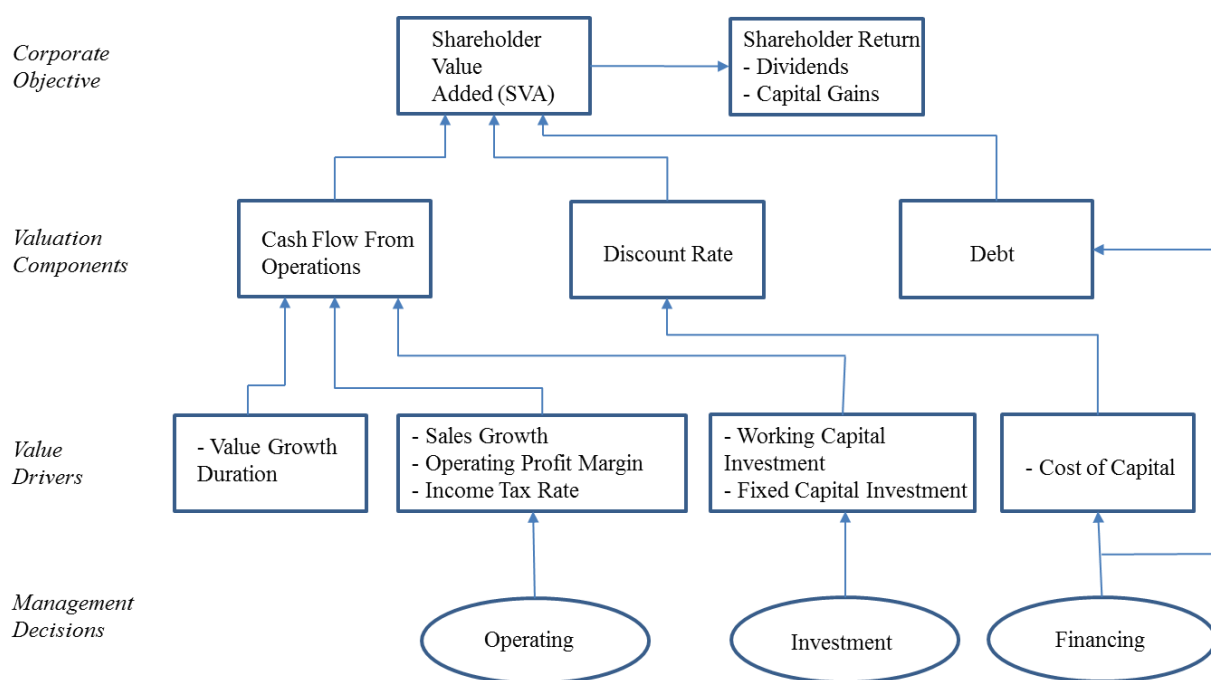
The above mathematical formulae do not take into account the psychological impact when, e.g., stocks are split to make them look cheaper to buy. Another direction when the company acquires its own shares can also imply that company management sees this as the best of all possible alternatives to create shareholder value, because they believe the company's share is undervalued. Many other explanations exist, but, theoretically, the actions create no shareholder value.

The relation between corporate shareholders' interest and management's main task has been captured in the above definitions. Corporate management seeks to ensure the growth of their value; therefore, management tries to improve the corporation's

financial capability to pay dividends and simultaneously improve the market value as defined on the stock market.

To increase their corporate share price, companies are looking for growth and improved financial performance. Creating shareholder value has become the basic global measure of success (Rappaport, 1998). Though this is becoming self-evident in some countries, it is still far from being a universally accepted measure to guide, e.g., resource allocation in a market-based economy.

The next step is to find possible alternatives for management to increase shareholder value and improve financial performance for paying dividends. An improved share price increases capital gains, as illustrated in the shareholder value network (Figure 7).



*Figure 7. The shareholder value network (Rappaport, 1998).*

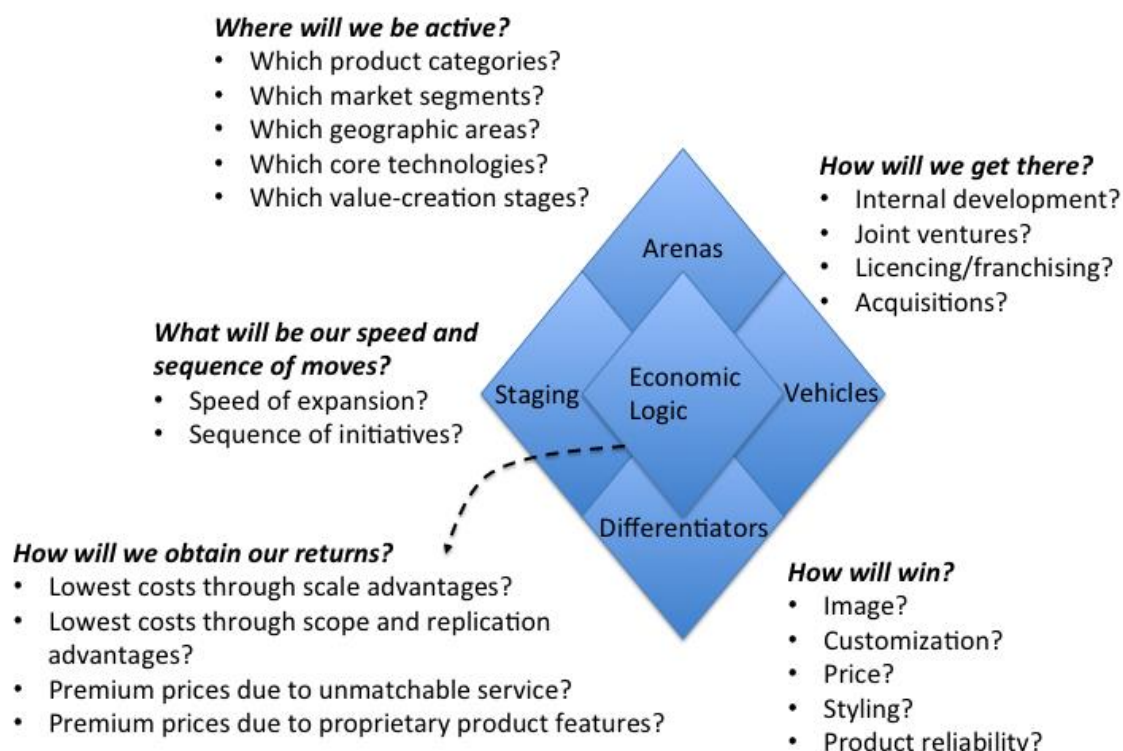
Rappaport combines the dependencies in the corporation's goal to add to the shareholder value (SVA). His definition starts from management decisions on operations, investments, and financing. *Operating* decisions on product mix, pricing, promotion, advertising, distribution, and customer service are linked to sales growth, operating profit margin, and income tax rate. *Investments* decisions such as increasing inventory levels and capacity expansion are reflected on two value drivers for both working capital and fixed capital. And, finally, *Financing* decisions define the proportion of debt and equity used to fund the business. Eventually, all management decisions lead to added shareholder value by either capital gain or dividends. This establishes a connection between three different types of management decisions and

shareholder value creation (SVA). The actions a company can take are short-term to improve its profitability and long-term to improve its strategic position.

### **2.1.2. Corporation's possibilities to enhance its profitability**

The next step in value creation analysis is to find the areas where a company can improve its profitability. A company's position in its environment in terms of its internal capabilities can be studied from two perspectives. One is to focus on products and their position in the markets (e.g., Porter, 1980), the other to focus on company resources (Penrose, 1959; Wernerfelt, 1984). For a company, they are the two sides of the same coin. The latter covers, e.g., labour, capital, land, technological skills, and intellectual property. The same resources can be utilized to make different products, and one product may need several resources. Prahalad & Hamel (1990) linked core competences and products together to enable companies to use the same competences to address new markets with new products. Resources are used to make products and hence they represent more stable competitive advantage than current products. The resource-based view (RBV) is suitable for studying a corporation's possibilities to utilize its current resources in new markets and to understand which resources are needed in the current markets to meet market needs.

Apparently, a company can improve its accessible markets by improving its position geographically by penetrating to new markets, by increasing its offering with enhanced products and service offerings to its customers, by improving its internal efficiency by speeding up manufacturing and product launches to gain a more competitive offering, and also by selling at higher prices than competitors, i.e., by making more profit. These activities are well captured in the Hambrick & Fredrickson article (Hambrick & Fredrickson, 2005), where they introduce the concept of *arenas*. Arenas define not only geographical presence, but also expand the market segments and product categories. *Staging* defines improved speed of expansion and sequencing of new initiatives to the market, whereas differentiators describe a company's offering to its competitive environment. *Economic Logic* defines the profitability and scale advantages, which rely on its components. In this frame, *vehicles* are, e.g., acquisitions, joint ventures, internal development, and licensing, i.e., factors about how to make things. These five major elements of strategy are described in Figure 8.



*Figure 8. The Five Major Elements of Strategy (Hambrick & Fredrickson, 2005).*

A company's strategic positioning describes how well it positions itself in the competitive environment. Strategy is defined in many different ways, one common definition being Porter's "finding positions in the industry where competitive forces are weakest" (Porter, 1979, p. 143). Later, Porter modified his definition to "creating a unique and valuable position ideal for each firm" (Porter, 1996, p. 68).

Competitive positioning has been claimed too static to describe the competitive arena of dynamic markets and changing technologies. This is also due to fast-moving rivals that can quickly copy any market position, making competitive advantage at best temporary (Porter, 1996). Porter states also that a company can outperform rivals only if it can establish a difference that it can preserve. Porter developed three generic competitive strategies to achieve competitive advantage. These strategies are cost leadership, differentiated product, and segment/niche play. They explain neither how to select the best one for the company nor how it should position itself to pursue even more multiple strategies at the same time.

## 2.2. Corporation's strategic position in the industry

When a corporation improves its strategic position, it needs to improve its capabilities and resources to compete in the areas mentioned above. Capabilities are the essential organizational competences that allow a company competitive advantage or strength (Sudarsanam, 2010). Prahalad & Hamel (1990) linked competitive advantage to

company core competences and built a bridge between core competences companies use to build core products, which can be diversified into separate businesses and end products. Core competences represent collective learning in the organization. On the other hand, resources that are easily imitated, replicated, substituted, traded, or mobile are unlikely to confer sustainable competitive advantage. Discussions about competitive advantage (CA) and sustained competitive advantage (SCA) have produced different views about sustainability. Some authors have suggested that a sustained competitive advantage is linked to calendar time that lasts long enough (Jacobsen, 1988; Porter, 1985), whereas others have linked it to possibility of duplication. These scholars have defined competitive advantage as sustainable only if it continues to exist after efforts to duplicate the advantage have ceased (Lippman & Rumelt, 1982; Rumelt, 1984). Barney categorized resources based on their nature. The resources that can create sustained competitive advantage are *valuable*, *rare* among current and potential competition, *inimitable* (or very costly to imitate), and *non-substitutable*. His resource test is called the VRIN test (Barney, 1991). When both resources are understood and the company value chain is defined, it is possible to understand the company's competitive advantage. It is therefore necessary to define a company's value chain to be able to compete in a particular industry (Porter, 1985).

Park (2007) defines strategic convergence-divergence by change in a company's strategic position as following: "Strategic convergence-divergence, i.e., the extent to which a focal firm draws closer to or further away from a competitor by changing its strategic position." According to the definition, a change in the strategic position is a prerequisite to achieving strategic convergence or divergence. This study focused in particular on competitive positioning. Corporations regularly shift their focus on new areas and make conglomerate acquisitions and diversifications in waves. Comment & Jarrell (2005) found that conglomerate acquisitions rose from 1950 to 1972, but then fell from 1973 to 1989. During the 1950s and the 1960s, the economies of scope increased significantly, and thereafter companies started to become more focused. The measure was based on the number of Standard Industrial Classification (SIC) codes assigned to companies and the percentage growth in revenues from one business segment. Comment & Jarrell (2005) concluded that one reason for increased focus was consistent with shareholder wealth maximization, implying that economies of scope were negative in balance during the 1980s. There was also no evidence that economies of scope were realized in their research. Additionally, diversified companies were much more active than focused firms as buyers and sellers of corporate assets.

When a company is targeting to move to a new strategic position in its value chain, its management needs to find a way to accrue new competences and resources. There are several ways to accrue new competences, and "Make, Buy, Ally" (Geyskens et al., 2006) is a common question asked when a certain technology or asset needs to be acquired to improve a company's strategic position. The decision can be made on

several levels in the company, and, e.g., when a new product needs to be developed, some components, modules, and technologies can be acquired or developed in-house. If a company tries to move to a new position in the industry, it can also make a conglomerate acquisition to diversify more rapidly.

Alternatively, *make* would on company level mean to establish a new unit to compete with the current vendor of the asset. The term *buy* signifies an acquisition, and the last alternative *ally* means either a joint venture between two corporations or a merger, in which corporations decide to continue as one unit. This study focused only on the company level *buy* aspect, which relates to acquisition or *ally* on its ultimate level of cooperation, establishing a merger, and leaving joint-venture out of its scope. These items were chosen because in both cases one of the firms ceased to continue as an individual company.

If a company starts to *make* a competitive offering, it is normally the slowest alternative to move to a new strategic position. This is a choice between acquisition and internal development (Trautwein, 1990; Hambrick & Fredrickson, 2005), whereas *Ally* includes a wide variety of different alternatives for partnering and is not as clear an alternative as buy, when companies agree on a contract, which is rarely public information, at least the terms and conditions of the alliance.

A corporation's five major elements of strategy explain the product, market offering, and economic logic, and acquisitions and mergers become possible vehicles to improve its competitive position in different arenas, accelerate its staging, and explore new differentiators through expansion (Hambrick & Fredrickson, 2005).

### **2.3. Mergers and acquisitions as an expansion method**

Merger and acquisition events first of all benefit shareholders in terms of increased value. This means that the investment made in acquisition is expected to have a positive return on the investment and increase either the company's share price or ability to pay dividends, preferably both. Mergers and acquisitions are long-term strategic decisions whereby two companies continue as one legal entity. They are strategic because they come with a host of implementation requirements and are difficult to reverse (Smith et al., 1992; Chen et al., 1992; Smith et al., 2001; Chen & Miller, 2012).

Normally in this research, no clear distinction is made between a merger and an acquisition due to the many similarities between these corporate actions. In theory, they differ, but as the ways to make an acquisition have diversified, they are often categorized as merger and acquisition (M&A) actions. The following section briefly discusses the differences between the two.



### 2.3.1. Acquisition or merger

A company makes an acquisition when it completes an action to buy most, if not all, of the target company's ownership stakes to assume control of the target. Sudarsanam (2010) defines an acquisition as one firm purchasing the assets or shares of another and the acquired firm's shareholders ceasing to be owners of that firm. Acquisitions can be divided into two main categories. The first is stock acquisitions when a company acquires all the shares of the target company with all liabilities and assets. The second is when the acquiring company buys only assets and liabilities, and this is called an asset acquisition. In many cases, the acquiring company acquires part of the assets. The other main difference between the two categories is the legal entity that receives compensation for the acquisition. In a stock acquisition, the target company's shareholders receive compensation, whereas in the latter case the company receives compensation. In this study, both categories were considered acquisitions, although most acquisitions were stock acquisitions. Normally, acquisitions occur in phases with the acquiring company acquiring a small part of a company to improve business understanding and as part of due diligence; thereafter, the acquiring company can increase its share in the target company and most probably receive a seat on the board of directors. Finally, the last hurdle is when a company reaches a certain threshold and must make a public offer to all remaining shareholders.

In this study, an acquisition announcement occurred when the acquiring company declared its intention to buy at least 90% of the target company's shares. The 90% threshold comes from the Finnish law on limited companies (Osakeyhtiölaki, 2006), which states in chapter 18, section 1, paragraph 1 the following:

*“A shareholder with more than nine tenths ( $\frac{9}{10}$ ) of all shares and votes in the company (redeemer) shall have the right to redeem the shares of the other company at a fair price (right of squeeze-out). A shareholder whose shares may be redeemed (minority shareholder) shall have the corresponding right to demand that the shareholder's shares be redeemed (right of sell-out).”* The unofficial translation here comes from the Ministry of Justice (Ministry of Justice, 2012).

On the other hand, when a merger occurs, corporations join to pool and share their resources to achieve common objectives (Sudarsanam, 2010). The Finnish Law on Limited Liability Companies Act (Ministry of Justice, 2012) defines merger as follows: *“A limited liability company (merging company) may merge into another limited liability company (acquiring company), in which event the assets and liabilities of the merging company are transferred to the acquiring company and the shareholders of the merging company receive shares in the acquiring company as merger consideration. The merger consideration may also consist of cash and future undertakings.”*

Though the definition sounds accurate, it, in fact, makes no clear difference between a merger and an acquisition. Normally both are categorized as M&A events. It is difficult to differentiate the two. Several sources have tried by explaining that in a merger one of the companies ceases to exist, and its current shareholders become shareholders of the new company. The previous owners of the company remain as shareholders of the new company.

An acquisition is implemented through a company security transfer to the acquiring company's shareholders. Conversely, this means that the difference in an acquisition is that the target company's shareholders do not remain shareholders of the merger company. This converse definition of acquisition does not apply as such, because often acquisitions are, in fact, mergers with the acquiring company using its securities as a payment method to target the company's shareholders. Therefore, a friendly acquisition where both company managements agree on the terms, and where corporate securities are used to pay for the acquisition can be very close to a merger—especially when the acquired company ceases to exist and its operations are dissolved into the new extended company.

To avoid the difficulty of defining merger or acquisition, it is common practice to combine the two categories and call it simply merger and acquisition (M&A). If a company refers to a merger in its release, then it could be categorized as one. Naturally, a problem arises if a company uses “merger” as a euphemistic term for an acquisition in its press or stock exchange release to make the acquisition sound less hostile. Euphemism is probably the main reason why the number of mergers is, in fact, greater than if they were defined strictly as mergers.

It is difficult to differentiate between a merger and an acquisition, because the public interprets them differently. Consequently, the safest choice in research is not to make a difference between the two but simply categorized them as merger and acquisition (M&A), as is done in this study.

### **2.3.2. Motives for mergers and acquisitions**

Previous studies have found many motives for mergers, and different classifications exist. Trautwein (1990) found seven theories behind a merger motive: *Efficiency theory*, *Monopoly theory*, *Raider theory*, *Valuation theory*, *Empire-building theory*, *Process theory*, and *Disturbance theory*. The first four target to increase acquiring companies' shareholder value. The *Efficiency theory* targets to increase net gains from the synergies of two companies. The *Monopoly theory* aims to move wealth from customers to the company by reducing competition and increasing the company's profits. The company is thus trying to maximize its market power, and it is well aligned with differentiator and economic logic elements as described in figure 9. These two theories are linked to

company strategic motives to increase profits and product offerings (Hambrick & Fredrickson, 2005).

The next two theories focus more on a company's business valuation and are, in fact, more about errors in the company's current valuation. The *Raider theory* explains the target as value moving from the target company's shareholders to the acquiring company's shareholders. The *Valuation theory* explains the acquiring company's management decisions as based on better information about the target company's value than about its own management.

The last three theories explain the motives not directly as company value or product/service offering, but more as the acquiring company's personal motives and others. However, because this study targeted investor's reactions, the last three theories can be ignored, since the driver there is not to increase value to the acquiring company's shareholders. Trautwein (1990) also found little evidence for these theories. This was later supported by Brouthers et al. (1998), who studied merger motives and came up with a list of three main categories and 17 subcategories, as shown below.

*Economic Motives:*

- Marketing economies of scale
- Increase profitability
- Risk-spreading
- Cost reduction
- Technical economies of scale
- Differential valuation of target
- Defense mechanism
- Response to market failures
- Creation of shareholder value

*Personal Motives:*

- Increase sales
- Managerial challenge
- Acquisition of inefficient management
- Enhance managerial prestige

*Strategic Motives:*

- Pursuit of market power
- Acquisition of a competitor
- Acquisition of raw materials
- Creation of barriers to entry

In their research, the main motives indicated by company management fell in the category of economic motives and the lowest scores in the category of personal motives.

Walter & Barney (1990) listed 20 different managerial goals for M&A and made five clusters as follows:

- 1) Mergers are a way managers obtain and exploit economies of scale and scope.
- 2) Mergers are a way managers deal with critical and ongoing interdependencies with others in a firm's environment.
- 3) Mergers are a way managers expand current product lines and markets.
- 4) Mergers are a way managers enter new business.
- 5) Mergers are a way managers maximize and utilize financial capability.

Though these goals are similar to the motives of Trautwein (1990) and Brouthers et al. (1998), they differ in that the personal motives are not visible. The main and useful outcome of their study for this one is the mapping of motives to the type of acquisition. The main motive for a vertical acquisition was cluster 2, and for a concentric acquisition cluster 3. In conglomerate acquisitions, both 4 and 5 were the most common goals, but in horizontal acquisitions, no cluster dominated. Different types of mergers and acquisitions are explained in detail in section 2.3.3.

The company's previous experience about acquisitions affects its future acquisition behavior. Previous positive financial performance in acquisitions has a positive impact on management support of acquisitions. Although previous experience is reciprocal, positive past experience has a bigger impact than negative experience (Haleblian et al., 2006).

Though measuring M&A abnormal returns on daily level has been a popular topic, it was interesting to see if shortening the event window would bring new information on this topic. Most studies have been done on international stock exchanges and mostly in the United States. Similar studies have not been conducted on this scale.

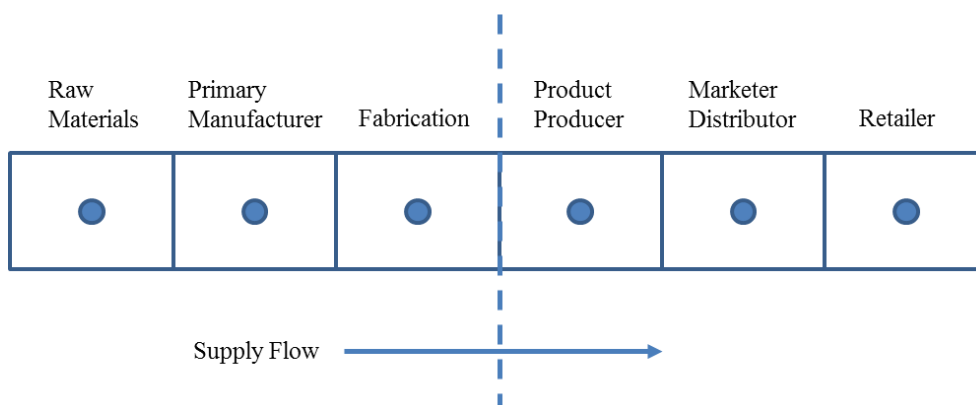
The Research Institute of the Finnish Economy (ETLA) published a discussion paper on Mergers and Acquisitions, "Reasons and Results in 2002" (Ali-Yrkkö, 2002). It investigated the value and volume of Finnish acquisitions and the relation between GDP, market capitalization, and the number of listed companies in Finland. The research was done on the macroeconomic level rather than on the individual acquisition level. Elina Pyykkö (2011) wrote her dissertation on "Stock Market Response to Research and Development Expenditures of the Firm in the Context of Mergers and Acquisitions."

### 2.3.3. Different types of mergers and acquisitions

Rumelt (1974) introduced nine strategies for acquisitions and mergers based on product, market, and technology linkages that the firm's businesses have with its core business. Later, Lubatkin et al. (1997) reduced this set to five categories, which were single business, vertical, constrained, linked, and unrelated acquisition. These definitions do not clearly explain a company's move in their value chain or value network. Therefore, in this study, it was more appropriate to use Galbraith's (2002) diversification types as the basis for categorizing different acquisitions. Galbraith defined his five categories of diversification as follows:

- By-product diversification
- Related diversification
- Linked diversification
- Unrelated diversification
- Center of gravity change

The company's *center of gravity* depends on where in the industry's supply chain (Figure 9) it started, and the center arises from the company's initial success in the industry in which it grew up (Galbraith, 2002).



*Figure 9. Supply Stages in an industry chain (Galbraith, 2002, p. 227)*

*By-product diversification* represents a situation in which a vertically integrated company sells by-products along the industry chain. In this case, the company changes neither its industry nor its center of gravity. Hence this diversification does not represent an acquisition, or in case an acquisition is associated with it, we can say that the company is making a *related acquisition* or *linked acquisition*, as it is already in the business. Therefore, this diversification model was not included as a separate acquisition model in this study.

*Linked diversification* occurs when a company moves within the supply flow either backward or forward and makes acquisitions from its new position in the supply flow. This type of acquisition is also called vertical acquisition (Haleblian & Finkelstein, 1999). In their study, they defined vertical acquisition as the acquiring company selling its products (at least 5%) to the target company or the acquiring company at least buying 5% of its total purchases from the target company. In this study, an exact percentage was not used but rather a textual explanation of the release. In this study, *linked diversification* was split between backward and forward based on the direction in which the company was moving. Lubatkin et al. (1989) used the linked acquisition term when two companies were less closely related, but when their non-competing core businesses had some, but not many, synergistic interrelationships as constrained mergers but more interrelationships than unrelated mergers. This definition was not used in this study. In Lubatkin et al.'s (1989) terminology, a vertical acquisition describes a possible buyer-seller relationship, which was used for a *vertical* relationship in this study as well. Note here that the term "vertical forward" is used and, respectively, "vertical backward" to follow Galbraith's (2002) definition of direction and Haleblian's (2006) definition of vertical acquisition rather than "linked" as Galbraith did. The term *backward* is used when a company moves toward raw materials (toward becoming an upstream company), and the term *forward* describes moving toward customers (toward becoming a downstream company).

*Related diversification* occurs when a company moves into new industries but in the same center of gravity (Galbraith, 2002). On the other hand, Rumelt et al. (1974) considered businesses to be related if they (1) served similar markets using similar distribution channels, (2) used similar production technologies, or (3) exploited similar scientific research. Salter & Weinhold (1979) had a similar description, and Andrews (1980) added the definition of operating at the same level of skills and resources. From the acquisition point of view, it means that a company acquires another company that operates in the same position in the supply flow, like a distributor acquires another distributor. In related acquisitions, companies are seeking economies of scale (Salter & Weinhold, 1979; Rumelt, 1974), economies of scope (Teece, 1982; Williamson, 1979), and market power (Shepherd, 1970). Barney (1988) defined related acquisition as based on the Net Present Value of acquiring company (A), target company (B), and their merger (A+B). Companies are related if their combined NPV is greater than their NPVs when they operate as independent companies.  $NPV(A+B) > NPV(A) + NPV(B)$ .

*Un-related diversification* takes place when a company moves into new industries but into a different center of gravity (Galbraith, 2002). From the acquisition point of view, this means that a company acquires another company that operates in a different position in the supply flow, like a producer acquires a distributor. In unrelated acquisitions, the relationship between target and bidder companies is not as apparent (Singh & Montgomery, 1987). Many researchers and the Federal Trade Commission

have used the term “conglomerate” to describe a merger or acquisition event between two non-competing businesses that possess different production, marketing, and research technologies (e.g., Lubatkin et al., 1997).

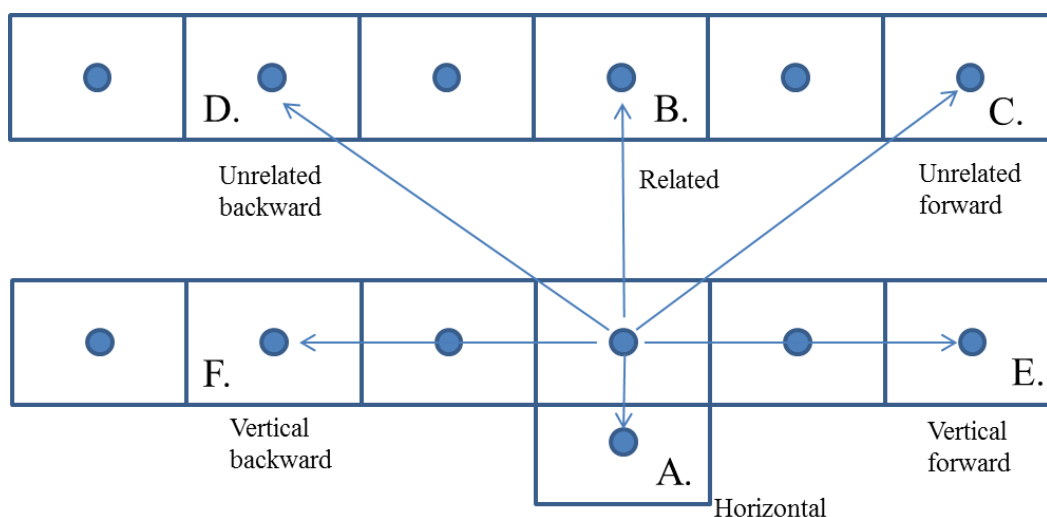
*Center of gravity change* happens when an organization remains in the same industry but changes its center of gravity there. Hence this change to a new place represents no normal acquisition, because the company is already in the business. Unless there is an acquisition to strengthen the organization’s competitive position, it can be categorized as a vertical or related acquisition, depending on the center of gravity. This diversification was not included in this study as a separate acquisition category.

Based on the above definitions, there are five basic types of acquisition: *vertical forward*, *vertical backward*, *related*, and *unrelated* acquisitions both *forward* and *backward*. In addition to these five types, related acquisition can be split into two: horizontal and non-horizontal, but still related. A horizontal acquisition signifies one whereby companies operate within the same industry in the same position of the industry (or value) chain, e.g., a grocery store acquiring another grocery store. Respectively, non-horizontal but related means an acquisition whereby a bank acquires an insurance company and moves to another industry. This type is related, because they operate in the same position in the value chain but in different value chains.

The literature has been referring to the division between horizontal and non-horizontal (e.g., Oler et al., 2008), but in this study, non-horizontal was further divided into five smaller and different groups: *vertical forward*, *vertical backward*, *related (non-horizontal)*, *unrelated forward*, and *unrelated backward*.

The final six acquisition classes are:

- A. *horizontal acquisition* – company acquires another company operating in the same industry and same center of gravity
- B. *non-horizontal, but related* – company acquires another company operating in a different industry and in the same center of gravity
- C. *unrelated, vertical forward* – company acquires another company operating in a different industry and moves closer to customers
- D. *unrelated, vertical backward* – company acquires another company operating in a different industry and moves closer to raw materials and suppliers
- E. *non-horizontal, but vertical forward* – company acquires another company operating in the same industry but in a different center of gravity, and by doing this the acquiring company moves toward customers
- F. *non-horizontal, but vertical backward* – company acquires another company operating in the same industry but in a different center of gravity, and by doing this the acquiring company moves toward its suppliers / raw materials



*Figure 10. Six classes of acquisitions.*

Most existing studies have used the horizontal-non-horizontal dimension as well as related and unrelated categories. A second goal is to compare how moving in the value chain is rewarded, compared to staying in the same center of gravity.

In the horizontal vs. non-horizontal category, comparison can be made between class A (*horizontal*) and the sum of classes B, C, D, E, and F to represent non-horizontal acquisitions. On the other hand, comparison between unrelated and related categories can be calculated in a similar way, because classes C and D are unrelated (*unrelated forward* and *unrelated backward*), and the sum of classes A, B, E, and F to represents *related* acquisitions. This justifies classes A and B to form classes of their own, but the justification for separating C, D, E, and F comes from the literature in that downstream and upstream companies face very different business problems and tasks, which may impact on how the acquisition is received on the stock market and how it is communicated by the organization (e.g., Galbraith, 2002).

Downstream companies add value through advertising, product positioning, marketing, channels, and R&D. On the other hand, the purpose of upstream companies is to produce flexible, predictable raw materials, and intermediate products add value by reducing the variety of raw materials (Galbraith, 2002, pp. 227–228).

These classes enable comparison between moving forward and backward in the value chain as well as staying on the same level. A corporation's intention to move forward in the industry chain will then be represented by classes C and E, moving backward by classes D and F, and remaining on the same level by classes A and B.



*Table 4. Traditional related vs. unrelated and horizontal vs. non-horizontal acquisition categories can be compared by summarizing findings from different classes.*

Category comparison as a sum of classes	Category comparison as a sum of classes
Horizontal ( <i>class A</i> )	Non-horizontal $\Sigma(\text{classes } B, C, D, E, F)$
Related $\Sigma(\text{classes } A, B, E, F)$	Unrelated $\Sigma(\text{classes } C, D)$
Keeping the current center of gravity $\Sigma(\text{classes } A, B)$	Moving in industry chain $\Sigma(\text{classes } C, D, E, F)$
Moving forward in industry chain $\Sigma(\text{classes } C, E)$	Moving backward in industry chain $\Sigma(\text{classes } D, F)$

## 2.4. Efficient market hypothesis

In his article, Eugene F. Fama (1970) explained the link between information and corporate stock price. He proved in its simplest form that the corporate security price fully reflects all available information. This theory is called the efficient-market hypothesis (EMH). In 1970, he introduced the following three test categories:

- 1) weak-form tests – How well do past returns predict future returns?
- 2) semi-strong-form tests – How quickly do security prices reflect public announcements?
- 3) strong-form tests – Do any investors have private information that is not fully reflected in market prices?

The first EMH categories were discussed very extensively, and in 1990 Fama published a sequel entitled “Efficient Capital Markets: II.” The original three categories were replaced with new thinking, and the most interesting change was the semi-strong-form test category, which was reformed into *event studies*. He claimed that event studies give the most direct evidence of efficiency (in capital markets), and that the evidence is mostly supportive (Fama, 1990).

