The information content of abnormal trading return.
An analysis of Top 325 M&A transaction announcements

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Abstract

This study uses an event study methodology and time series analysis to examine stock market reaction to merger and acquisition announcements in public companies. In particular, this study investigates the largest merger and acquisition announcements that occurred globally during 1998 to 2013. The purpose of the study is to detect possible merger and acquisition information leakages that happen around 15 days before the company announcement. The study results were a mixture of statistically significant and insignificant cumulative abnormal return and abnormal return. The study findings confirm that the largest M&A transactions generate significant negative and positive abnormal returns around the short-term event window for the bidder shareholders. Thus, the study cannot support any strong leakage events, and in this respect based on the CAR result the markets perform efficiently according to Fama’s theory.

Key-words Mergers and acquisitions, event study, information leakage
I would like to thank my master thesis supervisor Johanna Palmberg for her constructive critic and interesting insights. I would like to thank you, Andrey Zhukov, for your insights to R and your feedback on regressions and charts in R.

Last but not least, I would like to thank you, my family, who have been supporting and stayed close to me throughout the KTH time.

Annika Eving
Stockholm, August 29th 2016
# NOMENCLATURE

## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>M&amp;A</td>
<td>MERGER AND ACQUISITION</td>
</tr>
<tr>
<td>CAPM</td>
<td>CAPITAL ASSET PRICING MODEL</td>
</tr>
<tr>
<td>APT</td>
<td>ARBITRAGE PRICING THEORY</td>
</tr>
<tr>
<td>OLS</td>
<td>ORDINARY LEAST SQUARES</td>
</tr>
<tr>
<td>AR</td>
<td>ABNORMAL RETURNS</td>
</tr>
<tr>
<td>CAR</td>
<td>CUMULATIVE ABNORMAL RETURNS</td>
</tr>
<tr>
<td>N.A.</td>
<td>NOT AVAILABLE</td>
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This chapter introduces the subject of merger and acquisition announcements and possible insider trading activities prior to merger and acquisition announcements. The chapter highlights the study’s research question, its contribution and the structure of the thesis.

1.1 Introduction to and purpose of the study

This study investigates the merger and acquisition announcements and potential leakage of this transaction in the stock market. The merger and acquisitions can be considered as the largest financial transaction. In financial markets participate would like to “beat the market” to earn significant abnormal returns. Therefore, the merger and acquisition announcement are highly associated with insider trading activities (Fama, 1970).

Recently, the Securities and Exchange Commission investigated a Goldman Sachs trader, who bought a large number of Heinz Company derivatives the day before Berkshire Hathaway and 3G Capital announced their intention to purchase the Heinz Company. The trader was alleged to have used internal information illegally (American Criminal Law Review, 2015). This case of alleged insider trading activity indicates possible M&A announcement leakage to the market prior to a public announcement. This is just one example among a wide range of possible information leakages which might offer the opportunity to earn significant or abnormal returns for a market player, even though, that financial institutions are more monitoring the financial market participates and transactions (Moeller et al., 2005).

In perfectly efficient markets, security prices are a reflection of all available information in the marketplace at any given moment in time. However, in reality, markets are inefficient, thus allowing corporate insiders to hold onto information before it is communicated to the market and in doing so, derive material benefits. Information leakage results in inefficient markets and increases trading costs, despite the fact that publicly traded companies are legally bound to disclose information to all investors at the same time (Martynova and Renneboog, 2011a).

In practice, the M&A transaction process involves at least two in-house teams (the management and the board) who perform the corporate restructuring activities, as well as external advisors including investment bankers, lawyers, accountants, public relations specialists, consulting firms to name but a few. All of whom are prohibited from leaking information to the market. Nevertheless, the market can and sometimes is influenced by carefully planned corporate transaction announcement leakages prior to official announcements, which can in turn affect securities prices (Travlos et al., 2012).

The capital market incorporates the upcoming merger or acquisition event on the target and bidder firm’s share price in a timely fashion. The announcement of M&A transactions implies potential synergies of the combined entity as well as stand-alone values of the target and bidder firms respectively. Accurate market valuation is one of the most important aspects of M&A transactions, which has an impact on the final selling or buying price depending on the transaction type.