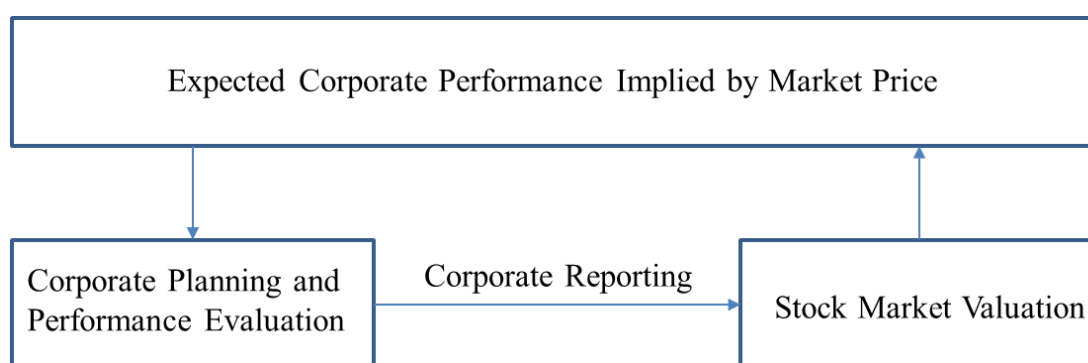
Though Fama’s theories have also been criticized since their publication and, e.g., recently (Baker & Nofsinger, 2010; Shefrin, 2008; Shiller, 2003; Shleifer, 2000; and Schijven & Hitt, 2012), this relation is a fundamental tenet in most event studies on implications of corporate share prices. In the management literature, the EMH was summarized by Bromiley et al. (1988). Although the EMH has been criticised, statements such as “stock markets can see through cosmetics” (Lee & Verbrugge, 1996), and that investor reactions are a reliable indicator of efficiency benefits have also

been voiced (Zajac & Westphal, 2004). Close attention is needed, because the event study method relies on the efficient market hypothesis. It establishes the needed connection between available information and stock prices. In short-term research, this has been shown to be a valid method to investigate corporate actions' implications for corporate market value, simplified as share price.

Because of the loads of criticism on EMH, we can start by analyzing some possible links between new information and stock price. If the EMH is not correct, the first analysis would show that there is no statistically significant abnormal return after an M&A event. If a link exists, the abnormal return would appear immediately after the announcement is released.

There are two major theoretical components in this research. First, the efficient-market hypothesis (EMH) provides a link between information and share price. The current security price reflects the accumulated value of all historical information released by the company and other available information on the market. The new information can be investigated in more detail. Based on the Efficient Market Hypothesis, as soon as new information is released, the impact can be measured in the stock price.

The same principle was also well described by Rappaport (1998) as companies announcing and reporting their performance and plan outcomes in their stock exchange and news releases (Figure 11). This strategy works as input for stock market valuation to generate expectations about future performance as defined by the market price of the publicly traded shares—which again works as input to corporate managements as a new benchmark for future performance (Rappaport, 1998). Rappaport states simply that “A company’s stock price is the clearest measure of market expectations about its future performance.”



*Figure 11. The linkage between corporate reporting, stock market valuation, and market price (Rappaport, 1998)*

Rappaport extends “information” to cover also company reports of future performance. If past information is separated from currently unavailable new information that is not yet in the share price, it is possible to write that

$$\text{Information}_{\text{now}} + \Delta\text{Information} = \text{Share price}_{\text{now}} + \Delta\text{Share price}$$

This study focused only on the delta ( $\Delta$ ) part of information and its implication to the  $\Delta$ Share price. The share price (or the difference in share price) is therefore a dependent variable (also known as explained variable or outcome variable), and information on mergers and acquisitions is an independent variable (a.k.a. explanatory variable or input variable). According to McWilliams & Siegel (1997), the new information should be instantaneously visible in the stock price, and with respect to firm-specific events, stock prices usually adjust to new information efficiently (Fama, 1990). In this study, the abnormal return was calculated from the company stock price by eliminating the market index and the company's expected price evolution calculated using its past performance.

## **2.5. Main hypotheses**

This section concludes the theory part and summarizes the theories discussed above. The hypotheses are examined further in the empirical section.

### **2.5.1. Investor reactions to M&A announcement**

As discussed above, companies seek to create value through mergers and acquisitions. Because by making acquisitions and mergers they are out for a new competitive advantage, companies can be categorized into different types to describe their strategic intentions to improve their current business.

The purpose of a company is to generate profits to its shareholders, and subsequently all management actions should focus on creating shareholder value (Rappaport, 1998; Sundaram & Inkpen, 2004). When a corporation takes M&A action, its management makes a very expensive strategic decision (Rappaport, 2006) to improve the corporation's strategic position (Brouthers et al., 1998), which may lower the corporation's ability to pay dividends in a short term though it improves its resources (Wernerfelt, 1984). These actions are difficult to reverse (Smith et al., 1992; Chen et al., 1992; Smith et al., 2001; Chen & Miller, 2012).

Corporations do sometimes fail to communicate their reasons for acquisitions, or the reasons may be vaguely expressed in the announcement, which may then negatively affect the stock price and subsequently the shareholder value. Studies have shown that unrelated mergers or acquisitions have not caused as positive an impact as expected, and they have been divested shortly after the acquisition. In divested businesses, related acquisitions dominate in volume. For example, over 70% of assets acquired in hostile takeovers ended up managed by firms in related businesses, whereas only 4.5% were sold to unrelated acquirers (Bhagat et al., 1990). The reason was that divested businesses were more valuable to the related buyer than to the unrelated buyer (Lubatkin et al., 1997). On the other hand, there have been discussions of the real

motives for mergers and acquisitions that had no impact on the shareholder value—not even a negative one. In many cases, the stock market cannot use acquisition information for unbiased adjustments to stock values at the time of the announcement or shortly thereafter, and long-term positive abnormal returns are non-visible at the time of the announcement, which has been seen as the negative side of short window event studies (Oler et al., 2008).

Though there may be management's personal motives such as empire building (Trautwein 1990) behind an acquisition, investors can expect management to improve the company's strategic position through acquisitions and hence create value in a way that the sum of the acquiring company and the target company is higher than the value of these companies individually (Singh & Montgomery, 1987). Lack of the real motive has been seen as one of the main challenges, because researchers cannot be sure if acquisitions are driven by a genuine profit motive (market power, efficiency, asset redeployment, market discipline) rather than managerial self-interest (hubris, empire building to justify increased compensation) (Haleblian et al. 2009). On the other hand, corporate executives have a strong incentive to show that their actions coincide with shareholders' interests (Walter & Barney, 1990).

Because the final motive or multiple motives are not released publically and can thus be only speculated afterwards, we can assume that the rational motive for corporate management is to maximize shareholders' wealth. Although M&A strategic action is an expensive way to grow, management can be expected to have evaluated the investment carefully, and investor reactions to the acquisition announcement can be assumed to be positive.

*Hypothesis 1. The abnormal return associated with the event of acquisition is expected to be positive.*

### **2.5.2. Related and unrelated acquisitions**

M&A actions can be categorized in multiple ways. One common way is relatedness between the acquiring and the target company. When the acquiring company has ongoing business with the target company, it can be said to be related. In some cases a vertical relation has been difficult to define, because especially large companies have relationships with multiple companies, and therefore some scholars have used a defined percentage to define a related connection between two companies. For example, Haleblian & Finkelstein (1999) determined that 5% of existing business between companies made them related.

Many studies have not used exact figures but defined relatedness generically (Singh & Montgomery, 1987). When a company remains in the same center of gravity and pursues its market power, it falls into the "related acquisition" category (Galbraith,

2002). Rumelt (1974) considered two companies to be related if they served similar markets through similar distribution channels or used similar production technologies or exploited similar scientific research. This means that a company remains in the same position also after an acquisition, because the acquired company is currently in the same position but in a different value chain. In this study, related diversification occurred when a company moved into new industries but within the same center of gravity (Galbraith, 2002).

When a company does not move from its current center of gravity but rather improves its competitiveness in its current strategic position, the strategic motive is likely either to acquire its competitor or pursue its market power (Brouthers et al., 1998). Jaffe (1986) and Cartwright et al. (1987) found that related acquisitions do reduce competition. This was shortly after Eckbo (1985) had found that horizontal acquisitions did not lessen competition. Salter & Weinhold (1980) combined both product market positions and acquisitions of key skills. Penrose (1959) introduced a resource-based view of corporate operations and noticed that a firm never fully reaches a balance in its use of company resources. Teece (1980) and Williamson (1975) found that from five alternatives (status quo, sale of resources in factor markets, contractual sharing of resources with another firm, expansion in present product markets or diversification) expansion and diversification were the most attractive ones.

In this study, all other acquisitions were categorized as unrelated, and in unrelated acquisitions, the relationship between the target and the acquiring company was not as apparent (Singh & Montgomery, 1987). These acquisitions can derive from many motives, because the definition is residual. However, the RBV increases the importance of an unrelated acquisition. An entry barrier without a resource position leaves the firm vulnerable to diversifying entrants, whereas a resource position barrier without an entry barrier leaves the firm unable to exploit the barrier (Wernerfelt, 1984). Therefore, a company may also create new barriers to entry when it limits a new technology to be used in the business and prevents competitors from pursuing it.

In related acquisitions, synergistic benefits through transfer of core skills between a bidding firm and a target firm should result in greater wealth, i.e., a higher share price than in unrelated acquisitions. In addition, partially, research on technology and relationship has shown that broadcasting and telecommunications company acquisitions have generated higher CARs than normal M&A events in Korea (Lee et al., 2011).

A vertical move can take place also in unrelated acquisition, when a company moves toward its customers or toward its suppliers and raw materials, but in a new value chain. Hence the company establishes a vertically integrated company to improve its position either in the market place or in the supply-chain network (Galbraith, 2002).

Although most studies have shown that related acquisitions produce a greater abnormal return, also contradictory results have been reported. Lubatkin (1987) found no significant difference in returns to bidding firm shareholders for strategically related and unrelated.

In unrelated acquisitions, increased efficiencies in technological or product market activities are more variable. Gains in unrelated acquisitions are expected to be positive, because all acquisitions should be rewarded positively, but lower than in related acquisitions, because the same gains that are available in unrelated acquisitions are also available in related acquisitions, but not vice versa.

Because there are both positive and no effects between a related and an unrelated abnormal return, the next research hypothesis is formulated as follows:

***Hypothesis 2.** The abnormal return associated with related acquisitions is higher than unrelated acquisitions.*

### **2.5.3. Horizontal and non-horizontal acquisitions**

The term *related* includes acquiring a company's former suppliers as well as customers in addition to the companies being in the same position, either in the same or in a different value chain. Lubatkin (1983) classified mergers into four categories and used the term *global benefit score* based on the expected performance outcome. His categories were vertical, conglomerate, horizontal and market conglomerate, and product concentric. These were classified based on their technical economies, pecuniary economies, and diversification economies. Product centric was rated highest due to technical and pecuniary economies (monopoly and monopsony economies), horizontal and market concentric were rated second highest due to technical economies, and both conglomerate and vertical received low scores. Although technical economies were seen as a superior merger type over the others, it was also noted that technical economies have never been proved empirically (Lubatkin, 1983). Also Rumelt (1974) found that horizontal and concentric mergers were more beneficial to shareholders than conglomerate mergers.

To separate vertical from horizontal moves, many researchers have made separated horizontal acquisitions a topic of its own, although the horizontal merge type has often been combined with market concentric (Lubatkin, 1983, 1987). A horizontal acquisition takes place when the acquiring company acquires a direct competitor. This was studied, e.g., by Oler et al. (2008), and they stated that short-term abnormal returns are higher for horizontal acquisitions than for non-horizontal acquisitions. Similar results were found in a study of Internet company acquisitions by Internet companies (online-online), which resulted in higher abnormal returns than online company acquisitions by

offline companies (Uhlenbruck et al., 2006). This pattern has been shown also more widely in the world, e.g., in China (Gaur, et.al., 2013) and Korea (Lee et al., 2011).

Clougherty & Duso (2009) argued that horizontal M&As result in reduced competition, which increases the market power for the acquirer. Although companies seek for an improved market share through horizontal acquisitions, this did not decrease competition in reality (Eckbo, 1985).

In addition to the higher short-term abnormal return of horizontal acquisitions, Oler et al. (2008) proved the opposite to be true, but only with a long event window. They proved that non-horizontal acquisitions are valued more in the long term than horizontal acquisitions. They also found that positive reactions to horizontal acquisitions became more common as the number of horizontal acquisitions increased.

Long-term impacts were also studied by Loughran & Vijh (1997), who found a lower return on horizontal acquisitions than on non-horizontal acquisition in the long term. They also observed a similar pattern among target shareholders: those who sold out their stock soon after the acquisition effective date gained from all acquisitions, whereas those who held on to the acquirer's stock received as payment found their gains diminished over time. This could not be verified in this study, because the research time was very short, and because the target was neither to prove a long-term high return for non-horizontal acquisitions nor a low impact of several consecutive horizontal acquisitions but to focus on a short event window. Consequently, the third hypothesis reads as follows:

***Hypothesis 3.** The abnormal return associated with horizontal acquisitions is higher than that associated with non-horizontal acquisitions.*

#### **2.5.4. Moving to a new center of gravity**

The orthogonal direction to a horizontal move is a vertical move. In terms of vertical mergers, the Federal Trade Commission defines vertical as a merger in which a buyer-seller relationship exists or could exist between two firms (Walter & Barney, 1990). In a vertical move toward customers, there is no single motive in their definition, but many economic motives can be associated with this category such as marketing, economies of scales, increase profitability, and respond to market failures, to name a few.

Vertical integration has been studied widely and industrial organization economics suggests that firms in markets dominated by a few players have an incentive to integrate by moving into adjacent fragmented stages. The main motivation for vertical integration is market asymmetry (Chatterjee, 1991). Several examples can be found; e.g., since the late 80's and early 90's, both Intel and Motorola have moved forward to minicomputer markets, and many companies have moved from pure product centric markets to service markets. These include most of the largest technology companies such as Kone, Nokia,

and Wärtsilä in Finland, to name a few. Fan & Goyal's (2006) vertical merger studies based on a three-day event window showed that a vertical acquisition created the same level of abnormal return than horizontal mergers.

Lubatkin (1987) looked at the market value implications of vertical mergers, but his study covered a long-term event window of 18 months and no reactions in the short term. Chatterjee (1991) looked at daily returns and found a correlation between market power and production efficiency. A major benefit to the acquiring company was when its production stage had high market power and when the target firm was in a relatively competitive industry. On the other hand, a company's move to a new position in the value chain indicates a change in its economic logic (Hambrick & Fredrickson, 2005), and the move benefits from the strong position before the acquisition.

Previous hypotheses have been a combination of vertical move and horizontal move, and horizontal acquisition types have not captured acquisitions when an acquiring company acquires a target company from another value chain but in the same position. Therefore, it is necessary to cover all six acquisition classes so that related forward acquisitions are calculated with an unrelated forward move, such as a conglomerate acquisition, while moving closer to customers.

The term *conglomerate* describes a merger or acquisition event between two non-competing businesses, which possess different production, marketing, and research technologies (Lubatkin et al., 1997). Conglomerate mergers have been studied since the 1960s merger wave, the so-called conglomerate wave, when acquirers bought targets from outside their main industry (Oler et al. 2008). The performance of most conglomerates was poor and apparently divested into separate businesses (Gaughn 2002).

Alternatively, when companies remain in their current position, they do either horizontal acquisitions or acquire related companies from a different value chain, but in the same position. Then they normally seek economies of scale (Salter & Weinhold, 1979; Rumelt, 1974), economies of scope (Teece, 1982; Williamson, 1979), and market power (Shepherd, 1970). Because all horizontal acquisitions represent remaining in the current center of gravity, they should be rewarded better than when they move to a new position in the value chain or value network. The same definition can be used, because unrelated acquisitions represent the company's intention to move to a new center of gravity, but not vice versa.

To conclude these definitions, the next hypothesis distinguishes between the company's move in the value chain and its intention to remain in the value chain.



***Hypothesis 4.** The abnormal return associated with an acquisition indicating a move to a new center of gravity is lower than a company's acquisition in the same center of gravity.*

#### **2.5.5. Moving closer to customers or closer to raw materials**

In this study, a vertical merger was divided into two directions, vertical forward and vertical backward. When a company moves in its current value chain, i.e., acquires its supplier or vendor with whom it is already in business, the acquisition category is vertical acquisition. A forward move occurs when a company moves closer to its customers, and, conversely, when a company moves closer to raw materials in the current value chain, the acquisition is categorized as vertical backward. Chen (2001) found that pricing incentives change in both types of acquisition when a downstream company makes a vertical acquisition and when an upstream company makes a vertical acquisition. Subsequently, the pricing incentive for competitors also changes. In the 1950's and 1970's, vertical mergers were seen as harming competition, but in the 1980's, the Chicago-School offered a new view, in which vertical mergers were considered to be completely neutral or even procompetitive. The current view is that vertical mergers may have a significant effect on anti-trust cases.

A vertical backward acquisition can be called a strategic motive to acquire, e.g., raw materials (Brouthers et al., 1998). When a company moves toward its suppliers, the move can be perceived as defensive to protect, e.g., its access to raw materials, components, and modules used in production or as gaining efficiency in the supply network. On the other hand, the purpose of upstream companies is to produce flexible, predictable raw materials, and intermediate products add value by reducing the variety of raw materials (Galbraith, 2002). Fan & Goyal (2006) estimated that vertical mergers are more likely when firms with relationship-specific assets face increasing demand or supply uncertainty, and when their market structures become more concentrated and therefore more prone to bilateral bargaining situations. Therefore, vertical integration (backward) can be seen as an ownership arrangement, which allocates residual control rights over production decisions. A vertical acquisition backward could be categorized as a less risky move, because the company knows the customer requirements in its new position because it has been there. This move has another impact, because the old competitors may now become customers of the new extended company. This may also pose threats due to anti-trust legislation and existing commitments in delivering components to previous competitors even at the same price level. In the long term, a previous competitor may move to use other suppliers' deliverables, and the value of the acquired company may thus decrease. Chatterjee (1991) combined the vertical industry move backward with Porter's (1980) strategic forces by stating that if entry barriers are low, vertical integration does little to further reduce the threat of new entries, so a firm might as well not integrate. Instead, it can use its market power to decrease input prices

or raise output prices and avoid losing its strategic flexibility as a result of integration. Chen (2001) found that a firm can raise its rival's cost through vertical integration if and only if its own cost is reduced through integration. Haleblan et. Al. (2009) called it an efficiency move when a company tries to reduce the cost side of value creation and to increase efficiency.

Generally, a vertical move toward customers is seen as expansive, opportunistic, or offensive and as a trial to expand into a new market. Haleblan et al. (2009) called it a market power move when a company attempts to appropriate more value from customers. Chatterjee (1991) proved that if market power is the predominant motive behind vertical integration, gains to the acquiring firm and to other incumbents in its stage should correlate positively. Therefore, vertical integration toward customers benefits all firms in the market place.

Currently, many companies are pushing to be more customer-oriented, and growth toward a services domain has been popular recently. Therefore, it is interesting to see if also moving toward company customers has been rewarded by a higher abnormal return. Becoming a more downstream company would require other types of resources, because they add value through advertising, product positioning, marketing, channels, and R&D (Galbraith 2002). A company's move toward its customers should result in a higher abnormal return, because it can be considered an opportunistic move to expand into new markets and a possibility to control its own destiny and to become better in taking into account customer requirements. On the other hand, moving toward customers increases the uncertainty of understanding the needs of the new location in the industry chain, and it can thus be judged a riskier move than moving toward the company's own suppliers. In some cases, when a company moves toward its customers, the previous customers become new competitors, and the market position may suffer—at least in the short term. In the hypothesis no. 5 the upstream move is defined as an acquisition when a company is making an acquisition of a company closer to its current suppliers and raw materials. Similarly a downstream acquisition is defined as company's move to its current customers.

***Hypothesis 5.*** *The abnormal return associated with a downstream acquisition is higher than that associated with an upstream acquisition.*

### **3. RESEARCH METHOD AND DATA**

The most common research format for studying the impact of corporate actions on a stock market is quantitative research, in which the dependent variable is the corporate stock market. Though also qualitative methods can be used to measure a perceived impact and the subjective behavior of investors, quantitative research is the more often used. A quantitative method is suitable in a context where the dependent variable is stock price, because it is an objective way to measure the impact directly in the stock price. Statistical methods are often used to support hypotheses in quantitative measurements of changes in the stock price. Hypothesis creation relies on previous research on the same topic or similar research on corporate actions' market impact. In most cases, not only statistical methods are used, but changes in the stock price are measured on individual security level; therefore, the nomothetic approach is selected, whereby a typical response is based on the past research and hypotheses are created. After that, hypotheses are verified with empirical data. Such nomothetic study is called a hypothetico-deductive scientific method to either support or reject a hypothesis. This is most often used in these studies and was also selected for this dissertation.

#### **3.1. Research process**

This study made use of three main methods: content analysis, event study analysis, and statistical analysis to compare different merger types and day-level and transaction level methods.

An announcement released by the corporation has two main parts. First, it includes a date, time, and information about the releasing company. This information can be called the header part (ID). The release has also its content (Data).

Header Information ID is defined in a way that uniquely identifies this information from other available information. In this study, the ID had three parts, which were enough to identify an event uniquely:

- Company stock identification  
(ISIN – International Security Identification Number)
- Date
- Time

The content part of the information (press and stock exchange release) describes the action the corporation is taking or other information it wants to release. The content

analysis method was used to analyze this part (Neuendorff, 2002). It describes how to analyze release semantics in a scientifically reliable way. This is the first method in this study to describe analysis of content.

The second method used in this study was event study analysis, commonly used to describe an announcement's impact on corporate value, i.e., the stock price in this study. Both content analysis and event study are described in detail in the following sections.

### **3.1.1. Content analysis method**

In this study, content analysis derived from Neuendorf's (2002) guidebook on how to run a content analysis. Hers was a six-step definition of content analysis. To become a reliable analysis method in a scientific environment, content analysis must provide an objective approach. It offers a way to analyze information and a possibility to explain a phenomenon without observer bias. Because all human inquiry is inherently subjective, content analysis tries to remove the subjective part with an accurate coding of the studied phenomenon to give the researcher an intersubjective method for research. This criterion is called *objectivity-intersubjectivity*. The next criterion is *A Priori Design* (i.e., before the fact), which defines a method that requires all decisions on variables, their measurement, and coding rules to be prepared before observations begin. In human coding, the codebook and coding must be constructed in advance. For good *reliability* in content analysis, two or more human coders are required for intercoder reliability. In this study, corporate stock and press releases were collected from two independent sources, and M&A actions were filtered using three coders to achieve good reliability.

*Validity* must be achieved to ensure that the measure represents the object the researcher wants to study and not something else. This was achieved by using only two channels of input, i.e., official corporate stock releases and official corporate press releases. A rumor about an acquisition or merger was ignored, if the company did not officially state the fact in their press release. *Generalizability* describes how well the research is able to represent a pattern, e.g., an outside Finnish stock release or in a time dimension outside its investigation window of five years (2006–2010). *Replicability* of the study ensures that the study can be repeated in another context or with another set of data to check if similar results can be reached. Each hypothesis was tested deductively, which required that both hypotheses and research questions be posed before data was collected.

### **3.1.2. Event study method**

Because acquisitions and mergers are complex transactions, and because the causality between an acquisition event and corporate stock value is ambiguous, studies have questioned the suitability of event study as a method for merger and acquisition events (Zollo & Singh, 2004). In fact, Zollo & Singh also wanted to investigate the qualitative

impacts of an acquisition and event study as a suitable method. On the other hand, other studies have shown a strong positive correlation between abnormal stock returns and post-merger increases in operative cash flows (Healy et al., 1992). Though Zollo & Singh (2004) explained that financial markets cannot anticipate and incorporate enough information at the time of acquisition announcements, an event study focusing on a cumulative abnormal return is not an appropriate method. Two years later, Halebian et al. (2006) used an event study in their research of the same event, i.e., acquisitions and mergers in the US banking industry. Despite this debate and criticism, the event study method has been used to measure the abnormal return on strategic actions such as M&A.

McWilliams & Siegel (1997) defined three basic prerequisites for a reliable event study: (1) markets are efficient, (2) the event was unanticipated, and (3) there were no confounding events during the event window. They also stated that this was not an exhaustive set of issues, as there may be industry- and size-related factors, but that the method was the best available at the time. The method has also been criticized in strategic actions such as M&A events (Bromiley et al., 1988), yet it is commonly used.

In this study, the ten-step recommendation of conducting an event study was used (McWilliams & Siegel, 1997, p. 652). These steps are as follows:

- Step 1:* Define an event that provides new information to the market.
- Step 2:* Outline a theory that justifies a financial response to this new information.
- Step 3:* Identify a set of firms that experience this event and identify the event dates.
- Step 4:* Choose an appropriate event window and justify its length, if it exceeds two days.
- Step 5:* Eliminate or adjust for firms that experience other relevant events during the event window.
- Step 6:* Compute abnormal returns during the event window and test their significance.
- Step 7:* Report the percentage of negative returns and the binomial value  $X$  or Wilcoxon test statistic.
- Step 8:* For small samples, use bootstrap methods and discuss the impact of outliers.
- Step 9:* Outline a theory that explains the cross-sectional variation in abnormal returns and test this theory econometrically.
- Step 10:* Report firm names and event dates in a data appendix.

These steps are discussed one by one in the following 10 sections.

### **Definition of an event that provides new information to the market**

The event chosen for this study was a corporation's intention to acquire another company or an announcement of a merger between two companies. Official press and stock exchange releases were used as the source for announcement data.

This information was considered new; i.e., in the study, the first intention to acquire was used as the defining point. Because of their complexity, merger and acquisition events require many arrangements before their completion. As a result, the acquiring company often announces first its intention to merge or acquire and later the completion date.

### **Theory that justifies a financial response to the event**

Numerous studies have shown that mergers and acquisitions create value, though others have shown the opposite. A positive relationship was found, e.g., by Salter & Weinhold, 1978; Porter, 1980; Lubatkin, 1983; and a negative effect by Singh & Montgomery, 1984; Elgers & Clark, 1980; and Kitching, 1967. Most studies admit that an M&A event is strategic, and that company management tries to achieve something with an action of this scale.

### **Company event date identification**

In this study, all data between January 1, 2006 and December 31, 2010 was collected. Because an event study needs a pre-event period to estimate trend data, the first date was 20 trading days after the stock opened in 2006. In practice, this means that the first event to be approved in the study took place on February 3, 2006.

### **Event window selection and its length justification**

This study embraced many times more data than in a normal event study, in which the abnormal return is calculated based on the security's closing price. The database contains a total of 68,827,956 transactions, which would give over 55,000 transactions per day, i.e., enough data for each day. If the smallest number of days (3) used earlier in the literature, i.e., [-1, 1], had been selected for the event study, over 150,000 transactions would have been recorded during that period. In comparison, less than 400 (3 \* the number of companies) transactions would have been recorded, if daily analysis had been employed. Three days are normally used in similar studies; hence it is justified to use even this narrow window, because otherwise the number of events would be reduced due to the confounding event definition. In daily analysis, which uses only the closing price, it is impossible to be 100% sure if an event affects its own date, because an announcement may occur after the stock market is closed, and because the impact would be visible in the next day's closing price.

In transaction level analysis, a 60-minute period was selected. The decision was based on research by Reboredo et al. (2012), who compared several non-linear models to study volatility dynamics in time intervals of 5, 10, 30, and 60 minutes. They studied both linear and non-linear models, and one finding was that a 60-min period yielded the best out-of-sample profitability for both high and low volatility sample periods.

### **Elimination and adjustment for firms experiencing other relevant events during the event window**

The window for an event should be set carefully, because small windows may miss early market reactions, whereas wider windows may have too many confounding events to influence the results (Haleblian & Finkelstein, 1999). A confounding event is another event that has an overlapping event window, i.e., these two events occur at the same time and have a temporal proximity that distorts pure event study results (McWilliams & Siegel, 1997). A confounding event is also called a contaminating event. McWilliams & Siegel also used certain criteria to categorize a confounding event to avoid too loose announcements limiting the number of study events. Only events such as declaration of dividends, announcement of an impending merger, signing of a major government contract, announcement of a new product, filing of a large damage suit, announcement of unexpected earnings, and change of a key executive are categorized as confounding events. On the other hand, events that have a direct impact on the stock value such as stock splits, releasing new shares, or invalidation of shares are not categorized as confounding events by McWilliams & Siegel. The definition is then questionable because some obvious events are excluded from research. Apparently, removing the impact of confounding events is necessary to ensure good reliability; research should take into account all types of events, but the number of samples would decrease. Therefore, in a study where it is possible to measure with high accuracy and by shortening the event window, the possibility of contamination from confounding events can be reduced. This leads to an increment in the number of events over the research period. The increased number of events should then increase the statistical reliability of the event study.

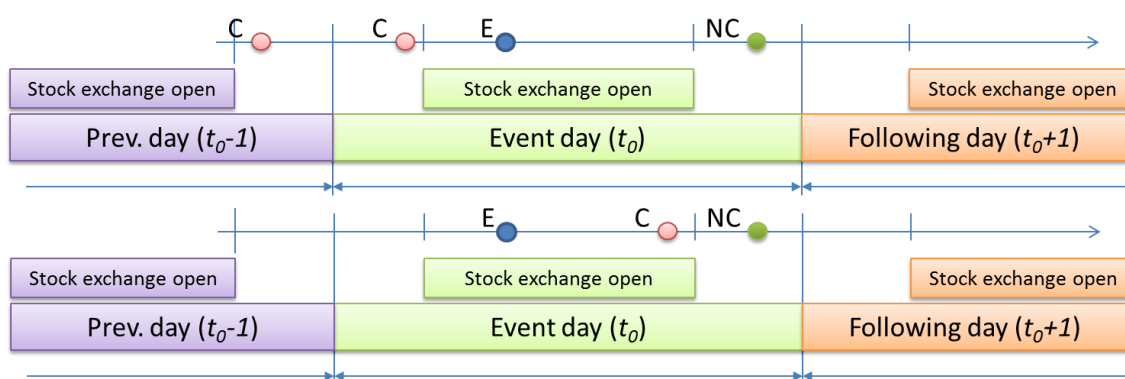
In this study, a confounding event followed Haleblian et al.'s (1999) definition within the event window as described in section 3.2.4. In practice, an event is rejected if one or more of the rules below are true (note that in this case a confounding event is not related to an M&A event):

- a. When an M&A event occurs during the stock closing time, there is no other confounding event after the previous closing time and before the next opening time.
- b. When an M&A event occurs during the stock opening time, there is no other confounding event before the M&A event during the same day.
- c. When an M&A event occurs during the stock opening time, there is no other event after the M&A event during the same day.

When this study used tick data values, it was possible to alter the final rule c) so that there was a certain time period before the following confounding event. This increased the sample size, because the impact from a confounding event appeared after the initial

event could be well isolated. On the other hand, one target of this study was to compare the findings between the daily analysis method and the transaction-based method, and that is why the same confounding event definition was used with both methods.

When the observed M&A event occurs during the trading day, the case is simple, because all events that occur before the next stock exchange closing time will be contaminated. The same contamination applies to those events that have taken place after the previous closing time even in previous day. An M&A event taking place during the trading day is illustrated in Figure 12. In the figure 12 the M&A event is shown with a letter “E”, confounding events with “C” and non-confounding events with “NC”.



*Figure 12. When an M&A event occurs during the stock trading hours, a confounding event C may occur either before the event day  $t_0-1$  or during the same day  $t_0$  but not after the event day  $t_0-1$ .*

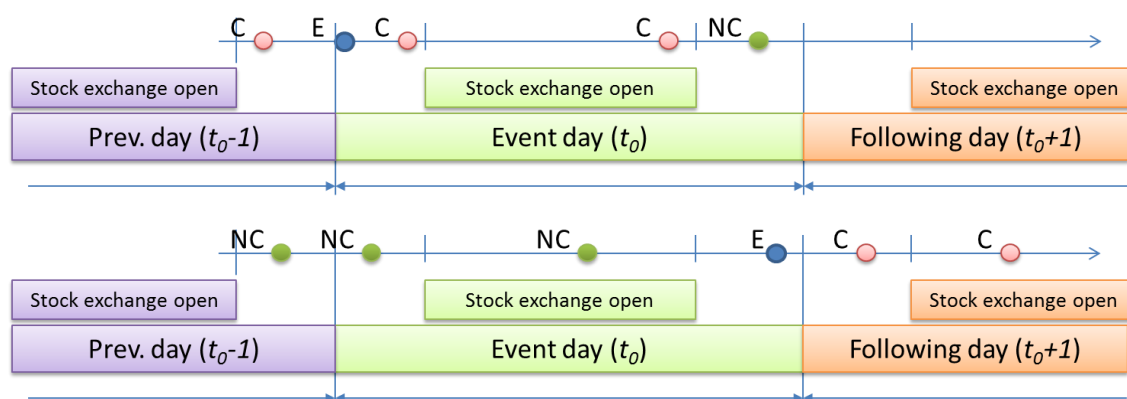
There are two possibilities when an M&A event occurs outside the trading day. Figure 13 shows rule a), where an M&A event occurs during the closing time either before the stock exchange is open a1 or after the exchange has closed a2.

In the first case a1, the contamination happens to events taking place after the previous closing date, even if the observed event happened during the next day.

In the latter case a2, contamination happens to the events during the same day or the following day.

Both of these cases a1 and a2 are shown in figure 13. The M&A event is shown with a letter “E”, confounding events with “C” and non-confounding events with “NC”.





*Figure 13. Confounding events C may occur either during the event day  $t_0$  or after the event date  $t_0+1$ . In addition, non-confounding NC events may exist during the same day either before the event E or after the event E.*

As can be seen, the definition of confounding event depends on the event time and the confounding event date and time. In case of longer periods such as public holidays and weekends, the rules are the same, but the stock closing time is extended to cover multiple days.

### Abnormal return computation during the event window and testing its significance

As identified earlier, an event is either an acquisition or a merger initiated by a company listed on the Helsinki Stock Exchange OMX. This price change is studied around an event window, as explained in the previous section, and calculation is based on the Capital Asset Pricing Model (CAPM), developed by William Sharpe and John Lintner (Sharpe, 1964; Lintner, 1965). In the dissertation, calculations were based on Campbell's formulas on CAPM (Campbell, 1997).

A stock price change is also called an abnormal return of an event, and it is calculated as the difference between the observed return of the stock and the predicted or normal return of the stock. Return is considered the price of the stock on the market. Hence the impact of an acquisition or merger event is measured by the part of the return that is unanticipated by an economic model of anticipated, normal returns. This can be formulated as follows (Campbell et al., 1971, p.155):

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

where

$R_{it}$  = the rate of return on the share price of firm  $i$  on day (time)  $t$

$R_{mt}$  = the rate of return on a market portfolio of stock (such as OMXH or a market index) on day  $t$

$\alpha_i$  = intercept term

$\beta_i$  = the systematic risk of stock  $i$   
 $\varepsilon_{it}$  = the error term, with  $E(\varepsilon_{it}) = 0$

Estimating the above equation, we can derive an estimate of daily abnormal returns (AR) for the firm  $i$  using the following equation:

$$AR_{it} = R_{it} - (a_i + b_i R_{mt})$$

where  $a_i$  and  $b_i$  are the ordinary least square (OLS) parameter estimates calculated from the regression  $R_{it}$  on  $R_{mt}$  over an estimation period of  $t$  preceding the event (McWilliams and Siegel, 1997). We can assume that  $\alpha_i$  and  $\beta_i$  are stable and calculated during an arbitrary estimation period. The length of the estimation window varies from a couple of days to even a couple of hundred days (-300,-61) (Haleblian, 1999).

Abnormal return is the basis of event study analysis, but to draw conclusions on the overall impact of events, we must calculate aggregated results over time and securities. Thus, in addition to abnormal return, other returns are calculated based on the abnormal return. First, the aggregation through time is calculated by Cumulative Abnormal Return (CAR). CAR is calculated over the event window as a cumulative result of the sample period abnormal result. The sample period during this study varied between 1 minute and 1 day, but results were finally calculated based on a 5-min sample. Standardized Abnormal Return (SAR) and Standardized Compounded Abnormal Return (SCAR) were used, because they are standardized in terms of standard deviation. All of them were calculated based on the AR, and their relations are explained below.

Many researchers calculate the standardized abnormal return (SAR), where the return is standardized by its standard deviation (Dodd & Warner, 1983):

$$SAR_{it} = AR_{it} / SD_{it}$$

where

$$SD_{it} = \sqrt{\frac{S_i^2 \times (1 + \frac{1}{T(R_{mt} - R_m)^2})}{\sum_{t=1}^T (R_{mt} - R_m)^2}}$$

where  $S_i^2$  is residual variance from the market model as computed for firm  $i$ , and  $R_m$  is the mean return on the market portfolio calculated during the estimation period.

Then the Standardized Abnormal Return (SAR) is used to calculate the Cumulative Abnormal Return (CAR) over a time period  $k$ , which is called an event window. Hence the cumulative abnormal return for each firm  $i$  can be defined as

$$CAR_i = \sqrt{\frac{1}{k}} \times \sum_{t=1}^k SAR_{it}$$

and finally, the Standardized Cumulative Abnormal Return (SCAR) is

$$SCAR_{it} = \frac{CAR_{it}}{SD_{it}}$$

The null hypothesis can be tested using  $J_2$ , which is calculated from the SCAR as follows:

$$J_2 = \sqrt{\left(\frac{N(L_1 - 4)}{L_1 - 2}\right)} SCAR_{it}$$

where  $N$  is the number of securities,  $L_1$  constitutes the length of the estimation window  $T_1 - T_0$ . Using  $J_2$  assumes that the distribution of abnormal returns follows normal distribution. If they are not distributed normally, the non-parametric tests of J3 and J4 are used.

### **Report the percentage of negative returns and the binomial value X or the Wilcoxon test statistic**

The seventh step in the event study process is to report the percentage of negative returns in order to understand how well the distribution follows the normal distribution model. The Wilcoxon test statistics were selected, because they take into account the size of the abnormal return (Burton et al., 1999; Tsetsekos & Gombola, 1992). During the test, absolute abnormal returns are ranked from the lowest to the highest. The highest abnormal return gets the rank of the sample size. After ranking the whole sample, the original value of the abnormal return is attached to the rank, and the sum of all ranks is calculated to produce the Wilcoxon W. After that, the Wilcoxon W is converted to a Z-value and finally to the significance level of the abnormal return sample (Lowry, 2011).

### **Use bootstrap methods and discuss the impact of outliers**

Using bootstrap methods and finding the impact of outliers are necessary if the sample size is 30 or less (McWilliams & Siegel, 1987). In this study, the sample size was 362, which is much larger than 30, so this step was not necessary.

### **Outlining a theory that explains the cross-sectional variation in abnormal returns and testing this theory econometrically.**

The ninth and second-to-last step is to outline the theory that explains the cross-sectional variation in abnormal returns. This step was covered in section 2.8 main hypotheses and theories linked to different abnormal returns. The basic theory relies on testing different strategic moves in the corporate value chain and on acquiring new technologies or market presence from other value chains (Galbraith, 2002).

### Report firm names and event dates in data appendix

Official press and stock exchange releases from all companies were listed on the Helsinki Stock Exchange between January 1, 2006 and December 31, 2010. Companies listed during these five years were considered in this study; consequently, if a company appeared or disappeared during the period, it was counted in if it had an M&A event, and if its evaluation period and estimation period were within the five-year period. All the studied companies (122) launched their press and stock exchange releases in Finnish (and in English, except 22). Because the content study was based on Finnish releases, all Finnish releases were studied, plus some additional English releases from companies that publish theirs mostly in English.

A total of 101 companies made at least one merger or acquisition during the period, some with an English translation embedded in their annual report. Some companies disappeared from the stock exchange during the period and were taken into account if they had an M&A event before disappearing.

This study used event study theory for M&A events and compared previous articles on related and unrelated acquisitions, horizontal and non-horizontal acquisitions, and empirical studies on the Helsinki Stock Exchange.

Corporation stock releases record the exact date and time of the event  $\tau$ , which was used as a basis for defining the event windows. Definitions of the estimation window, pre-event window, event window, and post-event windows vary, and at least two definitions are often used. One covers an estimation window and three parts of event windows (MacKinlay, 1997) and the other an estimation window, an event-, and a post-event window (Campbell et al., 1997).

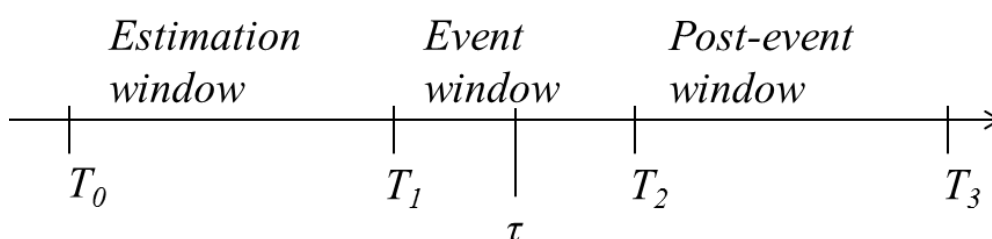
- estimation window ( $T_0 - T_1$ )
- pre-event window ( $T_1 - T_2$ )
- event window ( $T_2 - T_3$ )
- post-event window ( $T_3 - T_4$ )

Because this study focused mainly on a short event window and to increasing the accuracy of measuring M&A events'  $\tau$  impact around a corporate announcement, a decision was made to use Campbell's definition (Campbell et al., 1997). He used only

three steps and removed the pre-event window (or combined the estimation window and pre-event window) to produce

- estimation window ( $T_0 - T_1$ )
- event window ( $T_1 - T_2$ )
- post-event window ( $T_2 - T_3$ )

In both definitions, an event  $\tau$  takes place in an event window, but in MacKinlay's (1997) definition it occurs between  $T_2$  and  $T_3$ , and in Campbell's (1997) definition between  $T_1$  and  $T_2$ . All event studies have two mandatory components—estimation window and event window—which were also used in this study as well as Campbell's (1997) definition (Figure 14.). The post-event window was not included.



*Figure 14. Campbell's definition of the estimation window and event window was used in this research (Campbell, 1997).*

The two definitions are similar in two ways. First, estimation and event windows do not overlap, and, second, an event window is symmetrical in such a way that  $\tau - T_1 = T_2 - \tau$ . Many other types of event combinations are also used, whereas symmetrical event windows are rare.

### 3.1.3. Statistical models

When compounded abnormal returns have been calculated for different classes and categories, the next step is to compare the results for statistical significance. The J2 calculation is used for only an individual group, but when groups are compared, the basic statistical analysis model is ANOVA (Scheffe, 1952).

ANOVA, short for Analysis of Variance, compares two or more groups' means to find a statistical significance between the groups. Originally, it was developed by analyzing results in experiments on a scale of 7 or more points, but it can be used also to compare the means of two sample groups. If only two groups are compared, ANOVA can be replaced with the paired-samples T test. Both tests are parametric tests, and since the samples are independent, they are normally distributed and share an equal variance. For the last requirement, it is possible to use the SCAR instead of the CAR, because the former is scaled in terms of standard deviation.

If the distribution is not normal, non-parametric versions are used. The non-parametric version of ANOVA is the Kruskal-Wallis test (Kruskal & Wallis, 1952), and the similarly non-parametric version of paired samples T test is the Mann-Whitney U Test (Mann & Whitney, 1947). The Kruskal-Wallis is used for more than two samples and the Mann-Whitney U Test for two samples only.

## **3.2. Research data**

The research data consisted of press and stock exchange releases and company security transactions on the NASDAQ OMX Helsinki. Additional information related to the companies' background was collected from published annual reports and used mainly as control variables of company size, turnover, and profitability figures, if they were not explicitly mentioned in the press and stock exchange release.

### **3.2.1. Firms under study**

There were 122 publicly listed companies on the NASDAQ OMX Helsinki (previously known as OMX Helsinki) during the study period between January 1, 2006 and December 31, 2010 (see Table 5). All changes in company names, acquisitions and ISINs are described in Appendix B. An interesting detail is that also during the study period, the Helsinki Stock Exchange was acquired by NASDAQ on February 27, 2008, and the OMX Helsinki became the NASDAQ OMX Helsinki. Because the stock exchange itself was not listed on the stock exchange, it remained outside this study.

*Table 5. All companies included in the study.*

Affecto (LP)	Fortum	Nurminen Logistics (LP)	SRV Yhtiöt
Ahlstrom	F-Secure	Okmetic	SSK S.Sääst.Kiint. (LP)
Aktia	GeoSentric	Olvi A	Stockmann
Aldata Solution	Glaston	Oral Hammaslääkärit	Stonesoft
Alma Media	HKScan (LP)	Oriola-KD	Suominen
Amer Sports A	Honkarakenne B (LP)	Orion	Takoma (LP)
Aspo (LP)	Huhtamäki	Outokumpu	Talentum (LP)
Aspocomp Group	Ilkka-Yhtymä II	Outotec	Talvivaara
Atria (LP)	Incap	Panostaja (LP)	Technopolis
Basware	Innofactor	PKC Group	Tecnotree
Biohit	Interavanti	Pohjois-Karjalan Kirjapaino	Tectia
Biotie Therapies (LP)	Ixonos	Pohjola Pankki A	Tekla
CapMan	Kemira	Ponsse	Teleste
Cargotec	Keskisuomalainen	Pöyry	TeliaSonera
Cencorp (LP)	Kesko	QPR Software	Tieto
Citycon	Kesla A	Raisio V	Tiimari
Componenta (LP)	Kone	Ramirent	Tikkurila
Comptel	Konecranes	Rapala VMC (LP)	Trainers' House (LP)
Cramo	Lassila & Tikanoja	Rautaruukki	Tulikivi A
Digia	Lemminkäinen (LP)	Raute (LP)	Turvatiimi
Dovre Group	Lännen Tehtaat (LP)	Revenio Group	UPM-Kymmene
Efore (LP)	Marimekko	Ruukki Group	Uponor
ELCOTEQ	Martela A (LP)	Saga Furs	Vaahto Group (LP)
Elecster	Metso	Sampo A	Vacon
Elektrobit	Metsä Board	Sanoma	Vaisala A
Elisa	Neo Industrial	Sievi Capital	Viking Line
eQ	Neste Oil	Solteq (LP)	Wulff
Etteplan (LP)	Nokia	Soprano	Wärtsilä
Exel Composites	Nokian Renkaat	Sponda	YIT
Finnair	Nordea Bank	Solteq (LP)	Yleiselektronikka E
Finnlines	Nordic Aluminium	Soprano	Ålandsbanken
Fiskars	Norvestia	Sponda	

### 3.2.2. Content (Releases)

In this study, all data between January 1, 2006 and December 31, 2010 was collected. The company event date is the date (and time) indicated in the press or stock exchange release. Normally, the time was indicated as local Helsinki time (either Eastern European Time, *EET*, or Eastern European Summer Time, *EEST*). If the release announcement was shown in Greenwich Mean Time, *GMT*, or Coordinated Universal Time, *UTC*, it was corrected to the local time zone according to either UTC+2 (standard time) or UTC+3, when daylight saving time was used. This correction was necessary because stock transaction data always uses local time, i.e., *EEST* or *EET*.

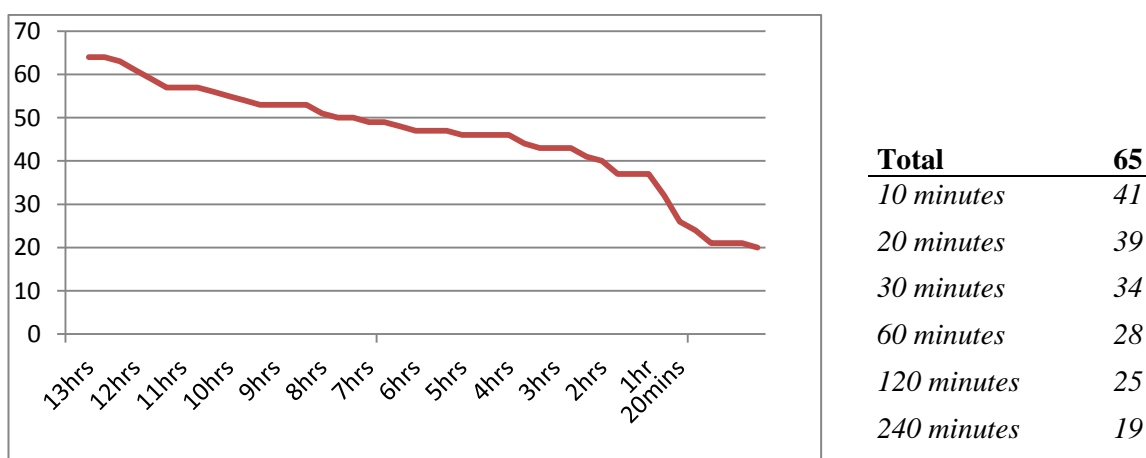
Previous studies have standardly defined the event date as the date when the announcement was released. This may, however, cause an error because the event may occur before the stock closing time or after it. In the latter case, the possible abnormal return is first visible on the following trading day. Consequently in this study, the time was taken into account, and it is thus possible to pinpoint the event more accurately on the correct date, or, more precisely, the aim was to monitor the right abnormal return if the event took place after the stock closing time. Additionally, public holidays and

weekends were taken into account in a similar manner as the nighttime between two stock trading days.

In practice, the stock trading clock is continuous time that consists of stock trading days in such a way that right after stock trading is closed, a new stock trading day begins. All events happening within the stock trading day carry the announcement's original date and time. Events that occur outside the stock trading day time are postponed until trading starts again; hence their observation date is the next trading day and the observation time 10:00:00 AM, when the stock market opens. The next trading day can be the same day if an announcement comes before the stock market opens, or the next day if the stock market opens the following day or some other day due to a long stock closing time at weekends or public holidays. For these reasons, the announcement date alone does not suffice for event studies but needs the event time as well.

During the study period, the number of valid press and stock exchange releases was a total of 548. First, all 65 confounding events were deducted from this number, as described in section 3.1.2. (confounding events are listed in Appendix A). Confounding events amounted to over 10%. Unfortunately, the long event window of 3 days accounted for a significant share of rejections. With the new method, confounding events could be decreased, as described in Figure 15. The table shows a calculation of confounding events that would have been lost had they been counted only in a narrow window. For example, with an event window of a total of 4 hours (+/- 2 hours), it is possible to investigate 19 more events. If the event window is reduced to 2 hours (+/- 1 hour), 25 more events could be added to a study.

The above comparison gives us a new approach to research, to reducing the number of rejected events because of contamination. This is important with small samples of relatively rare event types as well as in studying actions of large companies that publish several releases per day.



*Figure 15. Illustration of how the number of confounding releases drops when the event window is shortened from days to hours.*



After confounding releases have been removed from the data set, the next step is to delete the events that have no time information but only a date. Altogether, there were 73 such announcements. Although these could have been studied as part of daily analysis, they were useless for comparison. Hence they were rejected, because daily analysis was not a core element in this study.

The third issue that affects the number of releases is historical data during the estimation window. In this study, the 20-day estimation window was used; hence the first possible time to announce a release was February 3, 2006. Consequently, 13 events dropped out of the count.

Two more reasons caused events to be rejected. First, some had to be removed because the event time overlapped with another event and, second, because low stock trade numbers (very low volumes) interfered with satisfactory forecasting in abnormal return analysis. In summary, of 548 merger or acquisition announcements 362 events were valid for both analyses, and 33.9% of original releases were removed because of one or another of the above reasons.

- All M&A events: **548**
- Confounding events: **65**
- All events: **483**
- Null time in event time: **73**
- Date during weekend or holiday: **3 events (all null times)**
- Valid date & time: **410 M&A events**
- Time before the stock market opens: **139 events**
  - They were moved to 10:00:00
- Time after stock market closes: **3 events**
  - They were moved to the next stock date (one from Friday to Monday).

When daily closing values were used, there were three alternatives to interpret the events:

- 1) Before the stock market opened, i.e., 00:00 AM–09:59 AM
- 2) During the stock market, 10:00 AM–6:30PM
- 3) After the stock market closed, after 6:30 PM

Three different closing prices can be used, and their results differ if an abnormal return is observed. They are

- event days closing price at  $T_0$   
(This was the normal case in previous studies.)
- previous closing price from day  $T_0-1$
- next closing value at  $T_0+1$ .

Price information is continuous in such a way that all weekends and banking holidays are deducted from the observation period. This means that if an event takes place on a Monday or the day after a banking holiday, the previous closing value before the weekend and banking holiday is used. If the event occurs right before a holiday or weekend, the next market day closing value is used in a similar manner. In practice, this means that in case 1, when an event takes place before the stock market opens, the abnormal return is visible already in  $T_0$ , in a similar manner as if the event occurred during a stock market day, if the time of the event were “early enough” before the closing time. If an event occurs after the stock market closes, the abnormal return (AR) is visible in  $T_{0+1}$ .

Thus another parameter enables observation of either the previous day’s or the next day’s closing price. Observation of the next day’s closing price postpones all events to the next day’s stock price, regardless of the time of day, i.e., cases 1, 2, and 3. On the other hand, this may give misleading information in that if the next day’s closing price is used, the AR is not observed on the date the event takes place, but on the next day. This can be avoided by using the previous day’s closing price, when the event has its AR on the right day. In this study, the event day’s closing price was used, which in some cases gave misleading information but, on the other hand, also a reference to previous studies on the very subject. These alternatives are described in detail in Figure 16, where X, Y, and Z indicate the share price at the time the stock market was closed. Share price X stands for the event day-1 ( $t_{0-1}$ ), Y for the event day ( $t_0$ ), and Z is the closing price for the event day+1 ( $t_{0+1}$ ).

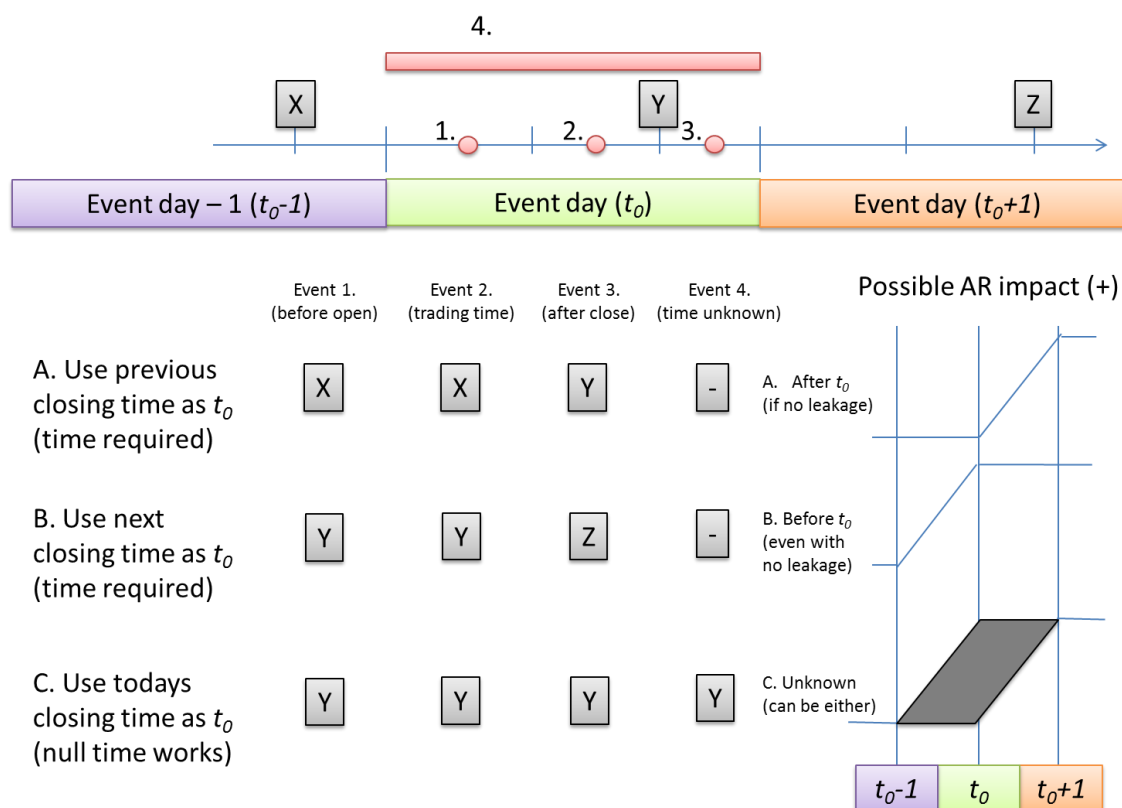


Figure 16. Daily closing events may pose challenges in abnormal return calculation.

### 3.3. Summary of the methods

First, all events were collected from both press and stock exchange releases, categorized into merger and acquisition actions, and triangulated with another source of information to ensure that all M&A events had been collected. Confounding releases, null time events, and irregularities were filtered to ensure that all events were valid.

When filtering was completed, all events were classified into six classes. In addition to this classification, events were evaluated based on three different parameters, i.e., if the target company was listed or not, if there was previous ownership in such a way that the acquiring company owned a part of the target company, or if the transaction was for the whole company or just for business.

Table 6. Initial results after triangulation

	Business	Previous ownership	Listed	Value chain	Moving
$P_x - P_y$	87,9%	93,6%	96,1%	85,8%	84,0%
$P_x - P_z$	96,4%	97,9%	96,4%	97,2%	92,0%
$P_z - P_y$	89,4%	95,1%	96,1%	85,3%	83,8%

Three persons compared the results, described with letters  $P_x$ ,  $P_y$  and  $P_z$ . During the first round of triangulation, they agreed on 91.8% of classes, as shown in Table 6. After a short discussion and further instructions for evaluation, full agreement was achieved on classification. The *value chain* in Table 6 represents a horizontal move. It has two alternative value steps, *same*, which describes the same value chain and *different*, which describes another value chain. The *moving* parameter has three alternatives, as it represents a vertical move. Hence, it had three alternative positions, *forward*, *backward*, and *same position*, which were coded into classes as follows (explained in detail in 2.5.3):

A.	Same value chain same position	<i>horizontal</i>	Class A.
B.	Different value chain same position	<i>related</i>	Class B.
C.	Different value chain forward move	<i>unrelated forward</i>	Class C.
D.	Different value chain backward move	<i>unrelated backward</i>	Class D.
E.	Same value chain forward move	<i>vertical forward</i>	Class E.
F.	Same value chain backward move	<i>vertical backward</i>	Class F.

Company security prices were collected from the transaction database using the ID part of the release (ISIN, Date, and Time), and the abnormal return was calculated with the estimated values of the security's evolution, which comprised the intercept term  $\alpha_i$  and the systematic risk of security  $\beta_i$ . Compounded abnormal returns for different classes were compared, and analysis of variance was made based on their standardized compounded abnormal return (SCAR).

Abnormal return was measured in two ways: by daily analysis using closing stock prices, which indicated changes on a day level, and by transaction-based analysis using tick data, which was summarized every minute during the stock day. Most literature references are to daily closing rates and only a few to transaction-based or even minute-level summary data research.

In the above procedure, two parallel tracks compare the hypotheses with both methods. Finally, the two methods are compared using statistical analysis to find out if any new information was revealed by using tick data analysis.

As described in 1.2., the research questions were as follows:

1. Does moving to transaction-level analysis reveal new information compared to day-level analysis in measuring investor reactions to M&A announcements?
2. Do announcements of different M&A types create different investor reactions?
  - a. related – unrelated
  - b. horizontal – non-horizontal
  - c. moving forward – moving backward
  - d. moving vs. staying in the current center of gravity

3. What other independent factors influence investor reactions to M&A announcements?

Research steps are summarized in Figure 17.

Daily analysis	Transaction level analysis	
Null hypothesis	Null hypothesis	
<b>Groups:</b> a. Related vs. unrelated b. Horizontal vs. non-horizontal c. Vertical forward vs. backward d. Moving vs. staying	<b>Groups:</b> a. Related vs. unrelated b. Horizontal vs. non-horizontal c. Vertical forward vs. backward d. Moving vs. staying	<i>Does moving to transaction-level analysis reveal new information compared to day-level analysis in measuring investor reactions to M&amp;A announcements? <b>J2, CAR</b></i>
<b>Classes &amp; Controls:</b> e. Related f. Unrelated g. Horizontal h. Vertical forward i. Vertical backward j. Merger / Acquisition k. Bear trend l. Bull trend m. Relational size n. Cultural proximity o. Publicly listed company p. Acquisition premium q. Price paid r. Profitability announced s. Pre-existing partial ownership position	<b>Classes &amp; Controls:</b> e. Related f. Unrelated g. Horizontal h. Vertical forward i. Vertical backward j. Merger / Acquisition k. Bear trend l. Bull trend m. Relational size n. Cultural proximity o. Publicly listed company p. Acquisition premium q. Price paid r. Profitability announced s. Pre-existing partial ownership position	<i>Do announcements of different M&amp;A types create investor reactions? <b>Kruskal-Wallis</b></i>  <i>What independent factors are influencing investor reactions and do transaction and daily-level analyses differ? <b>Multiple regression</b></i>
Comparison between daily analysis research and transaction based analysis on stock price		

*Figure 47. Research steps and final comparison of daily analysis and transaction-based analysis data.*

### 3.4. Variables used in the study

#### 3.4.1. Variables

This study had one main independent variable, a corporate release on merger and acquisition action. Such actions can be categorized into merger / acquisition or press / stock releases, but in this context, they represent only one variable, because mergers and acquisitions are very difficult, even impossible, to differentiate. A media selection press or stock exchange is often redundant, because the same release appears in both the press and stock exchange. Therefore, we can say that there is one independent variable: a corporate release on its acquisition.

The compounded abnormal return is a dependent variable, and it was calculated as defined in section 3.1.2. It is also quite straightforward to define, because the basic dependent variable is the abnormal return. On the other hand, the abnormal return is the

seed or origin of various other variables explained in the methods section. The company security's compounded abnormal return (CAR) is a dependent variable.

### **3.4.2. Control variables**

As mentioned above, mergers and acquisitions have been a very popular research topic over time, and many studies have examined the possible positive contributors to abnormal returns in mergers and acquisitions. Many studies have also focused on the outcome and reasons for the failure of mergers. At least the following control variables have been studied:

- Payment method (e.g. Loughran & Vjih, 1997; Hayward, 2002, Chakrabarti et. al., 2009; Haleblian & Finkelstein, 1999)
- Acquirer performance (Haleblian et.al., 2006; Haleblian&Finkelstein, 1999)
- Acquirer acquisition experience (e.g. Hayward, 2002; Oler et. al., 2008; Zollo & Singh, 2004; Haleblian et.al.; 2006)
- Acquirer debt-to-equity (Haleblian & Finkelstein, 1999)
- Defense tactics (Shijven & Hitt, 2012)
- Acquisition premium (Shijven & Hitt, 2012; Laamanen, 2007)
- Industry similarity (Hayward, 2002; Oler et. al., 2008; Shijven & Hitt, 2012; Gaur et.al., 2013)
- Trend data (Haleblian & Finkelstein, 1999)
- Involvement of the acquirer advisors (Shijven & Hitt, 2012)
- Pre-existing partial ownership position (Shijven & Hitt, 2012)

Based on previous studies (Shijven & Hitt, 2012; Oler et. al., 2008; Hayward, 2002; Haleblian, et.al., 2006; Dikova & Sahib, 2013; Chakrabarti, Gupta-Mukherjee, & Jayaraman, 2009; Laamanen, 2007; Haleblian et.al., 2006; Laamanen, 2009), this study used the following variables:

- Trend data in the stock market
- Relative size between acquiring company and target company
- Relative size class between acquiring company and target company
- Cultural proximity
- Domestic vs. International acquisition
- Publicly listed company
- Acquisition premium
- Acquisition price paid
- Target company's profitability
- Pre-existing partial ownership position
- Business acquisition vs. company acquisition
- Acquiring company's turnover class
- Announcement type press release vs. stock exchange release

The selected control variables represent a sample of the most commonly used variables, however some of the previously studied control variables like payment method were not chosen. This is mainly due to the missing information in press and stock exchange releases. Additionally several payment mechanisms and their combinations have been used M&A actions and they are not always visible at the time of an action. In this study, collected were those parameters that are normally easily available and mentioned in a company-initiated release.

### **3.4.2.1 Trend data**

Trend data is a control variable, because it is itself a variable of the results of the process. This means that the current market trend is to understand the implications of stock prices, which affect the index and the trend itself (Shijven & Hitt, 2012).

#### ***Bear and bull market definitions***

Normally, in the study of stock prices one major factor that has affected the return is the existing market trend. A rising market cycle is called the bull market and a declining trend is called the bear market. Normally, bull market impacts on the stock market have been positive and those of the bear market negative. Despite its popularity and the importance of a bull market, no consensus has been reached on its definition (nor that of the bear market) (Gonzalez et al., 2004). Many researchers disagree on the bull market definition and consider it an ex-post categorization of random data.

This study used the definition of Bry & Boschan (1971), according to which analysis starts by defining the turning points in the business cycle (peaks and troughs). Their quantitative definition was formulated to follow closely the qualitative definition of the NBER (National Bureau of Economic Research). In this definition, the peak signifies the highest market index value defined as a period of at least 6 months prior and 6 months after the point. Respectively, a trough is defined as the lowest value in a minimum period of twelve months (+/- 6 months).

The period between two peaks (or two troughs) is called a cycle. The minimum time for a cycle is 15 months calculated from peak – trough – peak or trough – peak – trough. This definition has an additional construct called phase. A phase is calculated as the time between two consecutive cycles of trough and peak (expansion) or peak and trough (contraction). The minimum duration of a phase is 5 months, defined such because cycle phases lasting for less than 5 months are generally of little economic or statistical value (Gonzalez et al., 2004).

There are also alternative and more complex methods to define bear and bull market cycles. For example, Maheu & McCurdy (2000) applied a Markov regime-switching model with duration dependence. In this instance, bull and bear markets are defined as high-return stable states and low-return volatile states, respectively. Turner et al. (1989)

found that excess returns can be modeled using a mixture of normal densities with different means and variances. Hamilton & Lin (1996) examined the joint behavior of stock returns and industrial production and found that economic recessions are the primary factor driving volatile stock returns.

### ***NASDAQ OMX Helsinki cycles between 2006 and 2010***

By the above definition, the period between January 1, 2006 and December 31, 2010 consisted of 1,257 trading days, out of which 430 (34.21%) were in the bear market cycle and 827 in the bull market cycle (65.79%). Though this study shows roughly a 65%/35% division, the bull market cycle, in fact, started before January 1, 2006 and continued past December 31, 2010. If we study the two full cycles (June 13, 2006-March 6, 2009) and (October 31, 2007 to April 7, 2010) closely, we can observe that the market was in the bull cycle 51% and 45% and in the bear market 49% and 55%. Hence we can say that the long and steep bear market cycle between October 31, 2007 and March 6, 2009 differed significantly from average cycles. For comparison, the New York Stock Exchange's (NYSE) average length (1800-2000) of a bull market cycle was close to 21 months and that of the bear market 15 months (Gonzalez, 2005), yielding a 40% to 60% ratio for the two.