More particularly, during the days leading up to an acquisition announcement, significant trading in the target company’s stock could be indicative of information leakage, as widely discussed by Keowen and Pinkerton (1983), Eckbo and Wier (1985), Brown and Warner (1985) and MacKinlay (1997). This papers represents the most influential in the merger and announcement literature and inspired to conduct studies in M&A announcement and insider trading.
In methodological terms, leakage is associated with significant pre-announcement trading across a large sample and examines trading patterns in leakage across time and securities. Academics have studied the abnormal returns and have shown that, on average, target firms experience higher returns, whereas acquiring firms experience a significant drop in their share price after corporate takeover announcements. For the target firm, it is strategically important to get the deal announcement information timing out promptly, in order to enjoy higher abnormal returns in longer time, and to gain more interest in the share price performance through increased trading activity, even though by that time the purchasing price has already been decided (Keown and Pinkerton, 1981).

Empirical studies demonstrated purposely leaked activities which are stated to be part of the merger and acquisition transaction process. This led to the question whether there was evidence of information leakage from the bidder’s side onto the market before the public announcement of top valuation deals. However, it is very complicated to interpret the purposely leaked announcement accurately. Some academics have attempted to investigate leakage occurrence in the stock market (Keown and Pinkerton, 1981, Chakravarty and McConell, 1997).

This study cannot confirm leakage activities in individual cases, but will attempt to examine possible leakages across time periods and securities. In this paper, indicators of information leakage are considered significantly higher or lower returns before the public announcement date. Interestingly, leakages related to the largest merger and acquisition operations between 1998 and 2013 have attracted little attention from academia, which is a motivation to undertake quantitative studies to examine the association between the highest valuation deals in the M&A history and intentional leakage activities.

The purpose of this study is to investigate the stock price behavior of bidder firms around the M&A announcement and whether the 325 highly valuated M&A deals can be associated with purposeful leakage activities. In this study, stock price behavior analysis and cumulative abnormal stock returns are examined throughout the 26 trading days around the announcement period. The study uses the assessment period of 1998-2013 and a sample of 325 deals of publicly traded companies worldwide and their respective announcement dates. This is the largest sample regarding the valuation of M&A transactions between 1998-2013. The event study methodology is employed, which enables the analysis of how the stock market reacts to merger/acquisition events and compares the share price performance pre- and post-announcement day.

According to the best of my knowledge this study is unique in this sense that it is the first attempt in academia to investigate if M&A announcement information leakage is intentional using the sample of the highest valuation deals of bidding firms between 1998-2013 and investigate throughout five event windows.

1.2 Research Focus

This paper aims to analyze the stock price performance during the initial merger and acquisition announcement period. Prior M&A studies on merger activities indicate evidence that stockholders of most target firms have earned significant excess returns during the announcement period, which includes weeks and days after the announcement date. The testing of stock market reactions regarding the prior leaking of information on M&A announcements of bidding firms has gained little attention in the literature. The purpose of the study is to examine the effect of M&A activity announcements on the stock price behavior for the top 325 bidder transaction leaks before the official announcement. Thereupon, this study attempts to investigate M&A activity announcement leaks to the market before their official announcements.
The purpose of this paper is to find out whether purposeful leakage is related to the highest valuated corporate takeover deals. The formulated research question is to find out if there are significant abnormal returns that could indicate insider trading activities in the 26 days surrounding the merger and acquisition announcement.

The study findings indicated mixed results. However, the majority of the abnormal returns were statistically significant and positive prior to (-2,+2), but closure to the announcement day the abnormal returns were statistically insignificant and negative. Meaning that market already incorporates M&A announcement prior to the official announcement.

**1.3 Contribution**

This study contributes to existing literature in at least three ways.

Firstly, the study uses a very restricted sample of data of 325 of the highest valued transactions that incorporate M&A transactions worldwide. Therefore, likely related to noise in the market. In fact, abnormal returns on the bidder firm side have not been widely investigated by academia. However, Moeller et al., 2005 investigated long-term abnormal returns of large transactions on the bidder firm with different motives.