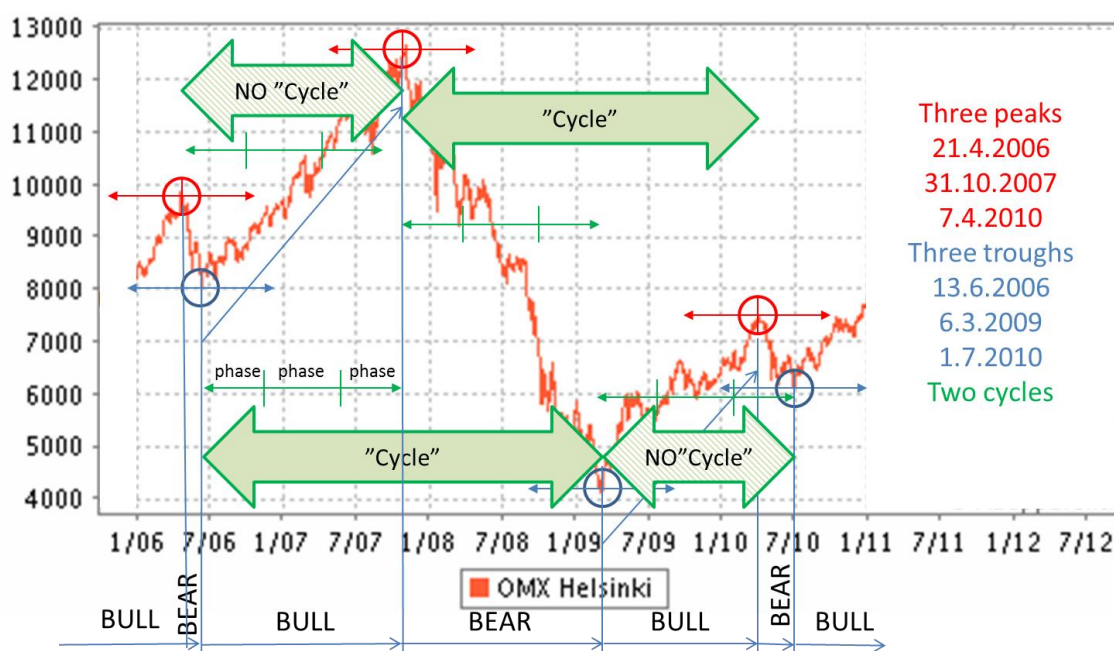
*Table 7. The Helsinki stock exchange has been more volatile in bear and bull market periods than the NYSE DJI (Nasdaq, Yahoo).*

	OMX (OMXHI)			NYSE (DJI)		
	From	To		From	To	
BEAR	9853,03	8032,03	-1821,00			
peak - trough	21.4.2006	13.6.2006	53			
BULL	8032,03	12525,87	4493,84	10667,39	14164,53	3497,14
trough - peak	13.6.2006	31.10.2007	505	20.1.2006	9.10.2007	627
BEAR	12525,87	4110,31	-8415,56	14164,53	6547,05	-7617,48
peak - trough	31.10.2007	6.3.2009	492	9.10.2007	9.3.2009	517
BULL	4110,31	7452,62	3342,31	6547,05	11205,03	4657,98
trough - peak	6.3.2009	7.4.2010	397	9.3.2009	26.4.2010	413
BEAR	7452,62	6134,78	-1317,84	11205,03	9686,48	-1518,55
peak - trough	7.4.2010	1.7.2010	85	26.4.2010	2.7.2010	67
BULL	6134,78	7897,95	1763,17	9686,48	12810,54	3124,06
trough - peak	1.7.2010	12.1.2011	195	2.7.2010	29.4.2011	301
AFTER RESEARCH PERIOD						
BEAR	7897,95	5367,04	-2530,91	12810,54	10655,3	-2155,24
peak - trough	12.1.2011	19.9.2011	250	29.4.2011	3.10.2011	157
BULL	5367,04	6291,35	924,31			
trough - peak	19.9.2011	20.2.2012	154			
BEAR	6291,35	4802,12	-1489,23			
peak - trough	20.2.2012	4.6.2012	105			
BULL (TODAY)	4802,12	5465,55	663,43	10655,3	13596,93	2941,63
trough - peak	4.6.2012	28.9.2012	116	3.10.2011	28.9.2012	361
RESEARCH PERIOD						
BULL SUM		63,5 %	1097		69,7 %	1341
BEAR SUM		36,5 %	630		30,3 %	584
AFTER RESEARCH PERIOD						
BULL SUM		43,2 %	270		69,7 %	361
BEAR SUM		56,8 %	355		30,3 %	157
TOTAL						
BULL SUM		58,1 %	1367		69,7 %	1702
BEAR SUM		41,9 %	985		30,3 %	741

Unlike, in the NYSE DJI index, a long period of contraction occurred after this study period. Because of a difference in banking holidays, this comparison used local US and Finnish trading days.

A steep fall in the stock market similar to that in the NYSE and the NASDAQ OMX Helsinki could also be observed between October 2007 and March 2009. The NYSE recovered almost completely, because its today's index is 96.0% of the DJI peak on October 9, 2007, but the NASDAQ OMX Helsinki's current OMXHPI is only 43.8% of its peak on October 31, 2007.

As shown in Table 7, a major difference between the NYSE and the NASDAQ OMX Helsinki was that though they hit a trough almost at the same time, the NASDAQ OMX Helsinki has not recovered to its previous level, but the NYSE even surpassed the all-time high of 2007 in 2013. In the NYSE, the average ratio of bear to bull markets has been almost constant, but in the NASDAQ OMX Helsinki, the bear market cycles have lasted longer with bull market cycles extending close to 21 months and an average bear market to 15 months.



*Figure 18. Peaks and troughs according to Bry & Broschan's definition (OMXH Kauppalehti)*

Pagan & Sossounov (2003) adapted the original Bry & Boschan (1971) algorithm and made two major improvements: the smoothing algorithm was not used, and the local peak and trough period was extended to 8 months, instead of 6 months used by Bry & Boschan. Though these changes sound minimal, they appear to have changed the number of peaks from 3 to 2 and the number of troughs from 3 to 2. Canova (1994) stated that a cycle should last at least 16 months instead of 15, and he shortened the minimum phase from 5 to 4 months. An additional definition was added so that if the index change was larger than 20% in a month, then the 4-month cycle definition was ignored and the phase was defined. This was because of rapid short-term changes during the 1990s, and because the total number of cycles dropped from 2 to 1 in the period.

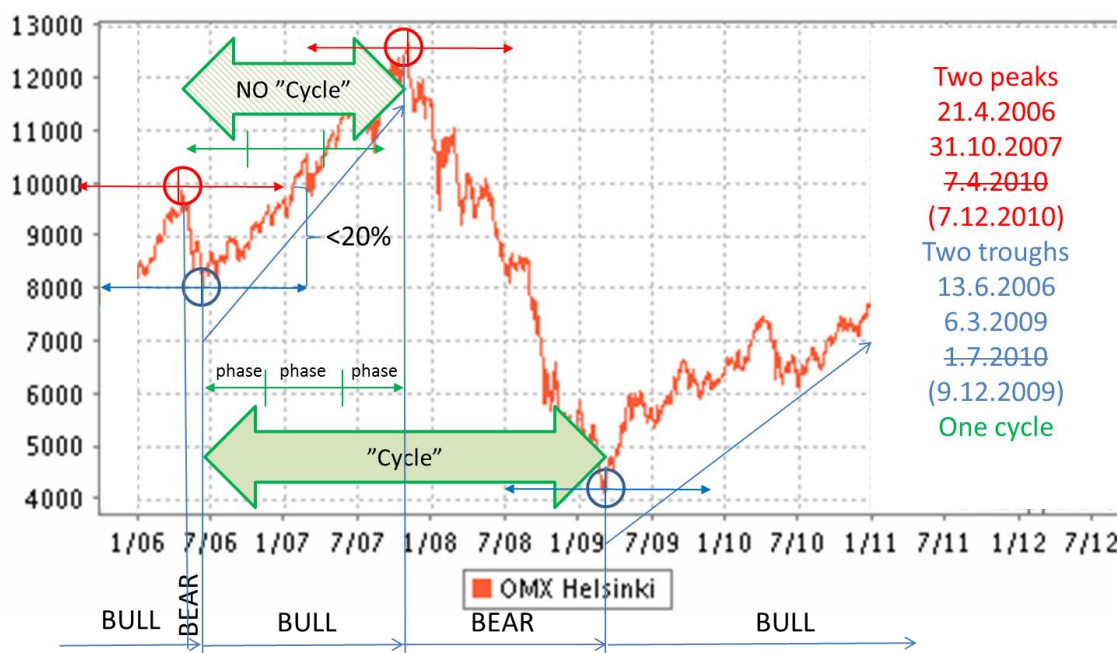


Figure 19. Peaks and troughs according to Pagan & Sossounov (OMXH Kauppalehti).

### 3.4.2.2 Relative size

Several studies have found that when an acquisition reaches a certain size, the performance of the acquiring company slackens; therefore, it is interesting to see if the relational size both in terms of employees and turnover has any impact on the market's reaction time to an acquisition announcement (Zollo & Singh, 2004). Normally, one of these three cases can be measured based on the announcement if either the relative size of employees, turnovers, or profits is mentioned (e.g. Oler et. al., 2008; Hayward, 2002; Haleblan, et.al., 2006).

Relative size can be illustrated according to the following formula:

$$S_{rel} = \max\left(\frac{E_t}{E_a}, \frac{T_t}{T_a}, \frac{P_t}{P_a}\right)$$

where

$S_{rel}$  is the relative size between the target company  $t$  and the acquiring company  $a$

$E$  is the number of employees at the time of a release

$T$  is the turnover at the time of a release

$P$  is the profit at the time of a release

The time of a press or stock exchange release is the time when the release is published and when the parameter is written in the release; however, if the release does not include a size definition, the size parameter of the acquiring company is taken from the

previous annual (or quarterly, if available) report. If the target company's size information is not released, it is taken from the next annual report, if the acquisition details are explained. The difference here is justified because in most cases the acquiring—publicly listed company—announces its current size, turnover, and profit based on the previous public announcement, i.e., often on the previous quarterly or annual release.

If the relation is  $<100\%$ , it means that the target company is smaller than the acquiring company, and when the relation  $>100\%$ , the acquiring company is smaller than the target company.

### 3.4.2.3 Relative size class

When we analyze the relational size by one number defining the relative size, the next step is to build size classes. This category is divided into size classes as follows:

- |  |         |
|--|---------|
| 1) 0% size class not measurable                              | [N=61]  |
| 2) 1% size is between 0% but less than equal to 1%           | [N=109] |
| 3) 2% size is larger than 1% but less than or equal to 2%    | [N=27]  |
| 4) 3% size is larger than 2% but less than or equal to 3%    | [N=23]  |
| 5) 5% size is larger than 3% but less than or equal to 5%    | [N=22]  |
| 6) 10% size is larger than 5% but less than or equal to 10%  | [N=30]  |
| 7) 50% size is larger than 10% but less than or equal to 50% | [N=44]  |
| 8) $>50\%$ size is larger than 50%                           | [N=13]  |

### 3.4.2.4 Cultural proximity

In 2007, mergers and acquisitions represented a total global value of USD 4.5 trillion, and roughly 47% of them involved cross-border deals (Reus & Lamont, 2009). Cross-border acquisitions are becoming more common, and the impact of different cultural backgrounds has been studied as a major challenge to merger and acquisition success (Dikova & Sahib, 2013). Companies are normally seeking to improve economies of scale, access scarce resources embedded in organizational cultures, teams, and individuals, generate tax advantages, and eliminate inefficiencies (Chakrabarti et al. , 2009). Cultural differences have been listed as one major challenge in acquisition failures. Thus it is interesting to see if this has any bearing on the measurement of an acquisition event when a press release or stock exchange release is published.

Proximity can be measured in many different ways, the easiest and most undisputable being to measure the physical distance between the acquiring company and the target company. The geographical distance measure does not necessarily take into account cultural and political differences between countries. Imagine, e.g., the similar cultural backgrounds of two very different countries where the political systems have produced very different business environments, such as Seoul and Pyongyang, which are located only 195 kilometers apart yet are very different politically. Therefore, physical distance

may not suffice as a proximity measure. The literature mentions several measures of cultural proximity that cover human aspects such as language, religion, as well as political aspects.

Dow and Karumatra (2006) used altogether eleven dimensions: *language, religion, education, industrial development, degree of democracy, socialism*, and, additionally, Hofstede's four most commonly used indicators of natural cultural distance (Hofstede, 1980). These indicators comprise four original dimensions to measure proximity: *power distance, uncertainty avoidance, individuality, masculinity*, and one additional, *long-term orientation*. Because of the more exact and recent research by Dow & Larimo (2011) on the same subject, a decision was made to use their study with only the first five dimensions: *language, religion, education, industrial development, and degree of democracy* and Hofstede's original four dimensions.

Some of the above are not uni-dimensional such as language, which is a combination of similarities or close relations (Norwegian, Swedish, or Sweden and Finland, where Swedish is the second language, and Sweden with a large Finnish-speaking minority). As an example, Dow & Karunaratna (2009) used a five-level definition of the two closest languages used in a particular country (1—being the same language; 2—the same sub-branch on the first level, but different on the second level; 3—the same branch but different on the first sub-branch level; 4—the same family, but different branches; 5—different families). Branch and level refer to a language classification according to which, e.g., Finnish and Hungarian are related on the branch level but not on the first level sub-branch, i.e., class 3—exactly on the same level as Swedish and English. In this language dimension, Finland and the United Kingdom are more closely related, because Finland has Swedish as the second language—otherwise Finland would be as far related in the language dimension with the United Kingdom as with China. Similar multidimensional parameters are also among the other four parameters. This five-dimensional division is one of many trials of clustering some 200 countries into smaller and similar groups.

Because of no single way to cluster, and because cultural proximity was not the main research topic here, a decision was made to select one recent clustering, that of Dow & Larimo (2011), which is based on Dow & Karumatra's (2009) original proximity dimensions with a certain simplification of Hofstede's dimensions. They combined countries into 25 clusters, as shown in Table 8.

Dikova & Sahib (2013) combined previous studies on cross-border acquisition performance and previous experience from international acquisitions and found that experienced acquirers are more likely to avoid pitfalls and fully benefit from cultural diversity (Dikova & Sahib, 2013). Though they did not use event study, they found that experience with international acquisitions increased performance in both low cultural

distance and high cultural distance cases. The measure was a one-month stock price increase compared to one at the time of an acquisition announcement.

*Table 8. Countries categorized into 25 clusters based on religion, language, industrial development, education, and degree of democracy (Dow & Larimo, 2011).*

Afghanistan Bangladesh Indonesia Iran <b>A</b> Malaysia Pakistan Sierra Leone Turkey Uzbekistan	Australia Guam <b>F</b> Ireland New Zealand UK USA	Cook Islands Jamaica Nauru <b>P</b> Papua New Guinea Philippines Samoa Solomon Islands Trinidad and Tobago
Algeria Bahrain Egypt Iraq Jordan Kuwait Libya <b>B</b> Morocco Oman Qatar Saudi Arabia Sudan Syria UAE Yemen	Belgium Canada <b>G</b> France Luxembourg Switzerland	Denmark Finland <b>Q</b> Iceland Norway Sweden
Argentina Chile Colombia Costa Rica Ecuador El Salvador <b>C</b> Guatemala Mexico Panama Peru Puerto Rico Spain Uruguay Venezuela	Bulgaria Croatia Czech Republic Greece <b>H</b> Lithuania Poland Romania Serbia Slovakia Slovenia	Estonia Kazakhstan <b>R</b> Latvia Russia Ukraine
<b>D</b> Israel	<b>I</b> Hungary	Ethiopia Ghana Kenya <b>S</b> Nigeria Tanzania Uganda Zambia Zimbabwe
<b>E</b> Italy	<b>J</b> Malta	<b>T</b> China
	Brazil <b>K</b> Mozambique Portugal	HongKong <b>U</b> Singapore Taiwan
	<b>L</b> Austria Germany	India <b>V</b> Nepal
	Cameroon Congo DR of Cote d'Ivoire French Polynesia <b>M</b> Lebanon Madagaskar New Caledonia Vanuatu	<b>X</b> North Korea
	<b>N</b> Fiji	<b>Y</b> South Korea
	Netherlands	Japan Laos <b>Z</b> Myanmar Sri Lanka Thailand Vietnam
	<b>O</b> South Africa Suriname	

Dow & Larimo (2011) tested their hypotheses of cultural dissimilarities driving a need to make an acquisition, because the acquiring company could not leverage its previous acquisition experience from other countries.

If a country was not listed in the clusters defined by Dow & Larimo (2011), the closest cluster was selected based on the neighboring country. The neighboring country is one with the longest common border with the country that was not found in any cluster. In the data sample, only one country, Georgia, was then categorized with Russia and Kazakhstan and not with Turkey, though Georgia has a common border with both. This is not necessarily correct, because it has a different language than Russia but the same major Orthodox Christianity as Russia and was part of both the Russian empire and the Soviet Union during the 19th and 20th centuries. Since only one acquisition was made in Georgia during the study period, a possible error in this categorization has no great impact.

If two simultaneous acquisition announcements were made, and if they were from different clusters, the cluster with the larger acquisition in the acquired company's turnover was selected. The reason was that the bigger acquisition was assumed to have a greater impact on the stock market than the smaller acquisition. If the investment value of one acquisition was missing in one of them, but the value was mentioned in the other, the mentioned one was assumed to have a greater impact. In case of two or more acquisitions in countries that were not all clustered, the clustered one was chosen.

Two announcements ended up in the above category; the first included an 80% acquisition in Nepal and a 100% acquisition in Cambodia. Categorization should have gone according to Cambodia, but because it was not clustered, categorization was made according to Nepal. Another case came when an announcement had two acquisitions: one in Estonia (cluster R) and the other in Lithuania (cluster H), but because no monetary value was indicated in the Lithuanian acquisition, categorization was made according to the Estonian cluster R.

### **3.4.2.5 Domestic vs. international acquisition**

Hayward (2002) noted that foreign acquisitions may generate lower returns to the extent that the acquirer is less familiar with such targets. He did not find any support for this hypothesis. Though proximity already measures cultural proximity, another variable was added to determine if an international acquisition had a higher abnormal return than a domestic acquisition. Furthermore, in this category, the target company was considered domestic if its headquarters was based in Finland. If a Finnish company was active abroad, it was still considered a domestic acquisition.

### **3.4.2.6 Publicly listed company**

Publicly listed companies were included as a control variable because there may be a link between available information and reaction on the stock exchange. Normally, publicly listed companies are required to publish more detailed information on their financial performance than privately held companies. We can assume that reactions are

stronger to the acquisition announcements of publicly listed companies than to those of lesser known companies.

If the target company was a subsidiary to a publicly listed company, it was not considered a publicly listed company, because the paid premium cannot be calculated. Another reason is that even if the whole company is listed publicly, the information it provides of its subsidiary is not necessarily on the same level.

### **3.4.2.7 Premium paid**

Acquisition premium is commonly defined as the acquirer's bid minus the target's pre-announcement market value divided by the target's pre-announcement market value. Many studies have shown that a high acquisition premium is value destroying for the acquirer's shareholders (Laamanen, 2009). The stock price of a publicly listed company reflects all available information, as defined by the Efficient Market Hypothesis (Fama, 1970). The premium paid by the acquirer thus indicates that not all information available reflects the price correctly, and that the acquiring company has more information on the subject, or that the EMH is not correct. Laamanen (2009) sees that the premium paid reflects the former alternative, where the premium indicates a value that is difficult for the market to value. Rappaport (1998) expresses this value in the following formula:

$$\text{Acquisition price} = \text{Stand-alone value of seller} + \text{Value of synergies}$$

which leads to the simpler definition of

$$\text{Premium paid} = \text{Value of synergies}$$

(Rappaport, 1998). Though there are many reasons why premiums must be paid, some researchers see the premium as an indication of low-quality decision making. In this study, the *premium* was used for listed companies only, and a correlation was sought between premiums and an abnormal return.

### **3.4.2.8 Price paid**

In most cases, the announcement did not include the exact price paid, but in a few cases, the amount of cash payment or stock transactions were mentioned in the press release. Scholars have studied also the payment method and its effect on the abnormal return; however, the limitation here is that in most cases the payment method is not announced and would need thorough investigation of the company's annual reports. This was not made because the scope was immediate response based on the information available before the event and in the press or stock exchange release.



### **3.4.2.9 Profitability announced**

Some acquisition announcements mentioned the profitability of the target company, and the impact of the announced profitability was studied. If announcing the profitability had no effect, it was ignored in the press release. One target of the study was to improve company announcements, and the scope of the announcement was one interesting factor.

#### **3.4.2.10 Previous ownership**

Many times, an acquisition takes place in phases. The acquiring company starts by announcing a minority share acquisition, which normally takes place after the threshold of the announcement obligation. If the acquiring company sees a benefit in increasing its investment in the company, it announces another stake and so on until the 90% threshold is reached. When the 90% threshold was crossed, the acquisition became part of this study. However, it is possible to use the previous ownership as a control variable and study what positive impact it may have on the abnormal return. Unfortunately, one cannot be 100% sure if the previous ownership is mentioned in the press or stock exchange release, though in many cases it is, or there is an earlier announcement about an acquisition that has not reached the 90% limit.

#### **3.4.2.11 Business acquisition vs. company acquisition**

A company can be acquired in two ways. The first is to buy all its shares, and the second to acquire its business. The main difference between the two is that when a business is acquired, the company receives a payment, not the owners of the company, but when all company shares are acquired, the target company's shareholders receive a payment. When a conglomerate divests one of its businesses, it is a business acquisition for the acquiring company, but when a publicly listed company is acquired, it is always a company share acquisition.

#### **3.4.2.12 Turnover class**

The next step in further study of this phenomenon was to divide the acquiring company's size into its components (i.e., profit, turnover, personnel), because relative size is a combination of three variables from both the acquiring company and the target company.

To better understand the origin of the difference, also the turnover of an acquiring company was analyzed. Acquiring companies were grouped based on their turnover (either stated in the press release or based on the company's previous annual report) into six groups. This was partially based on the EU classification of micro-sized in category 1, small enterprises in class 2, and mid-sized enterprises in class 3. In this study, no micro-size companies were listed on the stock exchange, or they did not make acquisitions.

The definition only partially follows the EU classification, which takes into account also personnel and the balance sheet. The EU 2003 states that “*The category of micro, small, and medium sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 Million, and/or an annual balance sheet total not exceeding EUR 43 million.*” Based on this definition, small enterprises are between 2M€ and 10M€ and mid-sized enterprises between 10M€ and 50M€. The following classes, derived from the EU categorization, were used in the comparison:

- 1) acquiring company’s turnover under 2M€
- 2) acquiring company’s turnover from 2M€, but under 10M€
- 3) acquiring company’s turnover from 10M€, but under 50M€
- 4) acquiring company’s turnover from 50M€, but under 100M€
- 5) acquiring company’s turnover from 100M€, but under 500M€
- 6) acquiring company’s turnover from 500M€, but under 1bn€
- 7) acquiring company’s turnover from 1bn€, but under 2bn€
- 8) acquiring company’s turnover from 2bn€, but under 5bn€
- 9) acquiring company’s turnover 5bn€ or over

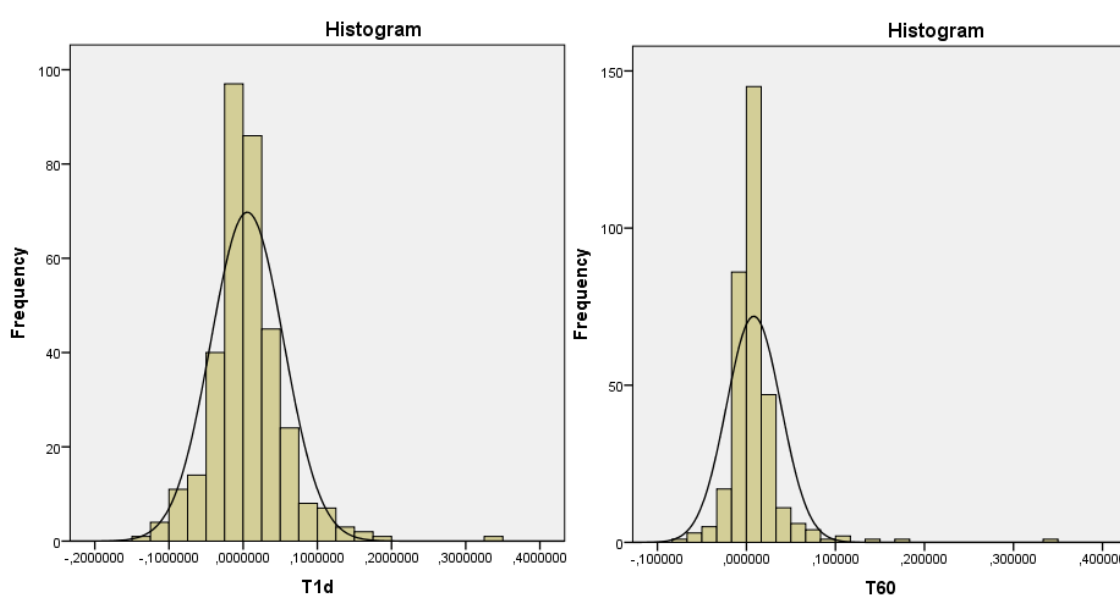
#### **3.4.2.13 Announcement type press release or stock exchange release**

The next control variable was comparison between press and stock exchange releases. Press releases are not necessarily followed as intensively as stock exchange releases. The requirements to announce merger and acquisition activities are described in Standard 5.2b, where the Financial Supervision Authority (FSA) describes the regulations and guidelines for companies listed on the Finnish stock exchange. This recommendation is based on the Finnish Securities Market Act (SMA) (495/1989). The standard states that “*In publishing information, special attention must be paid to timeliness, equitability and consistency, so that investors operating in the markets will have equal and simultaneous opportunities to access information.*” The same standard also allows companies some flexibility to choose their publishing principles, though practices should be coherent and based on company policy. The issuers should disclose as soon as possible and without undue delay the information that is likely to have a material effect on the value of the company security. For M&A, the standard states explicitly in section 5.10 that “*The issuer’s acquisitions and divestments of companies and businesses and other corporate restructurings likely to have a material effect on the value of the issuer’s security shall be disclosed.*”

Because the standard allows flexibility to publish releases also in the media (press), companies may prefer media to stock exchange releases. Therefore, this is an interesting area to study.

## 4. RESULTS

Before moving to detailed analysis, we must examine how well the distribution follows the normal distribution. This is necessary because ANOVA requires a normal distribution, samples must be independent, and variances of the population should be equal. Distributions for daily analysis and transaction-based analysis are shown in Figure 20.



*Figure 20. In daily analysis (left,) the distribution is closer to a normal distribution than in transaction-based analysis (right).*

The transaction-based analysis data is more skewed (4,806) to the right, being more positively skewed than the daily analysis data (1,344). In a normal distribution, the skewness should be = 0, and because it is already based on skewness, the distribution does not follow a normal distribution. The difference to a normal distribution becomes even clearer when the kurtosis values are compared. The distribution is expected to show significantly higher kurtosis in transaction-based analysis (44,540) than in daily analysis (7,308), because compounded values reduce the differences between securities over time. Evidently, both distribution values are far from the kurtosis of the normal distribution, which is equal to 0.

Based on McWilliams' (1997) steps, the seventh step in the event study process was to report the percentage of negative returns. In daily analysis, the distribution model follows the normal distribution more closely, but not enough to be treated as a normal distribution. The positive and negative values are well distributed, because 48.8% of

abnormal returns are negative and 51.2% are positive. In transaction-based analysis, the distribution is less balanced between negative and positive returns, because 34.0% of compounded abnormal returns are negative values and 66.0% positive. The Wilcoxon test statistics were selected, because they take into account the size of the abnormal return (Burton et al., 1999; Tsetsekos & Gombola, 1992). During the test, absolute abnormal returns were ranked from the lowest to the highest. The highest abnormal return received the rank of sample size. After ranking the whole sample, the original value of the abnormal return was attached to the rank, and the sum of all ranks was calculated to produce the Wilcoxon W. This Wilcoxon W was thereafter converted to a Z-value and finally to the significance level of the abnormal return sample (Lowry, 2011). The 1-day analysis had a Z-value of -2,245 with an asymptotic significance (2-tailed) of 0,025, and the transaction-based new method had a Z-value of -3,589 with an asymptotic significance (2-tailed) of 0,000. Because the absolute Z-value was over 2.0 in both studies, and because the p-value was less than 0,1, the normal distribution hypothesis could be rejected also based on this test. Two criteria were used: the Wilcoxon test statistics and the distribution of negative and positive values. Based on both these tests, it could be concluded that the compounded abnormal return values did not follow a normal distribution.

Based on these results, ANOVA could not be used for analysis, and non-parametric tests such as the Kruskal-Wallis and Mann-Whitney U tests were used instead.

The following sections report the results of the study, as shown in Figure 17 above. The basic principle is that the first results are from the daily analysis method, in which daily closing stock prices were used, and after each result, transaction-based data is given on the same topic.

The following sections cover different acquisition categories, and first compared are the daily compounded abnormal returns and then the transaction level results.

## **4.1. Comparison of different classes**

In section 4.3, categories representing the hypothesis structure are compared. Values were measured using the CAR over the whole event window, though comparison was made based on one value only. For all independent variables, only one CAR value was used. In this section, the intention is to compare differences between all classes. In section 4.1, the J2 figures show a standardized compounded abnormal return with a high probability of moving directly to comparing the groups.

### **4.1.1. Daily closing price comparison**

When daily values were analyzed with the Kruskal-Wallis test, the classes were not statistically significantly different with  $p < 0.1$ ; therefore, the distribution was the same

across all classes. The difference between this class comparison and category comparison was that in categories multiple classes were combined into one category, as shown in Table 4.

#### **4.1.2. Transaction level comparison**

In transaction-based analysis, using the Kruskal-Wallis, the non-parametric test gave the same result as daily analysis, i.e., there was no statistically significant difference between classes with  $p < 0.1$ .

Based on both analyses periods (daily closing prices and transaction-based analysis), no clearly significant differences could be detected in class level comparison.

### **4.2. All variables**

#### **4.2.1. Correlation table and multicollinearity analysis**

The correlation of all independent and control variables can be seen in Table 9, which shows the correlation matrix. Both daily and transaction-based analyses (dependent variables) are shown in the same table, and, clearly, when statistical significance was set at  $p < 0.1$ , four control variables significantly affected both analyses (daily and transaction level), namely relative size, size class, turnover class, and stock vs. press release. Additionally, one control variable—publicly listed companies—was significant for daily analysis.

Table 9. Independent and control variable results on both daily and transaction level

Multicollinearity analysis is done to ensure that no variable correlates with the other

	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1 CAR day	0,006	0,050																					
2 CAR 60 mins	0,008	0,031	,508***																				
3 Horizontal	0,833	0,374	-,144***	-,197***																			
4 Vertical FWD	0,067	0,250	,013	,074	-,597***																		
5 Vertical BWD	0,036	0,188	,039	-,025	-,434***	-,052																	
6 Related	0,052	0,222	,073	,079	-,521***	-,062	-,045																
7 Unrelated FWD	0,003	0,055	,377***	,596***	-,123**	-,015	-,011	-,013															
8 Unrelated BWD	0,009	0,095	,066	,098*	-,214***	-,026	-,019	-,022	-,005														
9 Bear	0,383	0,487	-,012	-,074	-,032	,014	-,020	,070	-,044	-,010													
10 Rel_Size	0,136	0,836	,130**	,181***	-,179***	,181***	-,018	,081	,123**	,001	-,031												
11 Size Class	3,508	2,262	,175***	,281***	-,163***	,004	,050	,172***	,110**	,063	-,058	,284***											
12 Cluster Nbr	2,742	2,983	-,036	-,002	,002	,093*	,017	-,136**	-,032	,051	-,022	-,031	,013										
13 Domestic	0,377	0,485	,061	,055	-,105*	-,058	-,051	,243***	,071	,057	-,006*	,095*	,014	-,455***									
14 Publicly listed	0,046	0,209	,104*	,084	-,058	,000	,035	,081	-,012	-,021	-,082	,042	,183***	-,035	-,020								
15 Premium paid	0,007	0,050	,046	,086	-,033	,010	,081	-,016	-,008	-,014	-,076	,047	,201***	-,062	-,005	,605***							
16 Price	52,420	371,065	,011	-,008	-,098*	-,003	,223***	-,020	-,008	,002	-,046	,037	,134**	,028	-,068	,386***	,382**						
17 Profit	0,475	3,201	,061	,081	-,055	-,019	-,013	,129*	-,008	-,006	-,058	,043	,219***	-,045	-,020	,332***	,147**	,111**					
18 Prev.ownership	0,164	0,371	-,030	-,067	,155***	-,086	-,066	-,024	-,043	-,028	-,028	-,045	-,125**	,063	,062	,100*	-,021	,020	-,066				
19 Business	0,198	0,399	,015	-,029	,038	-,011	-,015	-,047	-,027	,033	-,030	-,053	-,122**	-,070	,118**	-,108**	-,073	-,016	-,046	-,199***			
20 Turnover Class	6,167	1,943	-,145***	-,199***	,093*	,077	,008	-,190***	-,119**	-,074	-,016	-,133**	-,379***	,211***	-,429***	,071	,032	,144***	-,010	,135**	-,019		
21 Stock release	0,617	0,487	,132**	,175***	-,051	,061	-,047	,014	,044	,076	-,112**	,106**	,363***	-,049	-,019	,142***	,039	,100*	,089	,079	-,112**	-,271***	

Significance levels : \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01 (2-tailed).

variables. The normal value for not correlating variables was for *tolerance* higher than 0,2 and for *VIF* (Variance Inflation Factor) less than 5. The VIF is, in fact, the reciprocal for tolerance, i.e.,  $VIF = 1 / \text{tolerance}$ .

No significant collinearity was found between variables in the analysis, and even the biggest collinearity VIF was less than 2,0 (tolerance >0,5).

#### 4.2.2. Multiple Regression Model

The next step in the analysis is multiregression tests for both daily analysis (Table 10) and transaction level analysis (Table 11).

*Table 10. Results of regression models for the daily analysis CAR as a dependent variable (standard errors in parentheses).*

Model	Coefficients							
	Dependent variable CAR <sub>1day</sub>							
	1	2	3	4	5	6	7	8
Constant	0,006 (0,13)	0,025* (0,15)	0,025* (0,15)	0,030* (0,16)	0,103*** (0,27)	0,030 (0,29)	-0,001 (0,12)	-0,003 (0,003)
Horizontal		-0,023** (0,009)	-0,023** (0,009)	-0,029** (0,011)	-0,102*** (0,024)	-0,030 (0,027)		
Vertical FWD			-0,021 (0,014)	-0,026* (0,015)	-0,099*** (0,026)	-0,027 (0,028)	0,030 (0,010)	0,060 (0,010)
Vertical BWD				-0,016 (0,018)	-0,089*** (0,028)	-0,017 (0,030)	0,013 (0,014)	0,013 (0,014)
Related					-0,090*** (0,027)	-0,017 (0,029)	0,013 (0,012)	0,019 (0,012)
Unrelated FWD						0,293*** (0,053)	0,324*** (0,047)	0,343*** (0,046)
Unrelated BWD							0,030 (0,027)	0,037 (0,027)
Relative Size	0,005 (0,003)	0,005 (0,003)	0,005 (0,003)	0,005 (0,003)	0,004 (0,003)	0,003 (0,003)	0,003 (0,003)	
Size Class	0,002 (0,001)	0,002 (0,001)	0,002 (0,001)	0,002 (0,001)	0,002 (0,001)	0,001 (0,001)	0,001 (0,001)	
Turnover Class	-0,002 (0,002)	-0,002 (0,002)	-0,002 (0,002)	-0,001 (0,002)	-0,001 (0,002)	-0,001 (0,001)	-0,001 (0,001)	
Stock release	0,007 (0,006)	0,008 (0,006)	0,008 (0,006)	0,008 (0,006)	0,007 (0,006)	0,008 (0,006)	0,008 (0,006)	
F-Statistic	4,089***	3,767***	3,767***	3,339***	4,442***	7,673***	7,673***	11,962***
R <sup>2</sup>	0,048	0,066	0,066	0,068	0,100	0,178	0,178	0,143
N	328	328	328	328	328	328	328	328

Standardized beta coefficients. Significance levels: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Table 10 shows daily analysis regression results. Clearly, the control variables had no significant impact on the linear regression results. R<sup>2</sup> reached a maximum of 0,178, which for that model well explains the compounded abnormal return for merger and acquisition events.

Table 11 embraces exactly the same models and shows transaction level-analysis regression results. In this comparison, one control variable, *size class*, had an effect on

the linear regression results.  $R^2$  reached a significantly high maximum value of 0,427, which very significantly explains the compounded abnormal return for merger and acquisition events.

*Table 11. Results on regression models for the transaction-level analysis CAR as a dependent variable (standard errors in parentheses).*

Model	Coefficients							
	Dependent variable CAR <sub>60 minutes</sub>							
	1	2	3	4	5	6	7	8
Constant	0,005 (0,008)	0,015* (0,008)	0,017* (0,009)	0,025*** (0,009)	0,100*** (0,015)	0,028* (0,015)	0,000 (0,006)	0,006 (0,001)
Horizontal		-0,012*** (0,004)	-0,014** (0,006)	-0,0123*** (0,007)	-0,098*** (0,014)	-0,028** (0,014)		
Vertical FWD			-0,005 (0,008)	-0,014 (0,009)	-0,089 (0,015)	-0,018 (0,015)	0,010* (0,005)	0,011** (0,005)
Vertical BWD				-0,026** (0,011)	-0,101*** (0,016)	-0,030** (0,015)	-0,002 (0,007)	-0,001 (0,007)
Related					-0,092*** (0,015)	-0,020 (0,015)	0,007 (0,006)	0,013** (0,006)
Unrelated FWD						0,289*** (0,027)	0,317*** (0,024)	0,333*** (0,024)
Unrelated BWD							0,028** (0,014)	0,034** (0,014)
Relative Size	0,004* (0,002)	0,003 (0,002)	0,003* (0,002)	0,003 (0,002)	0,003 (0,002)	0,001 (0,002)	0,001 (0,002)	
Size Class	0,003*** (0,001)	0,002*** (0,001)	0,002*** (0,001)	0,002*** (0,001)	0,002*** (0,001)	0,002*** (0,001)	0,002*** (0,001)	
Turnover Class	-0,001 (0,001)	-0,001 (0,001)	-0,001 (0,001)	-0,001 (0,001)	-0,001 (0,001)	-0,001 (0,001)	-0,001 (0,001)	
Stock release	0,004 (0,004)	0,004 (0,004)	0,005 (0,004)	0,005 (0,004)	0,003 (0,003)	0,004 (0,003)	0,004 (0,003)	
F-Statistic	9,348***	9,013***	7,554***	7,413***	11,801***	26,445***	26,445***	39,842***
R <sup>2</sup>	0,103	0,122	0,123	0,139	0,228	0,427	0,427	0,381
N	328	328	328	328	328	328	328	328

Standardized beta coefficients. Significance levels: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The first three of the four control variables are related to the acquiring company's size in terms of turnover. Two control variables are directly related to turnover, and the third—relative size—is indirectly related to turnover, as it compares both the acquiring company's size to the target company's size. In addition to these three, it is interesting to observe the fourth control variable, *stock*, which is related to stock exchange releases.

### 4.2.3. Independent Variables

#### *Trend data*

The trend data control variable has two possible values based on the definition. The market is either in the declining trend (bear) or in the improving trend (bull). During the bear market cycle, 209 acquisitions and mergers took place, and during the bull market cycle 327. This means in practice about 1 acquisition in two days during the bear cycle and 1 acquisition event every 2.5 days during the bull market cycle. Interestingly, acquisitions take place more often during a contraction than an expansion.



Both daily and transaction-level analyses showed clearly that the trend control variable *bear* had no statistical bearing on the results ( $p < 0.1$ ); therefore, we can say that regardless of the market trend, abnormal returns behave similarly.

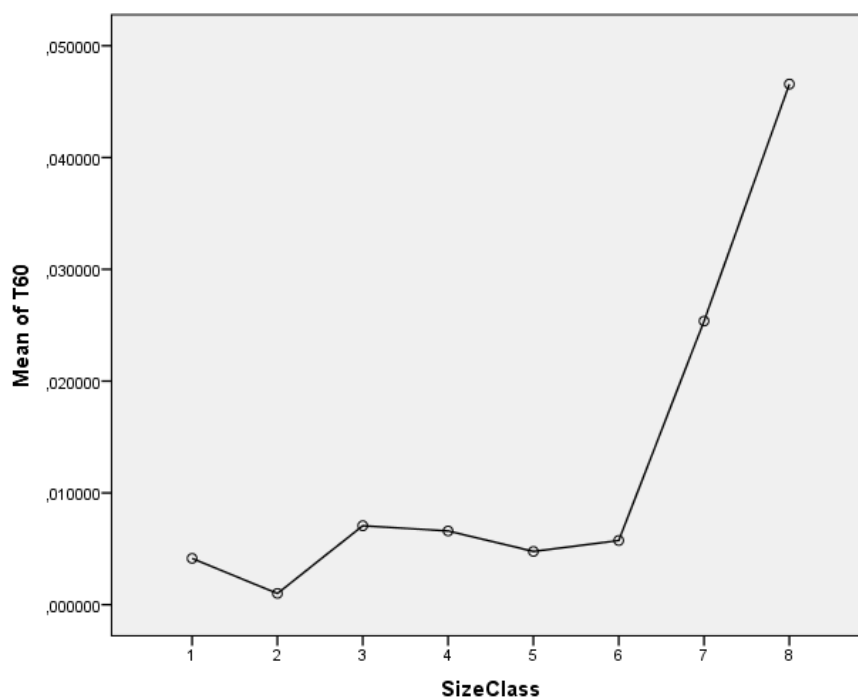
### *Relative\_size*

The next control variable studied further was relative size. It is a combination of turnover, profit, and number of employees in such a way that the target company's size was divided by the acquiring company's size.

Relative size had values from 0 to over 14, which describe the relative size between the acquiring company and the target company. A big value indicates that a large target company is acquired by a small acquiring company. In most cases, the target company was small with a value between 0 and 1. The median value was 0,01, which means that the acquiring company was 100 times larger than the target company. In the Kruskal-Wallis test, the relative size had a statistically significant impact ( $p < 0.1$ ), which was valid for both daily (Sig.=0,018) and transaction-level analysis (Sig.=0,000).

### *Relative size class*

In this size category, correlation was significant when the data was analyzed with the Kruskal-Wallis test ( $p < 0.1$ ) and valid for both daily (Sig.=0,018) and transaction-level analysis (Sig.=0,000). It was also statistically significant between groups, and when the cumulative abnormal return (CAR) was plotted, a large difference appeared when a relatively small company made an acquisition significant to its size (Figure 21). This is an interesting outcome and somewhat easy to understand; on the other hand, the literature maintains that digesting a large company (over 5%) is more difficult than digesting a small one. The difficulties normally occur when the merged company starts to operate as one company. Therefore, the initial very positive reaction was, on average, almost 4.9% in the biggest category.

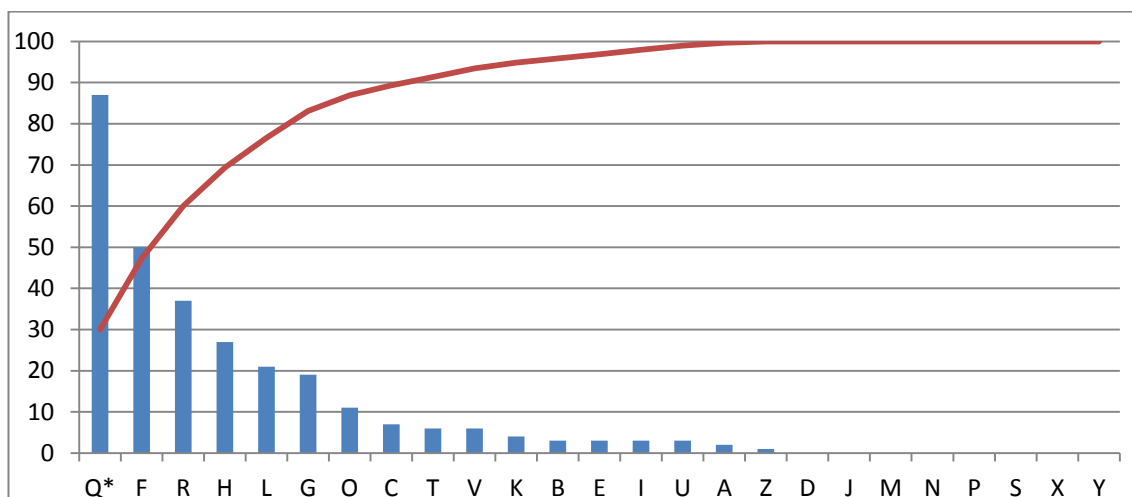


*Figure 21. A clear correlation occurs between relative size and cumulative abnormal return.*

### *Cultural proximity*

Cultural proximity was shown as a nominal value and for each cluster defined in 3.4.2.3, where one value represented each cluster. Cultural proximity as described in this study reached no statistically significant level ( $p < 0.1$ ). It was tested with the Kruskal-Wallis non-parametric test.

Altogether, acquisitions were made in 17 clusters out of a total of 25. The number of foreign acquisitions was slightly higher, 290, than that of domestic acquisitions, 199. Most acquisitions, 87, were made in the same cluster Q (Denmark, Sweden, and Norway), but also cluster F was popular with 50 acquisitions (Australia, New Zealand, United States, and United Kingdom). These two clusters represent almost half the total number, 47%, of acquisitions. Figure 22 shows the absolute number of acquisitions in each cluster (bar) and the cumulative share of international acquisitions in clusters. The graph shows well that eight most common clusters represent roughly 90% of the total number of acquisitions.



*Figure 5. Number of international acquisitions in each cluster (blue bars) and their cumulative share (in %) of the total number of international acquisitions (red line).*

### *Domestic acquisitions*

Another dimension closely related to cultural proximity was the role of domestic acquisitions vs. international acquisitions. In this case, cultural differences stemming from geographic proximity were minimal, because the acquiring and the target company were both Finnish, or at least had their headquarters in Finland. Domestic acquisition had no statistical significance ( $p < 0.1$ ) in the Mann-Whitney non-parametric U Test.

### *Listed vs. unlisted target company*

The next control variable analyzed was the listed company's impact on the study. This variable was set to "1" if the target company was listed and traded publicly. This means that when the correlation is positive, the compounded abnormal return is higher for listed companies. Interestingly, when the target company was listed, daily analysis showed a higher statistical significance than transaction-level analysis. Again the Mann-Whitney non-parametric U test was used, and it gave statistically significant results  $p < 0.1$  in both daily (Sig.=0,048) and transaction-level analysis (Sig.=0,035). In conclusion, listed company acquisitions take longer to achieve an abnormal return, a result that marks a difference between the two methods.

### *Premium paid*

When the acquiring company buys a publicly traded company, the premium compared to the current share price can be calculated. In most cases, the premium is mentioned explicitly and the method on how it has been calculated, because normally the premium is calculated as an average over a certain period before the announcement to avoid errors in pricing, if information has leaked on the acquisition. Only 15 companies mentioned the premium paid, and the value varied from 8% to 82.5% with a median

value of 22.5% and an average of 28.1%. The paid premium parameter had no statistical significance in this study ( $p < 0.1$ ).

### *Price announced*

In many studies, the price and how it has been paid has played a significant role; however, in this study, the price paid was not mentioned in 60% of acquisitions. When the price was mentioned in a press or stock exchange release, it produced no statistically significant compounded abnormal return ( $p < 0.1$ ).

### *Profit announced*

The target company's profitability was not mentioned in most cases; only 12.2% of them mentioned it. And even if it was mentioned, it had no statistical impact on the results ( $p < 0.1$ ).

### *Previous ownership*

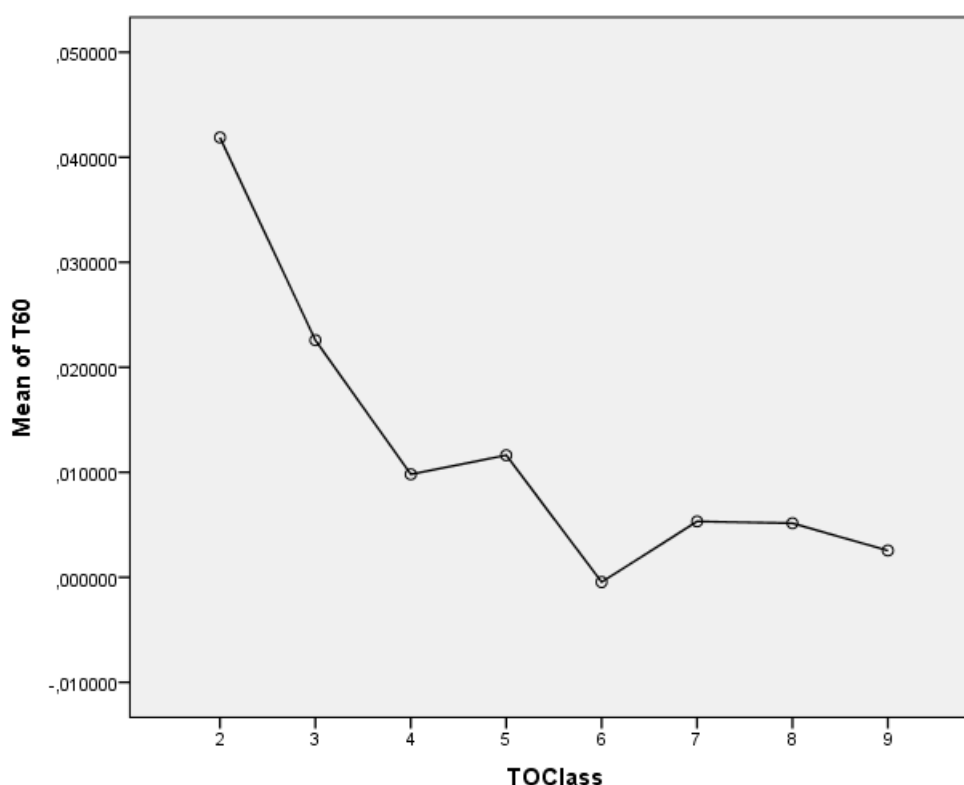
In many acquisition cases, the target company makes its acquisition in phases. The last phase when the target company must make an offer to the remaining shareholders has been defined by law, and this was the main topic in this study. In many cases, especially in large acquisitions, previous ownership has been in place prior to the last step of acquiring the remaining shares. In this study, previous ownership was mentioned in 16.4% of all acquisitions, and based on statistical analysis, it had no statistical significance in the compounded abnormal return ( $p < 0.1$ ) tested with the Mann-Whitney non-parametric U test.

### *Acquiring business vs. company shares*

The acquiring company buying company shares is more common than acquiring only the business. In this study, business acquisitions represented 19.8% of all acquisitions, whereas buying company shares constituted a large majority of 80.2% of acquisitions. Statistically, this was of no significance ( $p < 0.1$ ), as tested with the Mann-Whitney non-parametric U test.

### *Turnover class*

The outcome of this study was that the main impact comes especially from the size of the acquiring company. Thus the size of the target company plays no big role in creating a high abnormal return. Figure 23, shows the CAR in different turnover classes.



*Figure 23. A small company making an acquisition has a big abnormal return to a corporate security.*

In Figure 23, acquiring companies are divided according to turnover (either stated in a press release or in a previous annual report) into nine groups. In this study, no micro-size companies were listed on the stock exchange, or they made no acquisitions. Figure 23, shows the following turnover classes:

- |   |        |
|---|--------|
| 1) acquiring company's turnover under 2M€                   | [N=0]  |
| 2) acquiring company's turnover from 2M€, but under 10M€    | [N=9]  |
| 3) acquiring company's turnover from 10M€, but under 50M€   | [N=27] |
| 4) acquiring company's turnover from 50M€, but under 100M€  | [N=35] |
| 5) acquiring company's turnover from 100M€, but under 500M€ | [N=58] |
| 6) acquiring company's turnover from 500M€, but under 1bn€  | [N=43] |
| 7) acquiring company's turnover from 1bn€, but under 2bn€   | [N=52] |
| 8) acquiring company's turnover from 2bn€, but under 5bn€   | [N=67] |
| 9) acquiring company's turnover 5bn€ or over                | [N=38] |

Other categories were distributed evenly over 50M€, but, interestingly, increase in the acquiring company size did not significantly increase the average compounded abnormal return. In comparison, SMEs' and large companies' (turnover over 50M€) cumulative abnormal return was 3.4% vs. 0.48% respectively. This represents roughly a seven times higher abnormal return for SMEs than for large companies.

The final outcome from this control variable was that correlation was clearly visible in companies with a turnover of less than 50M€ and making acquisitions—especially if they correlated significantly with their size. Though the impact was clear, the Kruskal-Wallis non-parametric test showed no statistical significance ( $p < 0.1$ ).

### Press release vs. stock exchange release

The next control variable was comparison between press and stock exchange releases. In both cases, statistical significance was high. In daily analysis, it was over 95% ( $p < 0,05$ ) and in transactionlevel analysis even higher, 99% ( $p = 0,01$ ). The *stock* variable was set to “1” for a stock exchange release and to “0” for a press release. According to the results, stock exchange releases cause a higher compounded abnormal return on average than press releases. The tests were made with the Mann-Whitney non-parametric U Test. Comparisons were made so that press releases were compared with stock exchange releases, and statistical significance was measured.

Since the difference was clear, it was interesting to compare the CAR results. In daily analysis, the return was even negative for press releases, -0.21%, whereas for stock exchange releases it was +0.98%. Similar results came from transaction-level analysis, but both CAR results were positive, 0.08% and 1.2%, respectively. In conclusion, the investor community is more keen on stock exchange releases, or that a company’s stock exchange release is more valuable than its press releases. In the study, 126 press releases and 216 stock exchange releases qualified for daily analysis, whereas in transaction-based analysis the figures were 126 press releases and 203 stock exchange releases.

## 4.3. Results of the hypotheses

To test all hypotheses, J2 analysis was first used, as described in section 3.2.6. It gave for probability  $p = 0.01$ ,  $p = 0.05$  and  $p = 0.1$  and for the confidence interval 99%, 95%, and 90%. The percentages were shown in each figure. The confidence levels 99% and 95% are only for illustration purposes, and only 90% ( $p < 0.1$ ) was used to define the statistical significance of the compounded abnormal return.

### 4.3.1. Hypothesis 1 - Investor reactions to M&A announcements

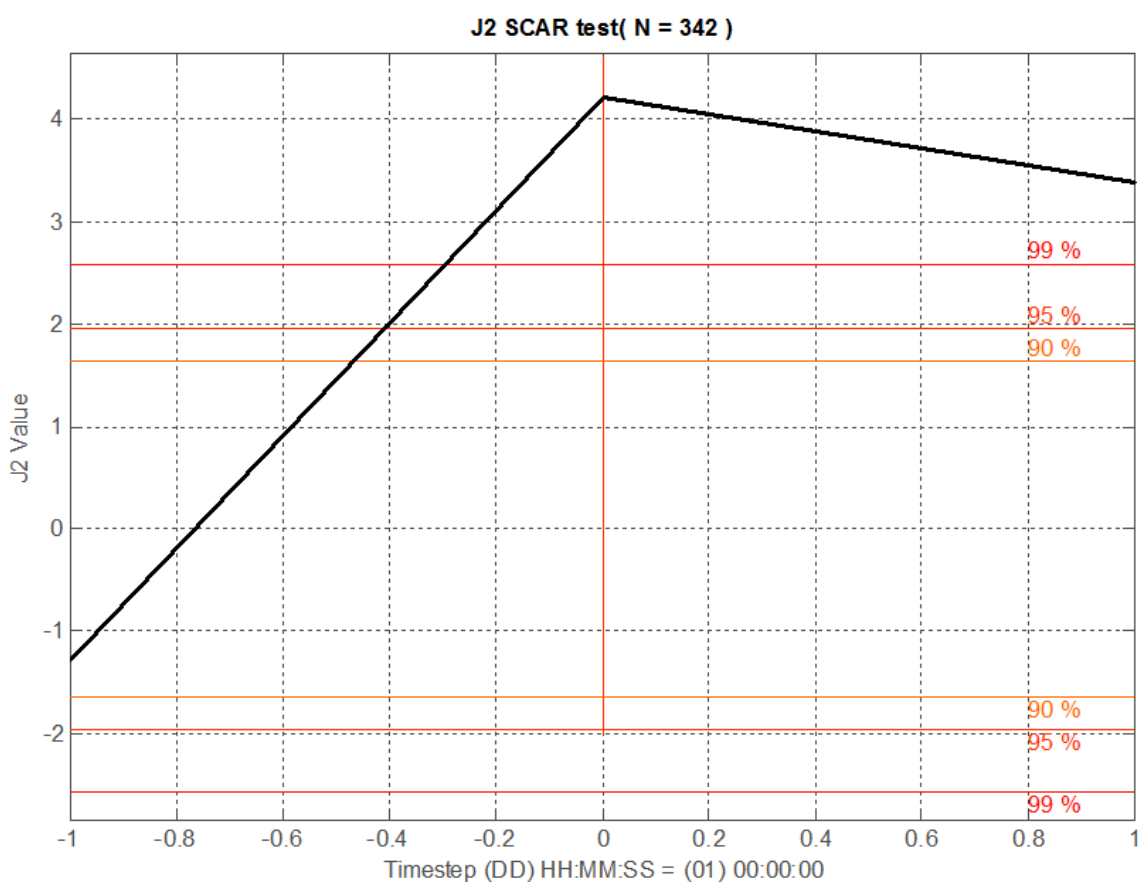
***Hypothesis 1.** The abnormal return associated with the event of acquisition is expected to be positive.*

#### 4.3.1.1 Daily closing price comparison

Daily values used closing prices on a daily level, as in previous studies. The null hypothesis test showed that significantly high confidence (>99%) could be reached, and that it could be rejected on a daily level. Hence the data from the Finnish stock

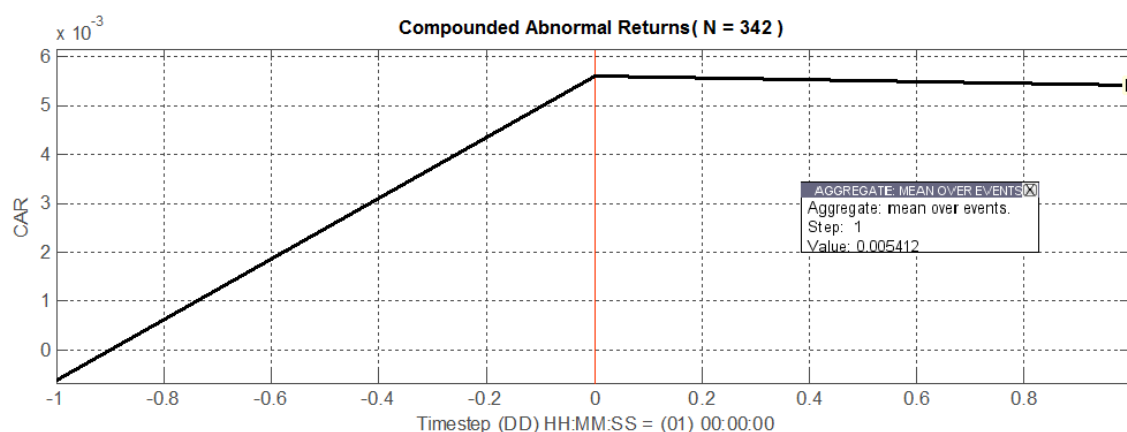
exchange follows the previous event studies on the compounded abnormal return caused by merger and acquisition releases.

As shown in Figure 24, the abnormal return was visible already at the time of the event  $T_0$ . This is caused by the definition in that when the closing price is used, an event occurring during and before the trading day causes an abnormal return at  $T_0$ , as explained in detail in section 3.5 in Research Process. However, we cannot see how fast M&A events cause a high probability of null hypothesis rejection, because the method uses only one value per day for analysis.



*Figure 24. J2 test shows over a 99% confidence interval to reject the null hypothesis on a daily closing price level.*

Figure 24 shows the probability of rejecting the null hypothesis, but it gives no information on how large the abnormal return is. The compounded abnormal return for the whole set of data was 0.5412% at the end of the following trading day  $T_1$ . This means in practice that corporate securities are 0.5412% higher at the end of the following day after an announcement was made.



*Figure 25. Compounded abnormal return is 0.5412% on the following day.*

The above is shown in Figure 25, and it represents an average return to corporate securities after an announcement about all different types of mergers and acquisitions. In daily analysis, the compounded abnormal return remained almost the same even at  $T_0$  and  $T_1$ . At  $T_0$ , not all announcements were recorded, because corporations gave press releases also after stock trading had closed.

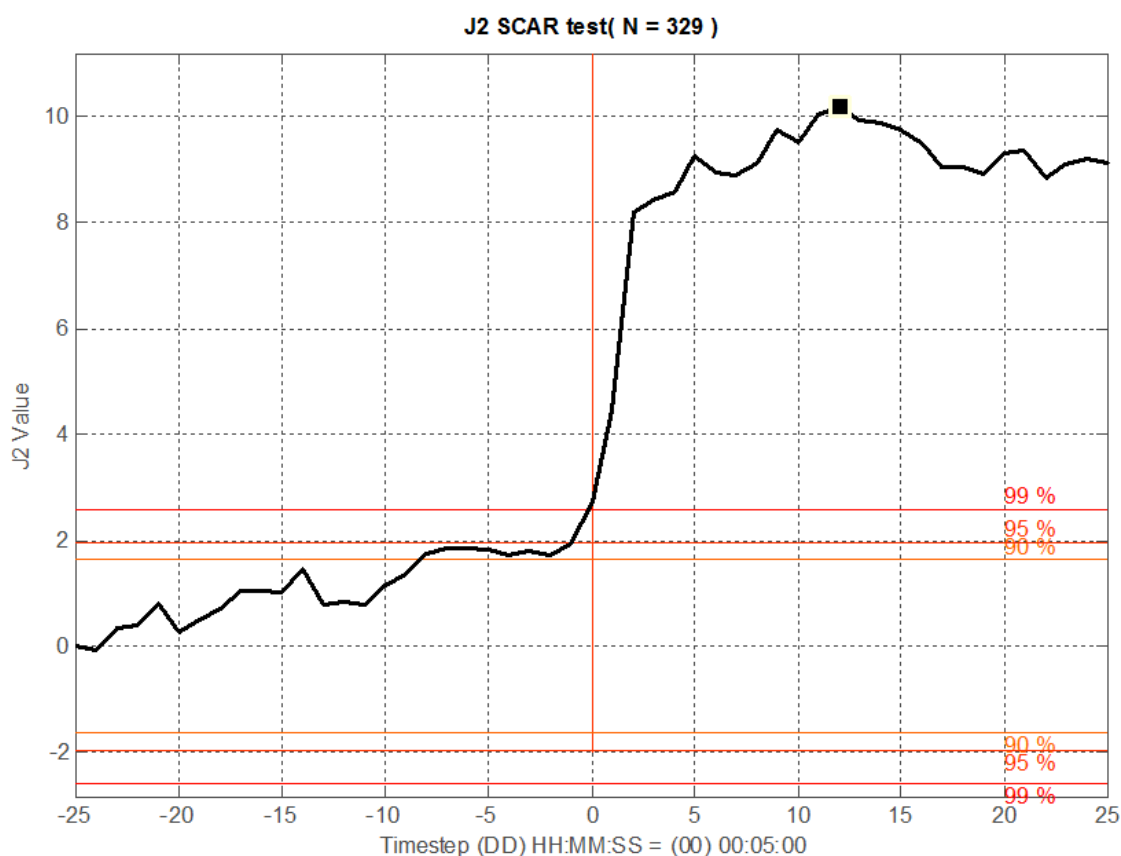
#### 4.3.1.2 Transaction-level comparison

In transaction-level comparison, a five-minute sampling rate was used. This means that the compounded abnormal return was calculated after each five-minute period, and the first return was available at five minutes after  $T_0$  and thereafter at 10 minutes after  $T_0$  and so on. The procedure was otherwise the same as in daily analysis; i.e., first, the null hypothesis was tested for the significance of the compounded abnormal return. Results show that the null hypothesis was rejected already in the first sample period, i.e., five minutes after the event. A rapid increase in the probability of null hypothesis rejection could be measured with the probability reaching 99% already in 10 minutes and 90% as soon as the first sample had been measured five minutes after the event. The J2 measure remained above the 99% limit for the whole 10-hour measurement period (Figure 24).

In this study, the studied sample size was 329 M&A events. The number differs from daily analysis because of the low number of stock trades that was used to estimate the security trend, as explained in the theory section. Because the trading volume is related to the estimation window, a short window gives fewer stock trades to estimate.

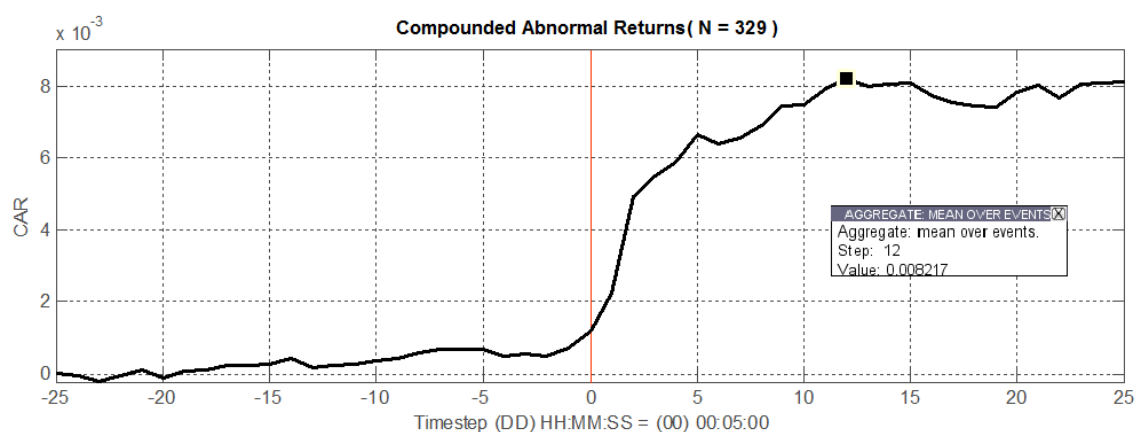
As in daily analysis, J2 gave no information about the level of the compounded abnormal return. Therefore, the CAR was calculated as in daily analysis, and comparison was made one hour after a release. The interval came as the longest period used in earlier studies on high-speed stock trading (Reboredo et. al., 2012).





*Figure 26. J2 test shows a very rapid increase in testing  $H_0$  rejection. The maximum value was reached one hour after the event.*

The compounded abnormal return for the whole data set reached 0.8217%, as calculated one hour after the issuance of a press or stock exchange release. Apparently, the one-hour time stamp after an M&A event already included the fastest growth.



*Figure 27. Compounded abnormal return is 0.8217% one hour after the release.*

The first hypothesis was to measure the abnormal return for all M&A events during 2006–2010. The results clearly support the hypothesis. After one hour, the cumulative abnormal return was 0.82% with  $p < 0.001$ . This means that with a probability of 99.9%,

an M&A event produces a positive abnormal return with a 0.8% compounded average return. This result was achieved with a sample size of 329. Apparently, the merger and acquisition event impacted the company's security price.

Though these percentages sound small, it is worthwhile estimating the real value of the abnormal return. One way to calculate the potential is first to calculate the total market capitalization and divide it by the number of companies that produce it for one publicly listed company. This value can then be used to estimate the change in the stock market. This calculation helped estimate the total market capitalization of the NASDAQ OMX Helsinki as being between 120 and 250 bn€ during the study period of 2006 - 2010. On average, 122 companies were then listed on the stock exchange, as explained in 3.2.1. Division of the total market capitalization by the number of companies gave an estimate of the average market cap of a publicly listed company as being between 1bn€ and 2bn€. Now the average abnormal return could be calculated for one company, which led from 8,2 M€ to 16,4M€ of abnormal return on average per an M&A announcement. Finally, this could be multiplied by the number of M&A events, 548, to yield a total value of M&A events of between 4,5bn€ and 9,0bn€. In this calculation, the multiplier was the total number of M&A events, 548, regardless of their time stamp and of any confounding releases, for the expectation was that, on average, an acquisition announcement creates a 0.8% abnormal return.

The above proved the fact that even a rather small percentage could represent a significant sum of money when multiplied by the total value traded on the Helsinki NASDAQ OMX stock exchange. This with the high probability of 99.9% constitutes a meaningful result in this study.

#### **4.3.1.3 Result for hypothesis 1**

All in all, it is obvious that *hypothesis no.1 is supported*, because the results show a positive abnormal return on merger and acquisition events with significantly high probability.

Based on theory, we can say that corporations intend to manage their value, and that management increases the shareholder value through acquisition decisions (Rappaport, 1998; Sundaram & Inkpen, 2004). This claim is justified at least in the very short time window of one hour and even one day, as seen in Figure 28. The abnormal return was positive for at least three days; however, long-term benefits could not be investigated using event analysis with short event windows.

Though a company final motive or multiple motives were not released, investors react positively to acquisition announcements. They cannot find the real motives such as empire building (Trautwein 1990) behind mergers, but a company can formulate its announcement so as to make plain its strategic reasons behind an M&A action, because

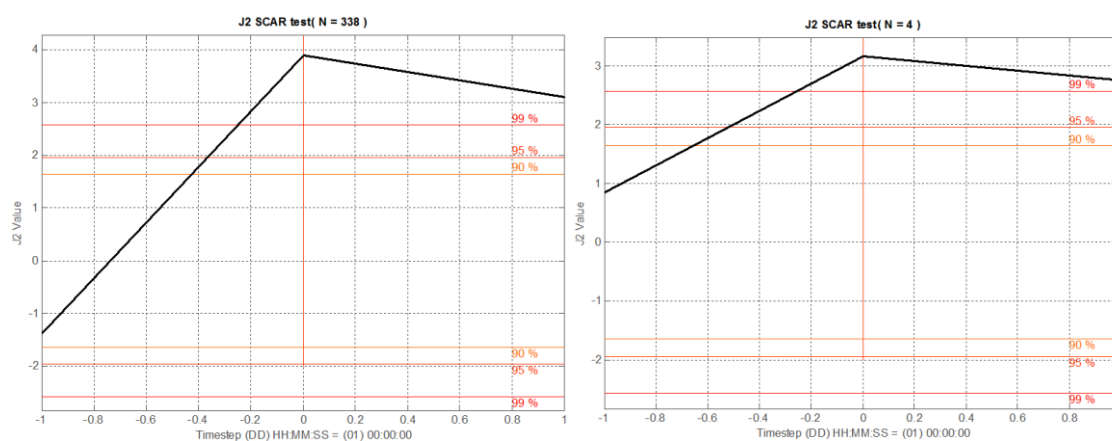
corporate executives have a strong incentive to make their actions coincide with shareholder interests (Walter & Barney, 1990).

### 4.3.2. Hypothesis 2 - Related acquisitions

The next hypothesis focused on a common research topic, namely, that researchers have tried to determine if some acquisitions types generate a higher abnormal return than others.

**Hypothesis 2.** *The abnormal return associated with related acquisitions is higher than that associated with unrelated acquisitions.*

#### 4.3.2.1 Daily closing price comparison



**Figure 28.** *J2 test shows very high probability for both related compounded abnormal return (left) and unrelated compounded abnormal return (right).*

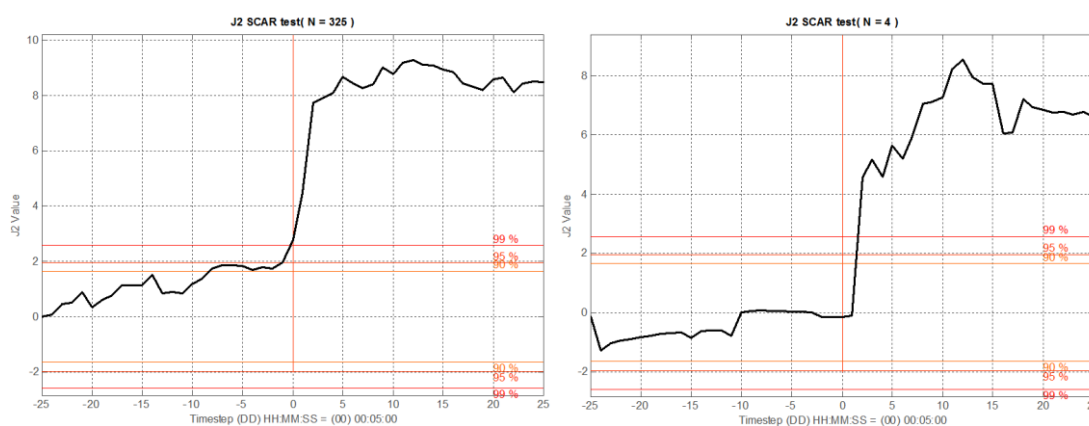
As shown in Figure 28, statistically significant compounded abnormal returns occur in both related and unrelated acquisition events with a probability of over 99% when they were tested individually. The next step was to compare these two groups' compounded abnormal returns (CAR) to see if they differed statistically significantly. ANOVA could not be used, because the unrelated acquisitions sample was too small ( $N < 20$ ); consequently, the Mann-Whitney nonparametric U test was used instead. It showed only a 0.146 significance level, indicating a statistical difference between the two groups on the following day after the acquisition event had been announced.

Although the Mann-Whitney non-parametric U test did not show a statistical difference between the groups, compounded abnormal returns were calculated. Unrelated acquisitions created an almost 30 times higher (28,5x) abnormal return than the related group. The compounded abnormal return for unrelated acquisitions was 11.67% on average and for related acquisitions only an average of 0.4%. The comparison showed

that the sample size was significantly bigger for related (N=338) than for unrelated acquisitions (N=4).

### 4.3.2.2 Transaction level comparison

The next comparison was transaction-level analysis. As in daily analysis, statistical significance was first tested individually with the J2 test, then results were compared with ANOVA or its non-parametric equivalents, and finally, if a statistical difference emerged, values were calculated for both acquisition types.



*Figure 29. J2 test shows a very high probability for null hypothesis rejection for both related acquisition abnormal return (left) and unrelated abnormal return (right).*

The J2 tests in Figure 29 show a statistically significant abnormal return in both the unrelated and related acquisition category. The difference between the groups could now be studied for statistical significance. ANOVA could not be used in this comparison, because the unrelated class sample was too small; consequently, the Mann-Whitney non-parametric U test was employed. It showed only a 0.283 significance between the groups, a difference that cannot be reliably measured.

Unrelated acquisitions generated an average compounded abnormal return of 11.43%, and related acquisitions a CAR of 0.6912%; that is, an unrelated acquisition generated on average about a 16 times higher abnormal return than a related acquisition. Though the difference is very clear, we should remember that the unrelated acquisition category differed greatly in size, containing only four acquisitions, compared to the related category, which consisted of 325 acquisitions. Therefore, these results are not statistically significant.

### 4.3.2.3 Result for hypothesis 2

The unrelated category was a combination of acquisitions by direct competitors, suppliers, customers, or companies working in the same position in another value chain. This classification was interesting in that only few acquisitions were left out. The unrelated acquisitions were strategically important companies but currently outside their

own competitive environment. Such acquisitions are normally made when a company acquires a new technology or new market channels it or its competitors do not yet have. Therefore, acquisitions may bring along new innovations to the company. Though the number of unrelated acquisitions was very small, it indicated that an abnormal return was more commonly visible in acquisitions, when the company was either seeking growth in another value chain or new technologies or new markets to compete in.

The results are clear but opposite to previous studies, because with a very high probability of  $p < 0.001$  (over 99.9%), an unrelated acquisition is expected to generate an over sixteen times higher abnormal return (11.43%) than related acquisitions (0.6912%). There were only 4 unrelated acquisitions but 325 related ones. ANOVA could not be used because of too few unrelated acquisitions ( $N < 20$ ); hence the Mann-Whitney nonparametric U test was used instead. The results show that *hypothesis 2 is not supported* due to the small sample size.

Calculated in monetary value, an unrelated acquisition generates an average of 100 to 200M€. In this case, the average is not a proper multiplier, because very large enterprises seldom make unrelated acquisitions. Large conglomerates are already involved in many businesses, and they may cover a larger part of their own value chain than smaller companies. A possible explanation for this great difference (apart from statistical sample size) can be found in RBV, which explains the importance of an unrelated acquisition. Wernerfelt states that “Entry barrier without a resource position leaves the firm vulnerable to diversifying entrants, whereas a resource position barrier without an entry barrier leaves the firm unable to exploit the barrier” (Wernerfelt, 1984). Therefore, a company making an unrelated acquisition can create new barriers to entry when one company corners a new technology in its business and prevents competitors from adopting it. In previous studies, also Lubatkin (1987) found no difference between unrelated and related acquisitions, but in this study the difference was huge, but in a different direction than before.

### 4.3.3. Hypothesis 3 - Horizontal acquisitions

The third hypothesis was a comparison between horizontal and non-horizontal acquisitions. In theory, horizontal acquisitions are valued more in the short than in the long term; hence, the third hypothesis focused on a short-term impact only.

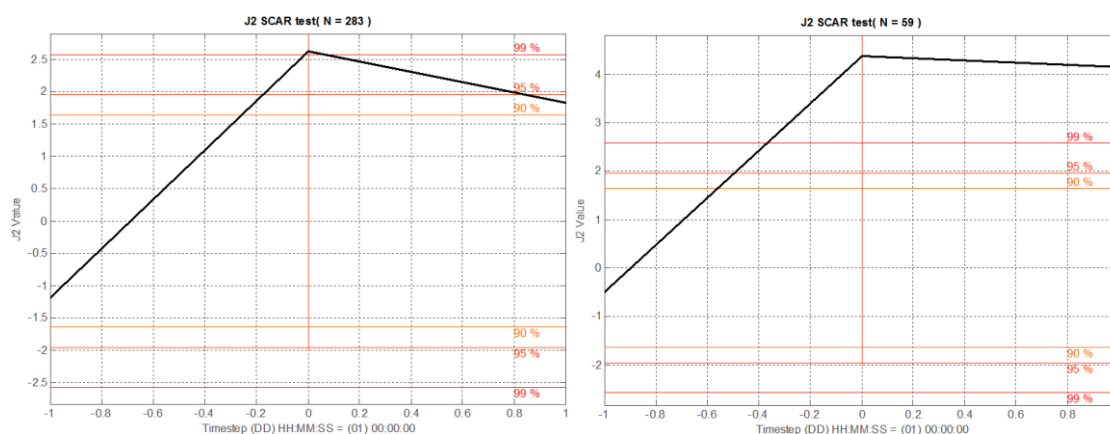
***Hypothesis 3.** The abnormal return associated with horizontal acquisitions is higher than that associated with non-horizontal acquisitions.*

Previous studies have reported also an opposite hypothesis on long-term abnormal returns, one which could not be tested in this study, because announcements were limited to 2006–2010. Reportedly, non-horizontal acquisitions have a higher abnormal return in the long term than horizontal acquisitions.

In a horizontal acquisition, the acquiring company buys its competitor. This comparison was described in detail in section 2.4.

### 4.3.3.1 Daily closing price comparison

In the first analysis, calculation was about the probability of null hypothesis rejection, in which both horizontal and non-horizontal acquisitions showed a significant over 90% probability of null hypothesis rejection. Since both were already statistically significant, it made sense to compare the abnormal returns. The J2 measure only validated the null hypothesis rejection and gave no information for category comparison. Therefore, the compounded abnormal return was used for comparison, and the Mann-Whitney U test was valid if the possible difference between the two categories was statistically significant.



*Figure 60. J2 test shows very a high probability for both a horizontal acquisition (left) and a non-horizontal acquisition (right).*

The next step was to compare the two groups' compounded abnormal returns with the Mann-Whitney U test, which is non-parametric and can be used for samples lacking normal distribution and when samples differ greatly in size. The horizontal acquisitions sample was 283 and the non-horizontals' 59. A significant enough statistical difference emerged in the CAR between the two acquisition types ( $p < 0.1$ ). Because in the Mann-Whitney U test, abnormal returns did not need to be standardized, the CAR was used instead of the SCAR. Compared to the following date's closing prices, the difference was  $p = 0.07$ , a high-enough confidence level to proceed to the next step of calculating the CAR for the horizontal and non-horizontal acquisition categories.

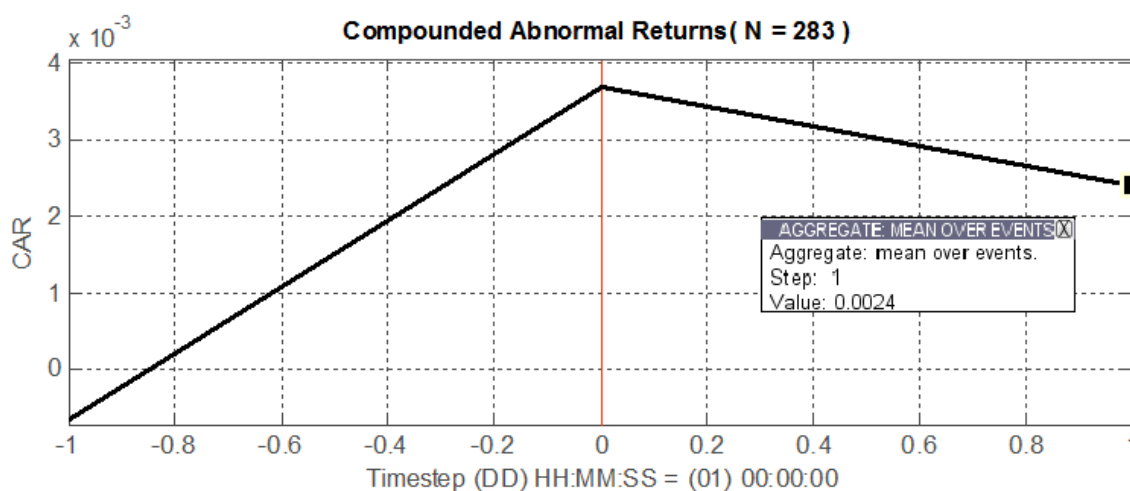


Figure 31. Horizontal acquisitions create a CAR of 0.24% one day after the M&A release.

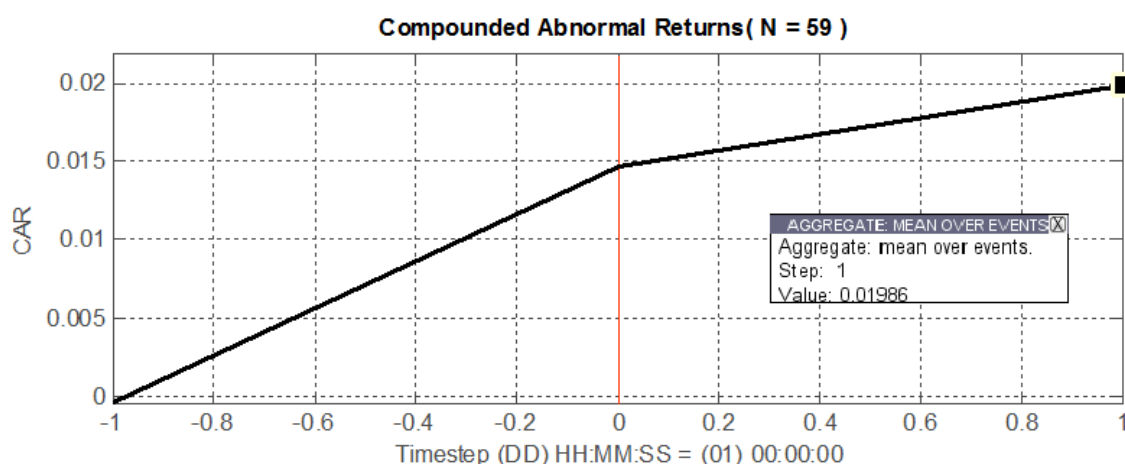
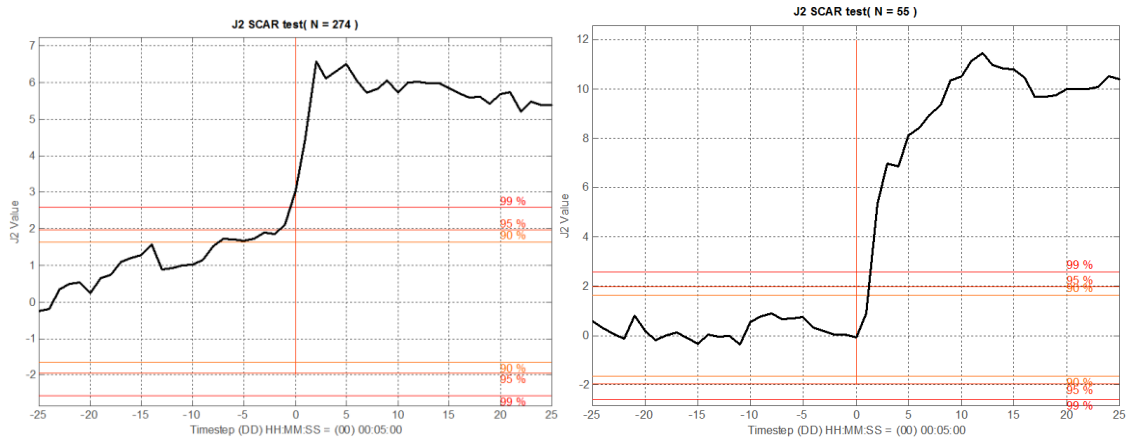


Figure 32. Non-horizontal acquisitions create a CAR of 1.99% one day after the M&A release.

The results show that non-horizontal acquisitions generated a significantly higher abnormal return, 1.99%, than horizontal acquisitions, 0.24%. After one day, the CAR was over eight times higher for non-horizontal acquisitions.

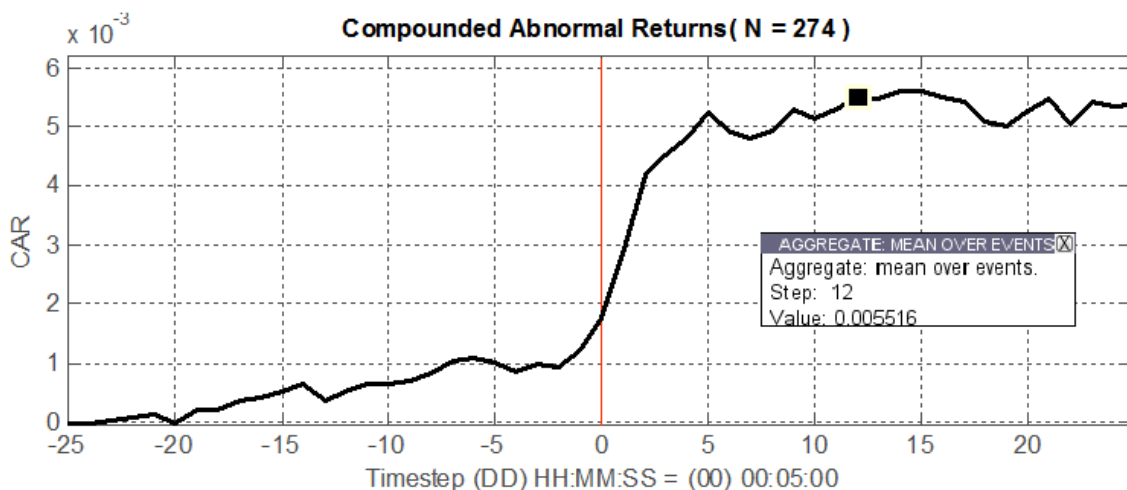
#### 4.3.3.2 Transaction-level comparison

The next step was to compare non-horizontal and horizontal acquisition announcements on the transaction level. The first test was to ensure statistically significant confidence in the J2 test, which shows a high enough confidence to determine that both horizontal and non-horizontal acquisitions create CAR.



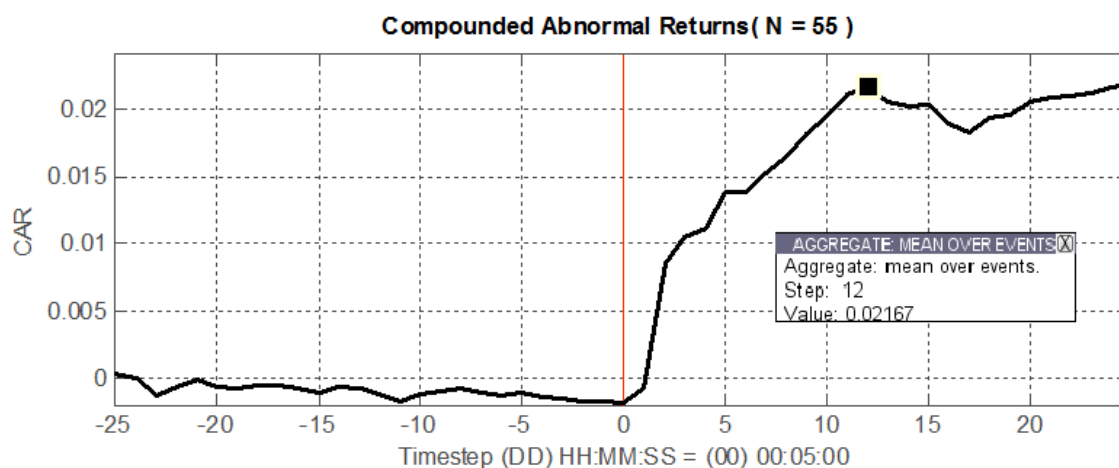
*Figure 33. J2 test shows a very high probability for both horizontal and non-horizontal acquisitions ( $p < 0,1$ ).*

Also in transaction-based analysis, the Mann-Whitney U Test was used to compare the difference between horizontal and non-horizontal acquisitions. This result showed a significant CAR difference of  $p=0,039$  ( $p < 0.05$ ) between horizontal ( $N=274$ ) and non-horizontal acquisitions ( $N=55$ ). A statistically significant difference could be claimed for the two types of acquisition release. Based on CAR calculation, it was possible to determine that a non-horizontal acquisition generates a 2.167% (Figure 35) compounded abnormal return and a horizontal acquisition only a 0.5516% (Figure 34) compounded abnormal return, an almost four times higher (3,92x) return than horizontal acquisitions.



*Figure 34. Horizontal acquisitions create a very rapid response to the M&A release, but the CAR level remains lower than in non-horizontal acquisitions.*





*Figure 35. Non-horizontal acquisitions create a 2.17% CAR in one hour after the M&A release.*

Another result was that a horizontal acquisition reacted faster to an announcement and reached its peak faster, but the stock price continued to oscillate more than with non-horizontal announcements, which increased steadily over time, even beyond the 60-minute event window. Therefore, the volatility of the stock price may be higher in horizontal acquisitions. However, volatility was not a target in this study.

#### 4.3.3.3 Result for hypothesis 3

With horizontal acquisitions, press and stock exchange releases generated a compounded abnormal return of 0.56% and non-horizontal acquisition releases 2.17% with a probability of 99%. The sample size of horizontal acquisitions was  $N=274$  and that of non-horizontal acquisitions  $N=55$ . In comparison, the Mann-Whitney U test showed a probability of  $p<0.1$ , indicating a statistically significant difference between the two classes. Therefore, ***hypothesis 3 is rejected***; i.e., horizontal acquisitions do not create a higher abnormal return than non-horizontal acquisitions. Rather, the reverse is true.

The above result is interesting, because it contradicts previous results on other stock exchanges (Oler et al., 2008). Oler's group had a sample size of 2,500 acquisitions, out of which 35.7% were horizontal, but the share did not increase from 14.1% in 1975 to 1979; from 27.8% in the 1980s; and finally from 43.8% in the 1990s. In the NASDAQ OMX Helsinki, horizontal acquisitions constituted 64.9%, so at least based on this trend, horizontal acquisitions are becoming more common. This study differs in three main aspects from that of Oler's group: different stock markets (NYSE vs. NASDAQ OMX Helsinki); they used SIC (Standard Industrial Classification); and the method (daily closing price vs. transaction based). There are also other differences such as sample size, study period, and control variables. On the other hand, it is interesting to see that in Oler's research, the long-term (three years) performance of horizontal acquisitions was negative. Similar results were found by Loughran & Vijh (1997), who

found a lower return on horizontal acquisitions than on non-horizontal acquisition in the long term. In three years, companies, of course, take multiple actions that have either a positive or negative effect on their stock price

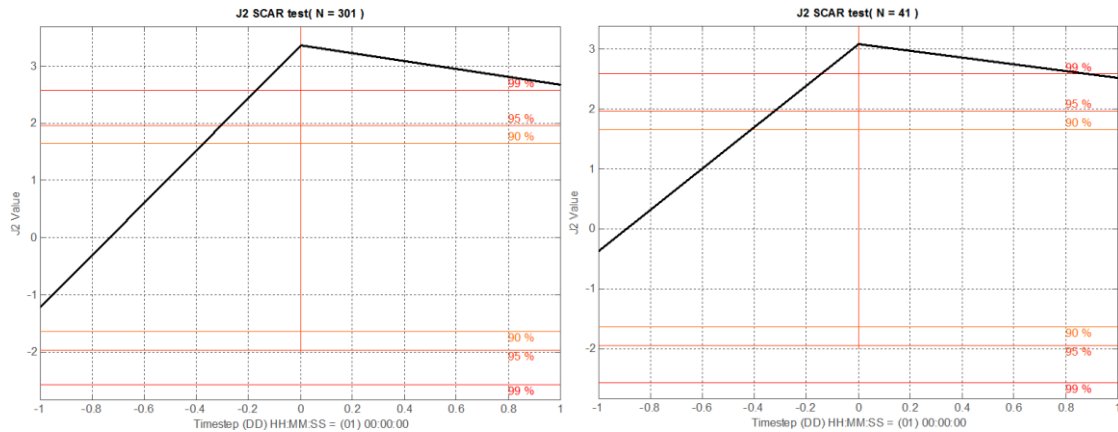
#### 4.3.4. Hypothesis 4 - Staying in the current center of gravity

When a company makes an acquisition in the same center of gravity, it is either a horizontal or a related acquisition whereby it acquires a company similar in terms of value creation; e.g., a distributor acquires another distributor. This section seeks to compare moves (either forward or backward) in acquisitions with the company remaining in the same center of gravity.

**Hypothesis 4.** *The abnormal return associated with an acquisition indicating a move to a new center of gravity is lower than a company's acquisition of the same center of gravity.*

##### 4.3.4.1 Daily closing price comparison

Daily analysis had first to ascertain if these groups had a high enough probability individually. In both groups, the statistical significance was high enough, and these types of acquisitions generated a statistically significant abnormal return ( $p < 0.05$ ).



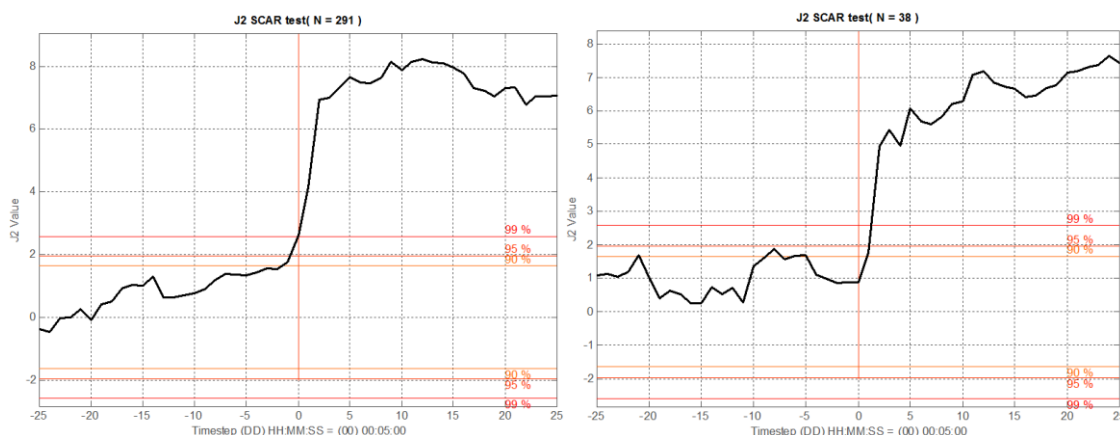
**Figure 36.** *J2 test shows high probabilities ( $p < 0.05$ ) for both categories, i.e., staying in the same center of gravity (left) and moving to a new center of gravity (right).*

The next step was to compare average compounded abnormal releases with the Mann-Whitney U test. With the non-parametric Mann-Whitney U test, it is not necessary to use standardized value SCARs, but CARs can be used. The test showed no high enough statistical significance ( $p < 0.1$ ) when the two categories were compared. This means that there is no significant difference in the compounded abnormal return when a company makes an acquisition, which means moving to a new center of gravity or staying in the same center of gravity. The sample size was 41 for moving to a new center of gravity and 301 for staying in the same center of gravity.

When a company moves to a new center of gravity, it brings an average of 1.98% compounded abnormal return, which is roughly six times higher than when it remains in its current center of gravity, 0.345%. This CAR was calculated one day after a press or stock exchange release was published.

#### 4.3.4.2 Transaction-level comparison

In this comparison, transaction-based analysis showed an interesting pattern, because staying in the same center of gravity reached a high probability already before the event took place, i.e., faster than moving to a new center of gravity. There was movement already before the event, and already at the event, the standardized abnormal return reached a high enough probability, and 99% probability was reached. It took about 10 minutes to reach the same confidence level, when a company moved to a new center of gravity. Apparently, while companies move to a new center of gravity, investor activities start before the event is actually announced on the stock exchange. If a company acquires a competitor or another company operating in the same position in the value chain, reactions start clearly after the event. In J2 analysis, the absolute level of the impact could not be seen, but only its speed and probability level.



*Figure 37. J2 test shows similar reactions for both staying in the same center of gravity (left) and for moving to a new center of gravity (right).*

In both cases, analysis showed a significant abnormal return, for a company making an acquisition to move to a new center of gravity and for remaining in the same position in the value chain. It was interesting to see a very rapid reaction to a company's remaining in the center of gravity. The statistical significance reached 99% probability faster than with an acquisition to move to a new position. In the latter case, the probability also fluctuated more than in the former case.

It was interesting to note while analyzing the statistical difference for the CAR with the Mann-Whitney U test between the groups that no significant difference occurred in the compounded abnormal return in the two cases. This led to rejecting the hypothesis that

movement in the value chain creates a lower abnormal return than staying in the current position. Hence the difference between the two groups needed no further study.

The final step in this analysis was to compare average compounded returns between the two moves in the value chain. When a company remained in the same center of gravity, it produced a 0.63% compounded return on average, but when it moved to a new center of gravity, it created a significantly higher compounded abnormal return of 2.3% on average. This represents about a 3.6 times higher CAR than when a company announces to remain in its current position in the value chain.

#### **4.3.4.3 Result for hypothesis 4**

Results for hypothesis 4 show that when a company moves from its existing center of gravity to a new one, no statistically significant difference shows in the Mann-Whitney U test. On the other hand, a move in the value chain generates a higher abnormal return than staying in the current center of gravity, but the difference is not statistically significant. Therefore, *hypothesis 4 is not supported.*

Based on the theory by Fan & Goyal (2006), a vertical acquisition created the same level of abnormal return as horizontal mergers. These two dimensions are also in different parts of this hypothesis, because a horizontal merger belongs to staying in the same center of gravity and a vertical one to moving to a new center of gravity. Therefore, it is normal that abnormal returns are on the same level and have no statistical significance.

On the other hand, a company moving to a new position in the value chain indicates a change its economic logic (Hambrick & Fredrickson, 2005), and the move benefits from the strong position before the acquisition. This promotes a higher abnormal return when the company moves to a new center of gravity.

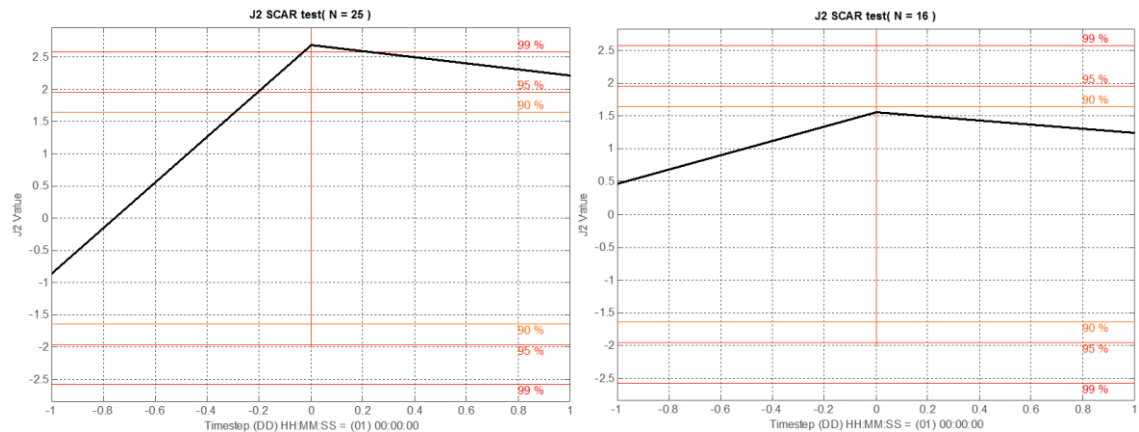
#### **4.3.5. Hypothesis 5 - Moving closer to customers**

With the next hypothesis, it was interesting to realize, first, that companies moved within their value chain and became more like downstream companies or transformed from product-oriented to service-domain-oriented. Becoming service-dominant is a popular current trend as companies seek additional growth from services.

***Hypothesis 5.** The abnormal return associated with a downstream acquisition is higher than that associated with an upstream acquisition.*

In the previous section, movement was rewarded with a higher abnormal return than staying in the same center of gravity. The next step was to analyze the direction that generates a high abnormal return.

### 4.3.5.1 Daily closing price comparison

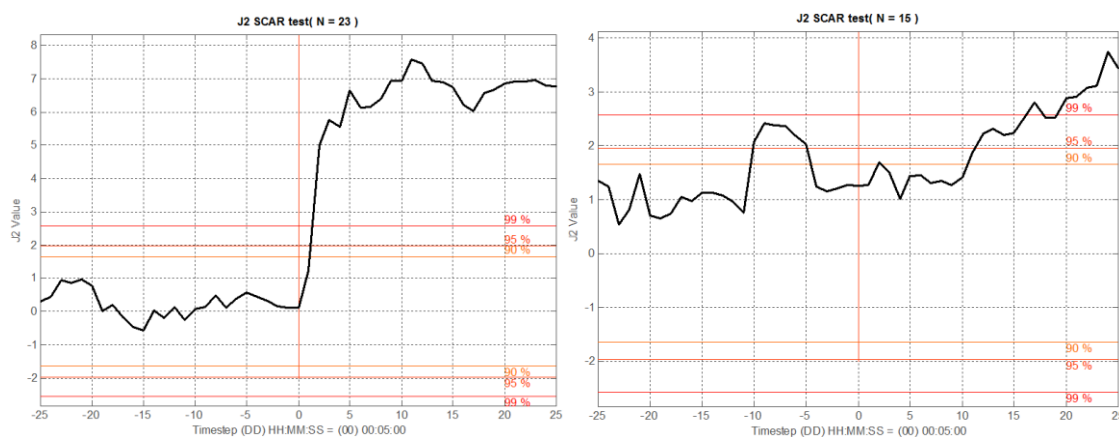


*Figure 38. J2 test shows a higher probability for moving forward (left) than moving backward (right).*

Already the J2 test, which seeks to determine if daily analysis brings a statistically significant abnormal return, showed that when a company announced an acquisition to move backward, the abnormal return did not reach a high enough probability to measure it. Therefore, a company's intention to move forward closer to its customers is rewarded with a statistically significant abnormal return, whereas its move backward closer to its suppliers is not. Though comparison is not necessary here, it is interesting to see the average compounded abnormal return for moving forward. The CAR for this acquisition category was 1.23% on the following day after an acquisition was announced.

### 4.3.5.2 Transaction-level comparison

In this comparison, a company's intention to move closer to its vendors and raw materials showed higher probabilities than the opposite movement to its customers and delivery chain. In fact, for the forward move the probability reached 95% within the first hour of measurement. It was significant that the difference between transaction-level analysis and daily closing price analysis differ in results, because in daily analysis J2 did not reach even  $p < 0.1$  in one day. Comparison of the different CARs in transaction-level analysis revealed that investors reacted very differently to a forward move as opposed to a move toward raw materials. A company's acquisition toward its customers was quickly responded to on the stock market, but when the move was toward suppliers, the response was slower and remained so longer, though it reached the same probability level in over an hour (75 mins).



*Figure 39. J2 test shows a high enough probability ( $p < 0.01$ ) for moving forward (left) and a high enough probability ( $p < 0.05$ ) for moving backward (right).*

In conclusion, we can say that daily analysis does not yield a statistically significant abnormal return to a vertical move toward company suppliers and raw materials; however, a statistical significance was found when a compounded abnormal return was calculated for a vertical move toward company customers. A transaction-level CAR could be calculated, and it was 3.073% for an acquisition toward customers and 1.14% for a vertical move toward suppliers.

### 4.3.5.3 Result for hypothesis 5

Results for hypothesis 5 show that a move toward customers generated a statistically significant compounded abnormal return with  $p < 0.01$ , which means 99% probability. On the other hand, when comparison, i.e., a move backward in the value chain, does not create statistically significant results in compounded abnormal return measurements, we can say that *hypothesis 5 is partially supported*, because a strategic move toward the company's customers creates an abnormal return, but one closer to customers' suppliers creates no value. The samples of these strategic moves were small: for a forward move,  $N=23$  and for a backward move even less,  $N=15$ .

Theoretically, strategic moves either toward company customers or raw materials should differ significantly. A company moving toward raw materials and suppliers is trying to optimize its supplier side to increase efficiency and to gain cost reduction from its purchases. Chen (2001) found that a firm can raise its rival's cost through vertical integration if and only if its own cost is reduced through the integration. Chatterjee (1991) combined a vertical industry move backward with Porter's (1980) strategic forces by stating that if entry barriers are low, vertical integration does little to further reduce the threat of new entries, so a firm might as well not integrate.

On the other hand, a company move toward its customers is an expansive, opportunistic or offensive move, when it tries to enter new markets or gain a larger share of the markets. Haleblan et al. (2009) called it a market power move when a company

attempts to appropriate more value from customers. Chatterjee (1991) proved that if market power is the predominant motive behind vertical integration, gains to the acquiring firm and to other incumbents in its stage should correlate positively. A vertical move forward can therefore be seen as increasing the total size of the market and therefore also that of other companies in the market place.

It is also exceptional in vertical integration that pre-event moves are negative in both cases. Another exceptional finding is that analysis takes longer and reaches its peak eight to ten hours after the event is published. It could be an interesting future research topic to study how differently stock markets react to these different acquisition classes.

#### **4.3.6. Summary of all hypotheses results**

Summing up the above hypotheses, it became apparent that the information available increases the abnormal return. This is valid also for surprises in the strategic moves when a company makes an unrelated acquisition. Horizontal acquisitions have become very common, and investors react positively to them, but in comparison to all other types of acquisitions, they do not create much shareholder value. This is a natural evolution, and studies (Loughran & Vijh, 1997, Oler et al., 2008, etc.) show that horizontal acquisitions are not very successful in the long term, though they generate an abnormal return.

The two analysis methods differed decisively in that daily analysis could not detect a statistical difference when a company moved toward its customers, but transaction-level analysis could. This enables more accurate comparison of actions that differ significantly in rapid responses but are not significant in longer event window analysis – not even on one day level.

#### **4.4. Summary of the results**

This section compares the one day daily analysis method after a press or stock exchange release with the new transaction-based method at one hour after a press or stock exchange release.

Table 12 shows the difference between the daily analysis method of using the daily closing price compared to transaction-level information. In addition to giving more detailed information on timing comparison, the transaction-level method also gives more reliable information on certain areas. Table 13 shows the difference between the two methods for different acquisition classes and all control variables. These two tables (Table 12 and Table 13) show three different types of differences in these methods.

### *Different control variables*

For example, the daily analysis method does not give high enough probability of null hypothesis rejection in the M&A event when a company is moving backward and the acquisition is unrelated (*unrelated backward*), but the transaction-based method shows a clear difference in this control variable. Another control variable where the difference is evident is *publicly listed company*, where the transaction-based method gives statistically significant results, but the daily analysis method does not.

### *Transaction level analysis produces a higher CAR in all M&A events*

The transaction-level analysis also shows over a 50% higher CAR than daily-level analysis, because the transaction level CAR is 0.82% after one hour and 0.54% after one day. We can see that the response is rapid immediately after one hour and the CAR drops during the first day.

### *Transaction-level analysis produces detailed differences in all categories*

For different hypotheses, transaction-level analysis produces more detailed differences between the categories than daily-level analysis. Based on the previous finding, the CAR decreases over time, but a lower CAR drops more in relation to a higher CAR. For example, in Hypothesis 2, the difference is over 16 times higher in transaction-level analysis, but it increases to 29 times higher in daily analysis. The same pattern is visible in all comparisons, as Hypothesis 3 produces less than a 4 times higher CAR in transaction-level analysis, but over 8 times higher in daily analysis. For Hypothesis 4, the relation is 3.6 on transaction-level and 5.7 in daily analysis.

**Table 12. Results comparison of the daily analysis and transaction-based analysis.**

	Day-level CAR (1 day)	Transaction level CAR (1h)
<b>Hypothesis 1:</b> Investor reaction	0.5412% (p<0.01)	0.8217% (p<0.01)
<b>Hypothesis 2:</b> Related vs. unrelated	NS; 0.4% (p<0.01) vs. 11.67% (p<0.01)	NS; 0.6912% (p<0.01) vs. 11.43% (p<0.01)
<b>Hypothesis 3:</b> Horizontal vs. non-horizontal	p<0.1; 0.24% (p<0.1) vs. 1.99% (p<0.01)	p<0.1; 0.55% (p<0.01) vs. 2.17% (p<0.01)
<b>Hypothesis 4:</b> Moving vs. staying	NS; 1.98% (p<0.05) vs. 0.345% (p<0.01)	NS; 2.3% (p<0.01) vs. 0.63% (p<0.01)
<b>Hypothesis 5:</b> Downstream vs. upstream	NS; 1.23% (p<0.05) vs. NS	NS; 3.07% (p<0.01) vs. 1.14% (p<0.05)
NS = Not significant		



*Table 13. Classes and control variables comparison between the daily analysis and transaction-based analysis.*

Classes & Controls (independent var.):	Day-level correlation	Transaction level correlation
Horizontal	-0.144 (p<0.01)	-0.197 (p<0.01)
Vertical forward	NS	NS
Vertical backward	NS	NS
Related	NS	NS
Unrelated Forward	0.377 (p<0.01)	0.596 (p<0.01)
Unrelated Backward	NS	0.098 (p<0.1)
Bear / Bull trend	NS	NS
Relative size	0.13 (p<0.05)	0.181 (p<0.01)
Size class	0.175 (p<0.01)	0.281 (p<0.01)
Cultural proximity	NS	NS
Domestic acquisition	NS	NS
Publicly listed company	0.104 (p<0.1)	NS
Premium paid	NS	NS
Price announced	NS	NS
Profit announced	NS	NS
Previous ownership	NS	NS
Turnover class	-0.145 (p<0.01)	-0.199 (p<0.01)
Press vs. Stock exchange release	0.132 (p<0.01)	0.175 (p<0.01)
NS = Not significant		

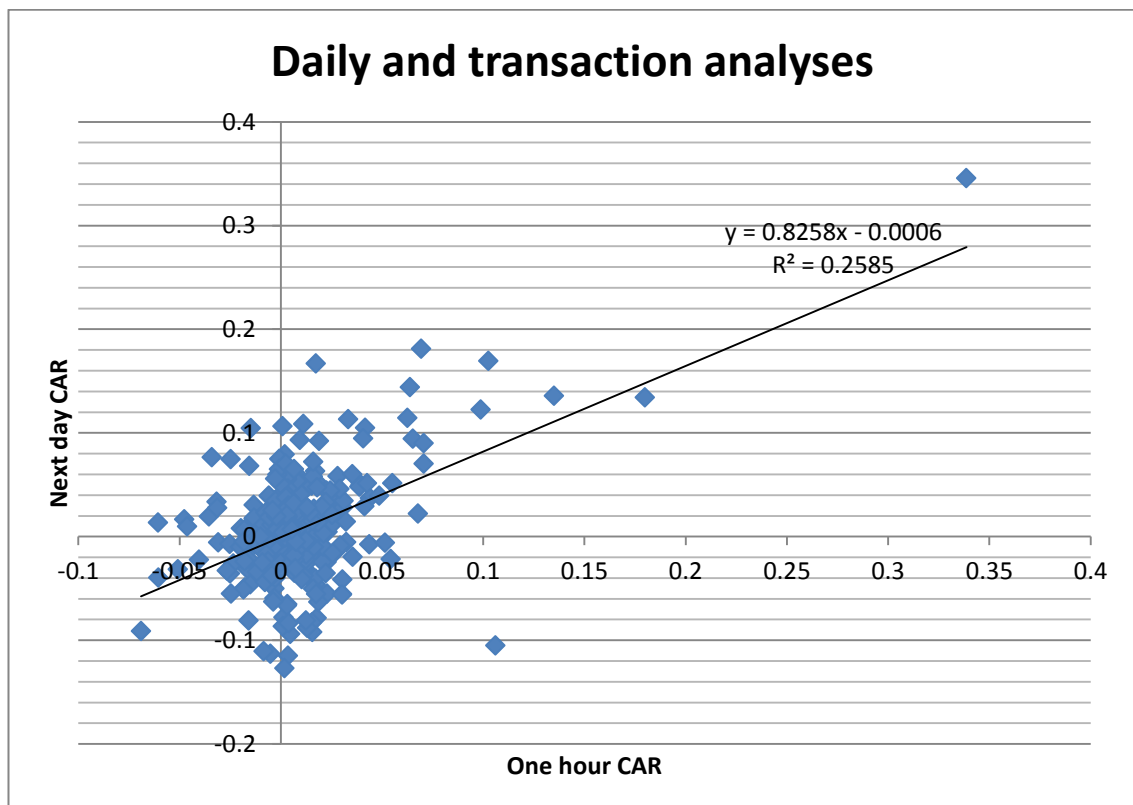
The new method of using more accurate time data for event definition poses more challenges with taking into account the events that have no time information associated with their date. This is a small challenge though, because the sample data is not the same; new sample data cannot directly be compared with old daily sample data. Thus the sample size will differ in these studies. The same events can be used in both methods, but then the sample does not represent the whole population as accurately as it could. This is the first limiting factor.

Another factor limiting the sample size is the definition of confounding events. In the new way of doing research, it is possible to shorten the confounding event definition, especially after an event has been published. Because the researcher can monitor the event and its impact much more accurately, artifacts stemming from confounding events can be avoided. Additionally, he can in a similar fashion shorten the time before an observed event, because there is basically over 500 times (60 minutes \* 8.5 hours) more information available in using minute-based data for event definition and transaction-based data for measuring the abnormal return.

Thus before studying the results, we can say that there are more events uncontaminated by confounding events than were we to use the daily analysis method. This compensates partly for the reduction in events due to missing time information required by the transaction-based method.

Finally, linear regression was calculated between the transaction-level analysis  $CAR_{60}$  and the daily analysis  $CAR_{1d}$ . This showed how well the first-hour CAR estimated the daily analysis CAR for the following trading day. The linear regression between the one-hour CAR and the one-day CAR was not significant; therefore, these two methods of studying the abnormal return complement for each other.

When plotted to the same graph in Figure 40, no clear linear regression appeared in daily analysis between the CAR after one hour and that after one full trading day. The  $R^2$  value that is the coefficient of determination is normally used to measure how well a stock follows the market portfolio index. In this case, the measure was used for how well the one-hour abnormal return explained the one-day abnormal return; the  $R^2$  value was 0,2585, which means a reasonably good level of explanation. Because individual results differed, we can say that the two measures measure different things although they derive from the same origin, i.e., corporate releases on M&A action.



*Figure 40. Plot diagram on how well one-hour CAR estimates the next day's CAR.*

In conclusion, transaction-based analysis gives more accurate data right after an event is published, and new findings can be discovered, but there is little correlation between quick reaction in CAR and how long the abnormality remains in the security price. This is interesting, because according to the Efficient Market Hypothesis (EMH), the information available should reflect the security price directly and remain constant if new information is not released. Because confounding releases have been removed,

there should be no other information from the corporation itself, though new information may come from other sources and validate the Efficient Market Hypothesis.

As mentioned earlier in this dissertation, event studies have been criticized as a method for measuring the success of strategic actions, and a consensus has been reached that it is a good tool for measuring investors' collective opinions about complex events (Oler et.al, 2008).

## 5. DISCUSSION

Stock trading has become very fast-paced as corporations keep issuing an increasing number of press and stock exchange releases. Thus it is more difficult to isolate a certain type of announcement from other announcements. It is fair to ask if it is even necessary, but there is also a growing demand for transparency, and more and more people are investing in publicly listed stocks. In September 2012, the number of households investing in publicly listed shares reached its record of 824,900 (Pörssisäätiö, 2013). A corporation would benefit from using this publicity also in a positive way—especially in terms of its stock price.

The first goal was to study merger and acquisition announcements' impact on corporate stock price and verify the results of the earlier literature on the topic. The second goal was to compare results between additional daily analysis research based on the daily closing price and a new method of using more minute-level time information and real trade prices after the event.

### 5.1. Methodological contribution

At the beginning of this study, the two goals were almost equally weighted, but as the study progressed, the new method and its more accurate findings became of more interest, partly because little information was available on such research, and secondly, because the impact of the event was so clearly visible. Both methods showed *positive abnormal returns* on corporate announcements, which was also somewhat surprising, because we know that many acquisitions do not create as much value as expected, at least in the long term. On the stock market, such announcements are rewarded with an abnormal return. Another finding was that large companies' acquisition announcements have a smaller effect on their stock prices than smaller companies' announcements. This is, however, easy to understand, as the impact may be more significant on small companies than on large enterprises; on the other hand, investors trade more in large company shares, and the potential audience buying shares is bigger there.

Zollo & Singh (2004) found that financial markets are not able to anticipate and incorporate enough information at the time of an acquisition announcement, and claimed that event study focusing on a cumulative abnormal return is not an appropriate method. Thus the new method of using real trade information offers a new approach to analyzing the reaction and is supplementary to the current use of event analysis. On the other hand the current way to make research using closing prices of securities may include erroneous event time information as illustrated in figure 16. Therefore it is

questionable if the traditional methods should be used at all in short time CAR analyses, but rather use the transaction level data. This transaction level method is opening a large number of additional research topics as the speed of investor reaction, order book reactions, as well as possible information leakages and illegal actions on price manipulation can be observed by using transaction level data. Previous studies have discussed this, as it offers, e.g., a particularly relevant tool for finance practitioners, i.e., shareholders to gain high returns in daily trading (Reboredo et al., 2012).

Linear regression is a good start for very short-term analysis, yet also non-linear modeling and more complex mechanisms can be used to capture some new information from very short event windows for analysis of company announcements (Kyoung-Jae, 2002; Reboredo et al., 2012). It provides new and more accurate information for event analysis and reduces the number of confounding releases. Additionally, some pre-event information related to M&A announcements can be measured using a very short event window, which may not be possible to measure equally accurately with only day level analysis (Rodrigues et al., 2012). Rodrigues et al. found that intraday trading behavior of takeover targets was affected by traders who held private information at least three months before the official announcement. We can justifiably say that event studies should not be used to measure the success of a strategic action such as M&A, because it has been proved earlier (Zollo & Meier, 2008). Zollo & Meier, 2008 concluded that event studies show no significant connection with the other metrics used, and that event studies do gauge something different than actual acquisition performance. Short event study windows are for measuring market expectations only; however, that has become more important, because, e.g., algorithmic trading covers most stock markets today (e.g., Clark, 2010; Erola, 2007).

***Research question 1:** Does moving to transaction-level analysis reveal new information compared to day-level analysis in measuring investor reactions to M&A announcements?*

As seen in the study, moving to a short event window reveals new information and can predict the compounded abnormal return (CAR) more accurately than traditional daily analysis. In the regression models, the maximum  $R^2$  value is 0,427 for transaction-level analysis compared to 0,178 for daily-level analysis. Additionally, transaction-level analysis indicates how rapidly investors react to different type acquisitions. It thus enables study of both reaction speed and volatility. Reboredo et al. (2012) studied volatility and time intervals of 5, 10, 30, and 60 minutes. They studied both linear and non-linear models, and one finding was that a 60-min period yielded the best out-of-sample profitability for both high and low volatility sample periods. This was the reason why a 60-min time interval was selected also for this dissertation.

The first hypothesis supports the Efficient Market Hypothesis that builds a link between information and the stock price (Fama, 1970). In this study, new information affected

the stock price, and strategic announcements on M&A presumably had a positive impact on the acquirer's share price. The change in share price was fast and reasonably high compared to previous studies that showed no or very little increase in the acquirer's share price.

## 5.2. Merger and acquisition categories

The next conclusion is that the direction of a strategic move matters as long as it is away from the existing strategy. If the company makes an unrelated move, it create a more abnormal return than a horizontal or related move. In this type of study, it is interesting to see how fast the stock market reacts to different types of announcements. In a normal horizontal move where a company acquires its direct competitor, the reaction is fast, but the absolute abnormal return is lower than in an acquisition where the company moves either toward its customers or penetrates totally new markets. Such moves can be symptomatic of moving to a service domain or extending the business away from the current center of gravity. They are interesting, but the stock market takes somewhat longer to analyze them.

*Research question 2: Do announcements of different M&A types create investor reactions and do these reactions differ?*

The questions were answered in the affirmative, because different types of acquisitions do differ in both M&A type and analysis type. The highest compounded abnormal return was for unrelated acquisitions, in which the target company's business was not close to the acquirer's current business. The challenge was that there were only a few acquisitions of this type. Both day-level and transaction-level analyses showed over an 11% CAR for these acquisitions. The smallest CAR measured was for the horizontal acquisition type, which was also the most common M&A type during the study period. Most previous studies have reported a difference between types of acquisitions (e.g. Lubatkin, 1983; Uhlenbruck et al., 2006; Oler et al., 2008; Loughran & Vijh, 1997; Gaur, et.al., 2013; Lee et al., 2011), but they used only one method to compare their results.

Daily analysis and transaction-level analysis produced similar results; however, in the unrelated backward type the difference was significant only in transaction-level analysis ( $p < 0.1$ ). This acquisition type reflects a move toward company suppliers and raw materials (Brouthers et al., 1998). The vertical acquisition backward could be categorized as a less risky move, because the company knows its customer requirements for the new position, because it has been there. This move has another impact, because the old competitors may now become customers of the new extended company. Briefly, the investors value efficiency gains over market opportunities.

Earlier research has not proved a difference between daily and transaction-level results, that the length of the event window affects the results on day level vs. transaction level. On the other hand, some scholars have compared daily results with very long event windows and seen a similar pattern of contradictory results (Oler et al., 2008). Therefore, different-length event windows measure different topics.

The second hypothesis on related and unrelated was not supported, but this was partially due to the very small samples of unrelated acquisitions. The abnormal return of unrelated acquisitions was markedly high, but as stated earlier in unrelated acquisitions, increased efficiencies vary in technological or product market activities. High variability creates more variance also in returns. Perhaps the unrelated acquisition samples in this study were too small to include also very low returns. The results may also indicate that unrelated acquisition announcements included surprising strategic moves, and that investors reacted to them more positively than to traditional related acquisitions. This was also seen in the third hypothesis, in which a horizontal acquisition release created a smaller abnormal return than a release on a non-horizontal acquisition. Both findings indicate that the low long term benefits of horizontal acquisitions were already taken into account in the short-term investor reactions. Similarly, related acquisitions were rewarded with lower returns than unrelated acquisitions. Strategic moves that differ from expected strategic moves had higher abnormal returns than traditional acquisition announcements.

The above may show past experience and investors learning from horizontal acquisitions, where market shares are difficult to keep for a merged company. Though companies may seek a monopolistic position, they may find it difficult to reach due to anti-trust legislation. Additionally, in the small Finnish (and EU) markets, monopolistic goals may show more easily than in global markets. Though some companies listed on the NASDAQ OMX Helsinki operate in global markets, not all of them do. The theoretical implication why the second and third hypotheses did not follow previous studies is possibly a combination of investor experience with horizontal acquisitions not being profitable in the long term and a low probability of reaching a monopoly position in the global economy.

Hypothesis 4 supports the same view that staying in the traditional business environment is rewarded with lower abnormal returns than a move to a new place in the industry chain.

When a move toward customers produces a high abnormal return, it rewards the more expansive strategy to, e.g., grow in the services domain or take a larger share of the delivery part and possibly become more customer oriented. These are very typical moves in 21<sup>st</sup>-century strategies, as many companies, first, seek revenue growth from services and, second, a possibility to distinguish themselves from their competitors with services.

Another theoretical outcome of this study is another view to the traditional “horizontal vs. non-horizontal acquisition” debate, because there are many other alternatives to divide M&A announcements. This study added to the categories based on Galbraith’s diversifications (Galbraith, 2002) types to cover both directions (forward and backward) and made it simultaneously possible to reserve the comparison of more traditional categories for both horizontal vs. non-horizontal and related vs. unrelated categories. The difference between a horizontal and a related acquisition may be somewhat unclear—especially in larger companies—and hide their exact relationship. The same applies to unrelated vs. related; i.e., is it feasible and enough to divide acquisition categories in this way or would another categorization make more sense to pinpoint the company’s strategies more accurately? This study has shown one way to categorize, but others may be justified as well.

### **5.3. Other variables**

The third research question covered all control variables, and the M&A type proved to be the most important variable in estimating the abnormal return.

*Research question 3: What other independent factors influence investor reactions to M&A announcements?*

As proved above, the answer to the third research question is true, and the results differ because of one major difference in the independent factors. As explained in Research Question 2, a vertical move toward company suppliers was significant only in transaction-level analysis ( $p < 0.1$ ). For all other independent factors, both analyses showed similar investor reactions.

Additionally, cultural proximity had no impact, though it has been a popular topic, and many researchers have found difficulties with integration. One statistically significant variable was the relational size and closely related control variable of turnover. Interestingly, when a large enterprise makes an acquisition, it does not really have an impact on the share price, but in smaller companies the abnormal return can amount to a few percentage points (on average 3.5%).

A final general conclusion is that corporations vary a lot in their announcements of events of this scale. Though mergers and acquisitions often have a direct bearing on shareholder value, the announcements do not always explain the reasons behind the acquisition, and the level of the announcement may vary considerably. Some corporations are clear about their reasons, but others sometimes even forget their announcement or only briefly mention the acquired company and the reason for the acquisition. Obviously, a large investment made in an acquisition would benefit a company more if its announcement clearly described its strategic goals.



## 6. CONCLUSIONS

Mergers and acquisitions have been very popular means for corporations to acquire new technologies, increase market share, offer new services, or other noble goals to increase corporate market value. As many researchers have shown, management has also other goals that are not easily linked to increasing a corporation's share price even in the long term. This study shows that an increase in the share price is visible in the short term. Though investors also use means other than corporate official announcements for their investment decisions, the total number of M&A events is significant enough to conclude that press and stock exchange releases are essential to decision-making. Even though the average abnormal return is only 0.8%, it represents an average of about 7.5M€ per acquisition announcement. This is a significant amount of money available for short-term investors looking for fast revenues in daily trading. This study shows that M&A events generated a significant abnormal return in the NASDAQ OMX Helsinki during 2006–2010.

### 6.1. Key findings

The main objective was to achieve a positive compounded abnormal return (CAR) for all M&A actions. This was realized, and the abnormal return was positive in all M&A categories.

The next major result was that transaction-level analysis was able to find CAR in unrelated M&A action toward raw materials when day-level analysis produced no CAR.

Finally the multiple regression model using transaction-level analysis improved the coefficient of determination  $R^2$  from 0.178 to 0.427 when compared to daily-analysis.

One contribution to the literature is to improve the current definition of related and horizontal categories. More detailed categories are needed to focus on company strategic moves and their impact on the share price. All unrelated acquisitions create a high abnormal return, but they occur seldom to make a sufficiently large sample for research. They represent rather an unexpected change in the strategy that is rewarded very positively.

Faster pace, an increased number of shareholders, and increasing demand for transparency—these all support the more advanced analysis methods and the calculating power of computers that make them easier and more accurate. By analyzing all types,

we can easily identify a valuable share that is worth investing in, also in the long term. Therefore, transaction level analysis should be a good supplement for daily analysis.

Another reason why the event analysis method should be further developed is the inaccuracy of timing, as described earlier in the document. Because corporate announcements are published around the world basically all day long, it is not good enough that their first impacts are observed the following day; event study does not take this into account. Though the incorrect dates represent only about 1% of all events in this study, this error is yet easy to correct with a more accurate analysis method.

The third reason for the new event analysis is that the number of “correct” releases increases with a narrow event window, because the number of confounding releases decreases. This makes possible a larger number of releases and perhaps also enables study of the more rare releases and their impacts.

A possible topic to discuss is how well a company could increase its share price at the time it announces an M&A event. This could lead to better communication and increased transparency with the shareholders and, furthermore, give a direct incentive to executives responsible for planning strategy and/or corporate investor relations.

The most obvious implication to management is to ensure that the content of the press and stock exchange releases reflects the management’s intended strategic message. There are many ways to clarify releases, but the way a stock exchange or press release is written may directly impact the stock price. The merger and acquisition categories introduced in this study are just one way of making categories reflect a company’s move in its competitive environment.

The next managerial implication is to ensure that the acquisition decision is formulated in line with the legislative guidelines on the corporate mission to generate profit for its shareholders, and that management honours its obligation to promote the company’s benefit.

## **6.2. Validity**

Validity is a term that describes how well a measure measures the concept it represents. The literature contains several different validity types such as internal validity, statistical validity, construct validity, convergent validity, discriminant validity, cross-validation, face validity, concurrent validity, external validity, content validity, sampling validity, criterion validity, predictive validity, and empirical validity. Some of them are subtypes of others, or they partially describe similar types with different names. The definition of research validity from Carmines & Woods (2005) was used in this study. They divided validity into three categories: *content validity*, which focuses on the extent to which a particular empirical measure reflects a specific domain of

content; *criterion-related validity*, which concerns the correlation between a measure and some criterion variable interest; and *construct validity*, which focuses on the relationship between the measure and theoretical expectations of other measures.

### *Content validity*

One main question related to content validity is “How well does the measurement represent what it is supposed to measure?” First, the entire domain of relevant content must be able to be specified in the measurement situation. It is easy to say about this requirement that all stock exchange releases were found from the database available in Kauppalehti. However, a comprehensive set of press releases is practically impossible to find, because companies, especially those active abroad, issue press releases in various languages, but merger and acquisition releases are normally published as stock exchange releases. Though it is a challenge to triangulate content, it can be done with M&A, because a database is available there for storing all acquisitions. Two listed companies (Talentum Oyj and Pohjola-pankki Oyj) keep track of all merger and acquisition announcements made in Finland, whereas stock exchange releases are stored in the Kauppalehti database (part of Alma-Media Oyj). Thus it is fair to say that the first prerequisite of content validation is achieved by using two sources of information. The second step is to select or construct specific indicators to be used in the measure. In this study, it meant in practice a guidebook on how to semantically analyze a press or stock exchange release that indicates an M&A event is imminent. Here the event is quite easy to analyze, because in most cases the announcement explicitly mentioned the share that was acquired of the company. It is a bigger challenge to analyze a different class of M&A; that was tackled using triangulation with three different people using with the same content analysis guidebook. This leaves, of course, the question of how well the guidebook represented the class. This was also triangulated with the same three people to avoid misinterpretation. Though triangulation is not a 100% sure way to analyze a text semantically correctly, it yet gives a solid basis for improving validity. Gray & Densten (1998) explain this by saying that “triangulation of methods strengthens the researcher’s claims for the validity of the conclusions drawn where mutual confirmation of results can be demonstrated.” Though the method is the same, analysis is done by multiple researchers; hence it is fair to say that triangulation improves the accuracy of analysis.

Content validity was achieved by using only two channels of input, i.e., official corporate stock releases and official corporate press releases. An official press release is one that the company has released on its Web pages or directly to the press. Rumors about acquisitions or mergers were ignored if the company did not officially state the fact in their press or stock exchange release with a recorded date and time.

### *Criterion related validity*

Criterion validity concerns the relationship between a measure and some criterion variable of interest. It is determined by the measure and its criterion. In this study, it was easy to see how well merger and acquisition announcements impacted the abnormal return. Criterion validity is predictive to some extent, because when a merger and acquisition event occur, their abnormal return could be estimated; however, because the time window is very narrow, criterion validity can here be defined as concurrent estimation. A correlation between the abnormal return and control variables is shown in Table 9.

Also small companies—as defined by the EU in 2003—are listed on the NASDAQ OMX with a small security turnover in the stock market. We can question if their daily volumes for all securities were high enough to warrant the criterion of efficient markets, which is a prerequisite with the Efficient Market Hypothesis (EMH).

To find the right set of control variables correlating with an abnormal return, previous event studies on mergers and acquisitions were used with a particular focus on announcement content. This was because extensive analysis of both the acquiring company and the target takes time. Also because the scope of the study was fast response rather than long-term analysis, it was questionable how extensive studies should be to be required to have good control variable coverage. These were the main reasons why for example payment method was left out as it has been one common control variable. Similarly the difference between an acquisition and a merger was interesting, however it was not clearly stated in the release. These could have been found from other sources or analyses afterwards, but the intention of this research was to study immediate and short-term impacts. The correct selection of control variables is always a challenge that may decrease the criterion related validity.

### *Construct validity*

With construct validity, researchers are interested in the relationship between the measure and theoretical expectations of other measures. Carmine & Woods divided construct validity into three distinct steps (Carmines & Woods, 2005):

- 1) Theoretical relationship between the concepts must be specified.
- 2) Empirical evidence must be examined.
- 3) Empirical evidence must be interpreted in terms of how it clarifies the construct validity of the particular measure.

In the first step, the theoretical relationship between an action and an abnormal return has been widely investigated with event studies over the past 20 years. Event studies have been criticized for reflecting too much value creation. Used in such a way, an event study does not give comprehensive results; however, if the intention is to measure

how investors have evaluated the company's recent action, then event study is probably the best if not the only measure. Event studies show well how comprehensively a company has been able to inform its investors about its strategic decisions and investments made to achieve these goals. In this respect, the theoretical results admirably fulfilled the criteria of construct validity. On the other hand, the study did not yield valid results for the long-term profitability impact due to merger and acquisition events.

When empirical evidence was sought for the theory, the main level hypothesis was proved valid. The next level empirical results on different classes and categories were not proved in previous studies. One reason may have been their small number of samples in each class or their different classification of related and unrelated. In many previous studies, the SIC (Standard Industrial Classification) code was used to define this relatedness; in this study, the relatedness was more subjective, because it relied on semantic analysis of press or stock exchange releases. The SIC code is not always the best method to indicate relatedness, because a conglomerate may have one unit closely co-operating with a smaller player; however, the small section does not have the same SIC, as it is part of the conglomerate. In addition, within the same value chain, SIC coding is not 100% sure either. For example, a metal mining services company has a SIC code of 1081 and a company manufacturing fluid power cylinders 3593, and they can have an intensive customer-supplier relationship. Therefore, SIC codes alone are not enough to measure relatedness.

The length of the event window must be defined, because it affects results, as proved also in this study. Only a few event studies use intraday data, a decision based on a study by Reboredo et al. (2012). They used several lengths for event windows and finally settled for a one-hour window, because it yielded the best out-of-sample profitability for both low and high volatility sample periods.

### **6.3. Reliability**

Reliability describes how well a test, measurement, or experiment produces the same results if repeated.

#### *Content analysis reliability*

Content analysis reliability was ensured by triangulating first the sources of the press and stock exchange releases on the Kauppalehti web site, all M&A data stored by Talentum & OP-Pohjola, and companies' own web sites. This step was taken to make sure that the press and stock release content was interpreted correctly to represent an M&A event.

An M&A release was triangulated by three individuals, who used a code book to categorize the event into pre-defined acquisition classes. The process followed the six steps defined in Neuendorf's (2002) guidebook. One topic that reduces reliability in content analysis is the fact that especially large companies may have overlapping functions or areas where the acquiring and target company relatedness is estimated. Therefore, many companies may be categorized as related though they may have clearly competitive divisions. Also Fan & Goyal (2006) found this reliability risk.

### *Event study reliability*

In this study, all press and stock exchange announcements without a time stamp were rejected. This is one major difference if daily closing price analysis uses all the data. If a study is conducted only with daily data, the number of samples would be 73 events more, which represents about 20% more data. In a normal event study, these would be taken into account, though the possibility of an error of an event being observed on the following day would decrease reliability. Therefore, the method used in this study limited the size of the sample too much, though in contrast increased the accuracy of analyzing the events with the correct date and time.

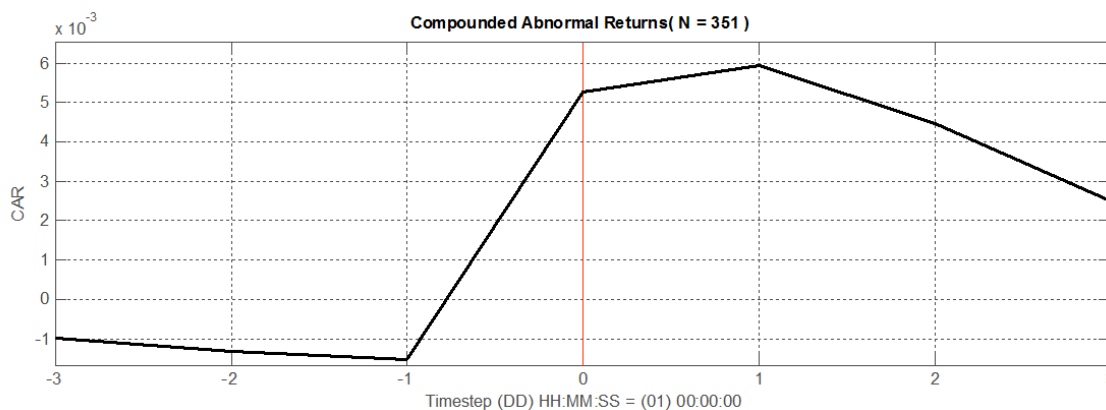
Another aspect is that in this study the event window was the same in both cases, which reduced the number of events in transaction-based analysis by 65 instead of 28. According to the event window definition, the number of rejected M&A announcements would have been 28, because the event window would have been only one hour and not one day. On the other hand, using the same event window enables comparison of two methods using the events.

In this respect, both the absence of time stamps in daily and the too wide event window in transaction-based analysis reduced data samples by as much as 30%, yet both increased the validity of the data, but decreased reliability if other researchers do not treat them similarly.

One factor that may reduce reliability is a leak of preliminary information on an acquisition; it may affect the acquiring company's stock price behavior prior to the acquisition and result in a higher than expected abnormal return, but it could be avoided with a very long estimation period. In this study, the estimation period was 20 days. However, an acquisition is usually a long process, and a possible information leak may then affect the estimated price.

The daily analysis method shows the fact that most value is created during the first hour after an event, and if the event window is extended to multiple days, the compounded abnormal return, in fact, drops over time. Figure 28 shows a downward trend after the event date and the following date. In this type of daily analysis, it is good to remember that some events appear on the following day and not exactly on the day the event was

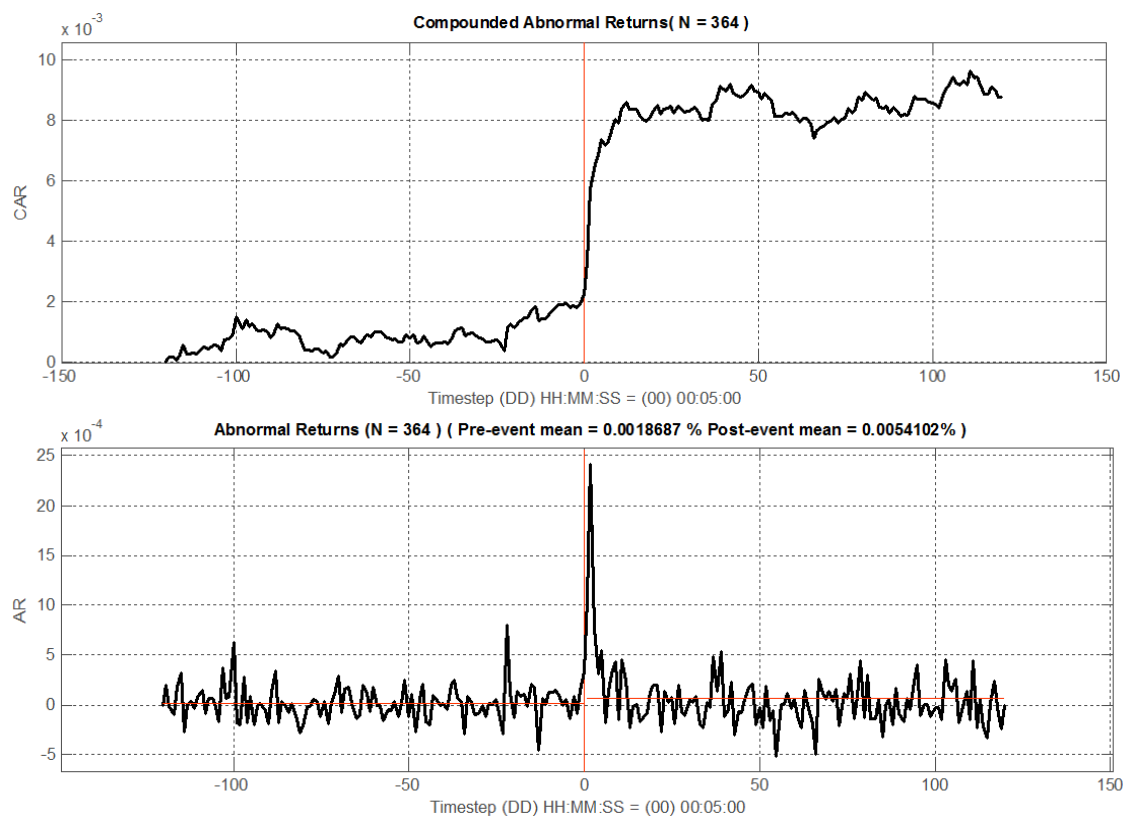
released. The figure also shows clearly that over 50% of gained value is lost on the third day after the event. Because for seven consecutive days, confounding releases were not taken into account here, the trend gives only a basic idea of what normally happens after M&A events. Figure 41 shows seven consecutive trading days consisting of three days before the event, event date, and three days after the event.



*Figure 41. Compounded abnormal return for three days before and three days after the event.*

Because the main goal of this study was to find a more accurate method for studying company actions and their impact on security prices, naturally some improvements were made to event study methods. The right comparison method would be discussed, because in previous studies, analysis was always the CAR. With a short event window, it is worth studying if the right measure is abnormal return rather than the CAR.

The comparison in Figure 42 shows that an abnormal return reaches a sharp peak at the time of an event, because the compounded abnormal return is not as volatile to timing, because it summarizes abnormal releases over the event period. When a compounded abnormal return and an abnormal return are compared, the latter is very sensitive to timing, which means that one event can be highly positive at the time of the event and zero or even negative shortly after the peak. To promote trading, both buy order and sell order must meet, and timing may vary significantly if the traded volume is low. Therefore, it is justifiable to compare compounded abnormal returns, because they are more robust against these errors—especially in this study, which aimed to measure differences in the compounded abnormal return between the groups.

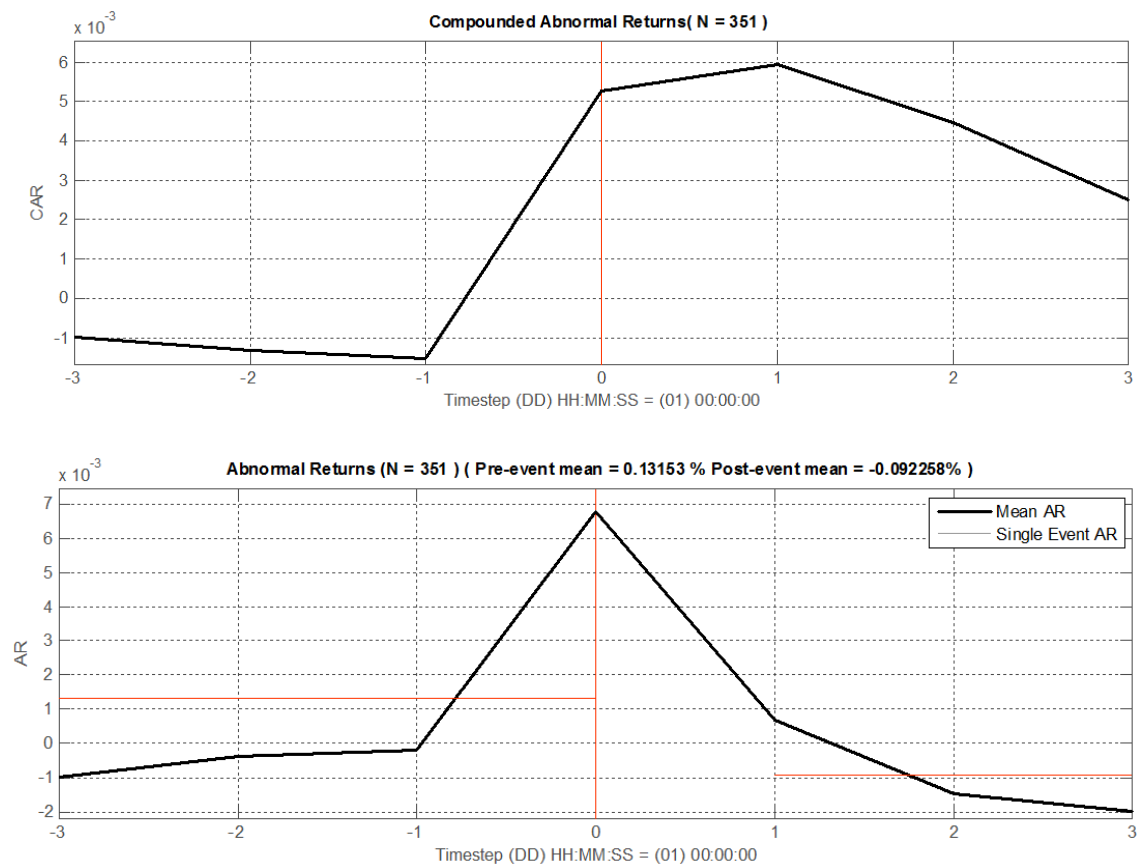


*Figure 42. Comparison between a compounded abnormal return (above) and an abnormal return (below).*

If the research topic is volatility or reaction time or some other measure related to investigating speed or change in speed, then the abnormal return may give a better resolution. In this study, which focused on value change, it made more sense to use the compounded abnormal return. In addition, the difference between the daily analysis method and the transaction-based method was compared.

On the other hand, in the comparison of the daily closing price in Figure 43, the AR would make more sense, because it reduces sensitivity to timing errors and increases the visibility of the event date's and the following date's abnormal return. The challenge in cumulative abnormal return analysis is that most events are visible at the event time, but some events cannot reliably be expected to appear on the following day (i.e., those released after the stock closing time).





**Figure 43.** In daily closing price comparison, the abnormal return (below) gives clear indication on the event day compared to the compounded abnormal return (above).

One discussion topic is the length of the observation window. Stock trading companies are now boasting about their capabilities in benchmarking their efficiency in microseconds, as shown by the following quotation from the NASDAQ OMX Executive Vice President Adena Friedman: "With Market Replay Europe, users can discover exactly how orders interacted with the market down to the millisecond at which the trade occurred, all in an easy-to-use visual tool." (Nasdaq 2009)

Because the daily analysis method very slowly observes reactions to a certain event type, a new way is needed to capture the fastest market reactions. Since some strategic moves have a very long-term effect on corporate success, a longer-term study is needed. The new, faster method should complement more than substitute for the old one and provide a new angle to event studies. Simultaneously, traditional event studies could benefit from an even longer event window.

### *Tools reliability*

Statistical abnormal returns were first calculated with the Matlab™ computer program, and the results were further analyzed with SPSS™ statistical tools, which calculated correlations and multiregressions. The Matlab™ program used the calculation methods introduced in Campbell's book on econometrics (Campbell et al., 1997). The calculation

of the program was verified for correctness by an external specialist, not only by the Matlab™ programmer.

#### **6.4. Limitations of the study**

This study, made on the Finnish stock exchange, the NASDAQ OMX Helsinki, represents an eventful period in stock exchange history. Because some of the companies were listed also abroad, their stock price impacted also overseas trading. In addition, the few companies listed abroad had it in common that they launched press releases abroad with a possible impact on their stock price. The releases in foreign countries may have skewed this study to some extent, because most listed companies are active also abroad and do not list all press releases on their websites.

The efficient market hypothesis has often been criticized, but in general it makes the rather straightforward assumption that a new piece of information may affect the corporate stock price. This is the only part that was used in this study, and the positive impact of new information has been shown very reliably in this study. The next questions are: What does this mean in practice; what conclusions can be drawn from this behavior; and in what circumstances can these conclusions be used? Recently, there have been studies on how much (Shijven & Hitt, 2012) the stock markets are impacted by the behavioral mechanisms of investors. However, they have not taken into account the current method of using a short event window that would give more visibility to the trading counterparts and possible group behavior. On the other hand, thorough research on buy and sell orders and their issuers would help trace this information.

Furthermore, event studies have been criticized as a research method that analyzes the implications of strategic actions, but as has been shown, there is a clear and measurable response to these actions. In this case, the method is useful, but what it really measures is debatable. It indicates at least how investors react to a strategic company move, but it does not predict the success of an acquisition in the long run. Therefore, the warnings about not making false conclusions are valid but also point to the history of event studies. The literature contains only a few studies that draw direct conclusions from event studies and their reliable analyses on certain events, and in most articles, researchers have been cautious to make fast conclusions.

Investors use, of course, other methods than corporate official announcements to make their investment decisions, but the total number of M&A events is significant enough to conclude that press and stock exchange releases are essential to decision-making. This brings one negative implication to short-event window analysis in that its long-term impact cannot be monitored. This is also one of the most commonly criticized areas of event analysis as a method.

Selection of control variables, and their impact, or rather lack of impact on the abnormal return can be similarly subjected to criticism. Surprisingly, trend data has no statistically significant impact on the abnormal return.

## 6.5. Research topics for further study

If not yet, then at least future algorithmic trading, a.k.a. automated trading, may well take into account historical information on certain types of events. At least the accuracy of predicting market moves may improve when all classes are studied. This also requires good algorithms for semantic analysis, which react faster than humans in analyzing corporate announcements. And finally, faster moves are even more reason for companies to improve their communications for desired ends. Algorithmic trading varies on different stock exchanges and over time, but it has been popular in American markets and has been growing globally in the 21st century. In 2007, algorithmic trading was 38% of all transactions on the NYSE, and in 2009 about 70% in the whole United States (Clark, 2010), whereas on the OMX Helsinki, it was about one-third (Erola, 2007). In 2007 in Finland, the response time (or latency) between a buy order and a sell order was estimated at about 15 milliseconds, though according to Clark, the latency was measured in microseconds rather than milliseconds. As trading is becoming dependent on time, stock exchanges are already offering co-location with their main order book computers, at least on the NYSE, Euronext, Eurex, Intercontinental Exchange (ICE), and the Chicago Mercantile Exchange (CME).

There is also a good reason for high frequency trading becoming so popular, and it is simply profits. In 2008, companies involved in high frequency trading made profits of USD 21 billion, many of them based in Chicago and staffed with former floor traders (Clark, 2010).

As the time window got shorter, other implications became apparent. One was an increased oscillation around the time of an event. This was not within the scope of this study, but in addition to studying “only” the abnormal return, it would be interesting to study increased oscillation as well. Therefore,  $\beta_i$  in the abnormal return equation, which describes the volatility of a security  $I$ , would also be interesting to study together with its changes at the time of an event.

This study focused on different strategic moves and their comparison on the stock market level. This meant that the company level short-term impact was not calculated, and as explained in section 4.10, no statistical correlation was found between the number of acquisitions and long-term stock price evolution. However, they would be interesting to study on company level and classify, e.g., as was done in this study. The study should then also consider dividends paid to shareholders. Of course, in this respect, causality may be difficult to measure, if a company has already succeeded in

strengthening its position even further, or if it is successful because of management skills to implement its expansion strategy.

The dilemma originated from different sizes of companies and the number of securities traded in a day. In practice, when we compare a large company making an announcement and a small company with markedly fewer shareholders and hence possible sellers doing the same, we have an interesting situation for further research. For a trade to happen, there should be a sell order and a buy order, and they should meet. If an acquisition positively increases a company's valuation, it should be interesting to see how new buy orders change the stock price. We could face a new scenario if buyers like to buy shares at a higher price, but buy orders do not meet sell orders and no trades are made. Also with shares with very small volumes, the order book would add new information—possibly.

In case analysis were changed from transactions to offering-level data, data would multiply, because the sell and buy orders that do not meet are much more numerous than realized transactions. Because a finalized trade is the result of a transaction, the buy and sell order would describe better the demand and mental valuation of a security. Hence if an announcement creates more demand for securities than are available, i.e., buy orders are higher than sell orders, securities would not be traded, yet the response to the announcement is significantly positive. The same works also in the opposite direction, when a negative announcement curtails the buy orders, but there are no sell orders to the lowered price transactions that do not occur. Because a trade is the end result where two intentions have already met, sell and buy orders could directly measure intentions. This would directly link a subjective (or algorithmic) response to the stock or press release of a certain event, even though it would lead to a stock transaction. This can be further developed to see if some intentions affect algorithmic analysis more directly and, hence, open a possibility for arbitrage. Two main ways can be monitored: spoofing and layering. *Spoofing* is the term for unreasonably high buy order or sell order input in the order book. This raises too high expectations and creates pressure in the market. The order level is set very close to the best offer, but the trade is cancelled or re-entered prior to one that takes place. Another way to manipulate stock prices is *layering*, where one big buy or sell order is manipulated by multiple small orders in the opposite direction. In practice, this means that when a trader wants to sell a large number of shares, he/she puts in several small-size buy orders. This is done in the hope of increasing the virtual demand of the shares, which would lead to a higher selling price. After the initial sell order is sold, the seller cancels all small buy orders.

Another interesting observation would be a leak of insider information, especially in securities whose normal trade volumes are low. When we observe trades in which a handful of people are listed as insiders and when order books prior to the event undergo a big change, insider information is difficult to detect without combining all data and

summarizing it over a long period. This would help point out a few sporadic events, because transaction-level analysis takes into account even the announcement of an individual event.

Manipulation of a stock price is always punishable—also in high frequency trading—as is the use of insider information (Finanssivalvonta, 2012). When stock transaction latencies go down first to milliseconds and then to microseconds, and when the abnormal return is measured on a daily level, the new method should be used in the future. Currently, research conducted on a daily level can be compared to traffic lights being monitored with an annual calendar. Therefore, abnormal return research could justifiably be developed closer to today's real trade transactions.

## 7. BIBLIOGRAPHY

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## 8. APPENDICES (2 pieces)

<i>Event Date</i>	<i>Company Affected</i>	<i>Acquired company</i>	<i>Confounding date</i>	<i>Confounding event type</i>
2.2.2007	Ahlström	Fabiano Filter Media SpA	2.2.2007	Dividend/Earnings Announcements
1.2.2008	Ahlström	Friend Group Inc	1.2.2008	Dividend/Earnings Announcements
11.8.2010	Ahlström	Shandong Puri Filter & Paper Products	11.8.2010	Dividend/Earnings Announcements
6.5.2010	Aldata	Cosmic Solutions Ltd.	6.5.2010	Dividend/Earnings Announcements
1.10.2008	AlmaMedia	Vuodatus.net-blogipalvelu osaksi Alma Mediaa	1.10.2008	Major Executive Change
1.11.2010	Aspo	KSM-Lämpötekniikka Oy	1.11.2010	Debt or Equity Related Event
1.7.2009	Basware	TAG Services Pty Ltd	1.7.2009	Contract Awards
24.10.2008	Biotie	elbion GmbH	24.10.2008	Dividend/Earnings Announcements
21.11.2006	Cencorp	TMD	21.11.2006	Major Executive Change
26.3.2009	Cencorp	Savcor Group Limited /Telecom liiketoiminta	26.3.2009	Debt or Equity Related Event
3.9.2007	Revenio	Finnish Led-Signs Oy	3.9.2007	Major Executive Change
13.2.2009	Elisa	Xenetic Oy	13.2.2009	Dividend/Earnings Announcements
13.2.2009	Elisa	Trackway Oy	13.2.2009	Dividend/Earnings Announcements
27.2.2006	Exel	Pacific Composites Pty. Ltd	27.2.2006	Dividend/Earnings Announcements
25.7.2006	Kemira	Kolorit Paints	25.7.2006	Joint Venture
22.3.2007	Kemira	Arkema	22.3.2007	Debt or Equity Related Event
22.11.2006	Keskisuomalainen	Savon Mediat Oy	22.11.2006	Dividend/Earnings Announcements
1.10.2008	Kesko	Termalin Oy (Suvi, Palta-veneet)	1.10.2008	Debt or Equity Related Event
1.12.2010	Kone	Virginia Elevator Company	1.12.2010	Debt or Equity Related Event
31.7.2007	Konecranes	Kongsberg Automation AS	31.7.2007	Debt or Equity Related Event
31.7.2007	Konecranes	Reftele Maskinservice AB	31.7.2007	Debt or Equity Related Event
1.8.2007	Konecranes	Savcor One Oy	1.8.2007	Dividend/Earnings Announcements
29.7.2009	Konecranes	Knight Europe GmbH & Co. KG	29.7.2009	Dividend/Earnings Announcements
8.2.2006	Metso	Aker Kvaernerin Pulping ja Power	8.2.2006	Dividend/Earnings Announcements
15.1.2007	Metso	Metso-SHI Co., Ltd.	15.1.2007	Contract Awards
27.5.2008	Metso	Lignoboost AB	27.5.2008	Acquisition activity
14.10.2008	Metso	G & F Beltline Services Pty Ltd	14.10.2008	Contract Awards
23.8.2010	Metso	Camoplast Oy:n kumihihnaliiiketoiminta	23.8.2010	Contract Awards
5.11.2010	Metso	Karmannin avoautojen kattoliiketoiminnan	5.11.2010	Contract Awards
28.6.2006	Metsäboard	Merger of M-real Petofi Printing House Ltd. and M-r	28.6.2006	New Products
8.8.2006	Nokia	Loudeye	8.8.2006	Contract Awards
31.8.2006	Nokia	gate5	31.8.2006	Debt or Equity Related Event
4.12.2007	Nokia	Avvenu	4.12.2007	Forecasted Changes in Earnings or Sales
3.5.2007	Oral Hammaslääkärit	Helsingin Hammaslääkärikeskus	3.5.2007	Dividend/Earnings Announcements
31.10.2006	Oral Hammaslääkärit	Espoon Hammaslääkärikeskus	31.10.2006	Dividend/Earnings Announcements
29.4.2009	Oral Hammaslääkärit	Maariankadun Hammaspaiikka	29.4.2009	Dividend/Earnings Announcements
1.2.2007	Oriola-KD	Medith Oy:n sairaalaravikkeiden ja -laitteiden markki	1.2.2007	Dividend/Earnings Announcements
23.4.2008	Outokumpu	SoGePar	23.4.2008	Dividend/Earnings Announcements
16.12.2010	Panostaja	Suomen Graafiset Palvelut Oy Ltd	16.12.2010	Dividend/Earnings Announcements
2.10.2006	Pohjola-pankki	OKOn ja Opstockin sulautuminen	2.10.2006	Debt or Equity Related Event
21.12.2007	Pohjola-pankki	K-Rahoitus Oy	21.12.2007	Forecasted Changes in Earnings or Sales
3.4.2007	Poyry	ZAO Giprobun Engineering	3.4.2007	Contract Awards
27.6.2007	Poyry	Evata Worldwide Oy	27.6.2007	Contract Awards
5.10.2007	Poyry	Ingenieurgesellschaft Witzenhausen Fricke & Turk	5.10.2007	Debt or Equity Related Event
1.10.2008	Poyry	ETT Projectos S.L	1.10.2008	Contract Awards
3.12.2008	Poyry	Kündig & Partner AG	3.12.2008	Contract Awards
1.2.2010	Poyry	PRG-Tec Oy	1.2.2010	Major Executive Change
14.6.2010	Poyry	ETV-Eröterv	14.6.2010	Contract Awards
15.8.2006	Ramirent	Konevuokraamo P. Salminen Oy	15.8.2006	Dividend/Earnings Announcements
25.4.2006	Rautaruukki	AZST-Kolor CJSC	25.4.2006	Restructuring/Divestiture
5.2.2010	RuukkiGroup	Intermetal Madencilik ve Ticaret A.S.:	5.2.2010	Major Executive Change
13.8.2008	Sanoma	Auto Trader	13.8.2008	Debt or Equity Related Event
27.1.2006	Solteq	Artekus Oy	27.1.2006	Dividend/Earnings Announcements
23.4.2009	Stora Enso	Sunila	23.4.2009	Dividend/Earnings Announcements
27.9.2007	Takoma	Hervannan Koneistus Oy:n osakekannan ja Tampereen	27.9.2007	Major Executive Change
15.12.2010	Tectia	Siltanet Oy	15.12.2010	Forecasted Changes in Earnings or Sales
7.2.2008	TeliaSonera	LMT, Lattelcom	7.2.2008	Major Executive Change
26.9.2008	TeliaSonera	SpiceNepal, Applifone	26.9.2008	Major Executive Change
21.8.2006	TietoEnator	TOPAS Consulting GmbH	21.8.2006	Contract Awards
21.9.2006	TietoEnator	Laps Care AB	21.9.2006	Contract Awards
6.11.2009	Turvatiimi	Otsu palvelut Oy	6.11.2009	Dividend/Earnings Announcements
19.8.2010	Turvatiimi	Turvatiimi Palvelut Oy	19.8.2010	Dividend/Earnings Announcements
16.10.2006	Wärtsilä	Stockholms Fartygsreparationer AB	16.10.2006	Contract Awards
4.5.2007	Wärtsilä	McCall Propellers Ltd	4.5.2007	Dividend/Earnings Announcements
3.3.2008	Wärtsilä	Maritime Service AS	3.3.2008	Contract Awards

*Table A1.* Confounding events based on one day event window

*Table B1. Seven new companies were listed in NASDAQ OMX Helsinki between January 2006 and December 2010.*

<i>Company name</i>	<i>Stock listing date</i>
Ahlstrom Oyj	14 March 2006
Oriola-KD Oyj	3 July 2006
Outotec Oyj	10 October 2006
SRV-Yhtiöt Oyj	12 June 2007
Talvivaara Oyj	11 May 2009
Aktia Oyj	29 September 2009
Tikkurila Oyj	26 March 2010

*Table B2. Twelve de-listings took place in NASDAQ OMX Helsinki between January 2006 and December 2010.*

<i>Company name</i>	<i>Date of de-listing</i>	<i>Acquiring company</i>
Analyste Oyj	January 31, 2006	Basware Oyj
E.ON Finland Oyj	February 2, 2006	Fortum Oyj, renamed as Fortum Espoo Oyj; delisting on September 5, 2006)
Suomen Spar Oyj	May 19, 2006	SOK
Leo Longlife Oyj	September 19, 2006	Leo Longlife Oyj acquired Tiimari Oyj; merger is using Tiimari Oyj name
Sentera Oyj	September 26, 2006	Sysopen Digia Oyj
Kekkilä Oyj	November 30, 2006	Vapo Oy
Pohjola-Yhtymä Oyj	December 31, 2006	OKO Pankki Oyj
Suomen Helasto Oyj	May 30, 2007	Panostaja Oyj
Iittala Group Oyj	June 29, 2007	Fiskars Oyj
Kasola Oyj	December 10, 2007	Nurminen LogisticsOyj
Larox Oyj	October 15, 2009	Outotec Oyj
Tamfelt Oyj	November 5, 2009	Metso Oyj



*Table B3. Fourteen companies changed their names and stock symbols during the research period.*

<i>Date</i>	<i>Symbol</i>	<i>Current name</i>	<i>Previous Symbol</i>	<i>Previous name</i>
27.11.2006	CRA1V	Cramo Oyj	RAK1V	Rakentajain Konevuokraamo Oyj
4.6.2007	GLA1V	Glaston Oyj	KRO1V	Kyro Oyj
2.1.2008	NLG1V	Nurminen Logistics Oyj	KASAS	Kasola Oyj
20.4.2009	REG1V	Revenio Group Oyj	DSO1V	Done Solutions Oyj
22.4.2008	WUF1V	Wulff Oyj	BTN1V	Belton-Yhtiöt Oyj
2.5.2007	HKSAV	HKScan Oyj	HKRAV	HK Ruokatalo Group
12.4.2006	ORA1V	Oral Hammalääkärit Oyj	END1V	Endero Oyj
1.10.2008	SAA1V	Sanoma Oyj	SWS1V	SanomaWSOY Oyj
17.3.2008	DIG1V	Digia Oyj	SYS1V	SysOpen Digia Oyj
12.12.2007	GEO1V	Geosentric Oyj	BNFSV	Benefon Oyj
21.4.2008	WIC1V	Westend ICT Oyj	TJT1V	TJ Group Oyj
13.2.2007	XNS1V	Ixonos Oyj	TIX1V	Tieto-X Oyj
6.4.2010	TEC1V	Tectia Oyj	SSH1V	SSH Communications Security Oyj
2.1.2008	TRH1V	Trainer's House Oyj	SAI1V	Satama Interactive Oyj

*Table B4. Six companies changed their names, but kept the stock symbol and ISIN during the research period.*

<i>Date</i>	<i>Symbol</i>	<i>Current name</i>	<i>Previous name</i>
24.4.2009	EXL1V	Exel Composites Oyj	Exel Oyj
30.4.2009	TIE1V	Tieto Oyj	Tietoenator Oyj
13.4.2010	TEM1V	Tecnotree Oyj	Tecnomen Lifetree Oyj
11.5.2009	TEM1V	Tecnomen Lifetree Oyj	Tecnomen Oyj
2.4.2007	AFE1V	Affecto Oyj	AffectoGenimap Oyj
3.12.2010	WIC1V	Innofactor Oyj	Westend ICT Oyj

*Table B5. Five companies combined their stock series and stock symbols during the research period.*

<i>Date</i>	<i>New Symbol</i>	<i>Company name</i>	<i>Previous Symbol</i>	<i>Previous Symbol</i>	<i>ISIN used</i>
20.12.2010	WAT1V	Vahto Oyj	WAT1S	WATKV	FI0009900708
27.3.2008	WRT1V	Wärtsilä Oyj	WRTAV	WRTBV	FI0009003727
31.7.2009	FIS1V	Fiskars Oyj	FISAS	FISKS	FI0009000400
10.4.2006	SWS1V	Sanoma Oyj	SWSAV	SWSBV	FI0009007694
14.11.2008	PNA1V	Panostaja Oyj	PNAAS	PNABS	FI0009800379

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