Secondly, bidder firms in M&A transactions have not been studied as the majority of the studies focused on abnormal returns around target firms.

Thirdly, this study applies different time frames to test the reaction of stock price to the announcement, specifically, it focused on the prior announcement period to find evidence of information leakage to the market.

In the classical M&A announcement study not more than three time frames are used but this study uses five time frames to get a closer look at the stock price trends’ or cycles’ performance.

Fourthly, this study will have practical applications for fund managers, who hold large sized corporation stocks in their portfolio and how they strategically time their investment strategy when portfolio firms are undertaking corporate merger and acquisition transactions.

**1.4 Structure**

This paper is organized as follows: section II presents the background of the study. Section III presents the literature review on M&A announcement and the theoretical review. Section IV covers the sample data and methodology used in this paper. Section V provides empirical results and discussions. Section VI concludes the paper and makes recommendations for further studies.
This chapter presents the concepts behind M&A activities by firstly defining mergers and acquisitions and secondly, by introducing types of transactions. Thirdly, this chapter presents financing means and transaction targets that influence the stock price. Furthermore, this chapter addresses four more key areas:

1) the main motivation behind corporate takeover in academic literature
2) how M&A activity occurs
3) the major factors which impact/affect M&A announcement

### 2.1 Definition and types of M&A transactions

Corporate takeover literature defines a merger as a corporate transaction where a bidder company purchases the total assets and liabilities of a target company (Gaughan, 1999). The acquisition is referred to as a corporate event where the bidder firm purchases only a part of another company (Clayman, Fridson, and Troughton, 2008). M&A transactions are divided into three types. The first type is a transaction which involves two companies operating in the same industry; this is called a horizontal merger. The second type is when a buyer purchases a firm which is a supplier or a client of the purchaser and this transaction is called a vertical merger. The third type is the conglomerate merger, which represents corporate takeovers between two companies which operate in different industries (Berk, DeMarzo and Harford, 2012).

In M&A literature, transactions are also divided according to the method of payment. The means of payment provides in-depth diligence from the acquirer’s perspective of the relative value of the target company’s stock price/enterprise value. The payment method can be either cash or stock transactions or a combination of the two, to finance a corporate takeover transaction. Cash used as a means of payment is seen as the acquirer shareholders taking the risk if the expected synergies will not be utilized. On the other hand, stock is used as a means of payment to reduce the risk by sharing it between shareholders (Fuller, Netter and Stegemoller, 2002).^1^ Travlos and Papaioannou (1991) investigated the impacts of the method of payment on bidding firm’s stock return at the official announcement of a takeover bid. Their study indicated that bidder firm’s abnormal returns were negative.

The acquisition can be “friendly” or “hostile”. The board of directors will recommend whether to bid as “friendly” or “hostile”. It is particularly important for the target side to increase the offer price until the board of the acquiring firm confirms the offer (Trautwein, 1990).

### 2.2 Motivation to undertake M&A activities

Brealey and Myers summarize potential M&A activity parties as follows “There are always firms with unexploited opportunities to cut costs and increase sales and earnings. Such firms are natural candidates for acquisition by other firms with better management. In some cases better

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^1^ King et al., (2008) extended the methods of payment study to managers’ behavior and decision making. They argued that managers who perceive their companies to be undervalued prefer to finance M&A activity with cash, whereas those who perceive their company to be overvalued intend to use stock for financing means. It is certain that the type of payment will have a significant impact on the target or bidder’s share price performance during the takeover process (Trautwein, 1990).
management may simply mean the determination to force painful cuts or realignment of the company’s operations” Brealey and Myers (2000, p. 945).

Trautwein (1990) has extensively studied the predominant theories of merger and acquisition motives in financial economics and provides a practical guide to merger prescription. One of his major contributions is to put together merger motive into seven theories, which he distinguishes as efficiency, monopoly, valuation, empire-building, process, raider and disturbance theory.

M&A theory indicates that the major catalyst to engaging with corporate takeover is to achieve synergies, agency, and hubris. The efficiency theory states three types of synergies that corporations are seeking, which are financial, operational and managerial. The finance rationale for M&A transactions creates many important benefits, such as lower cost of capital, easier to raise capital and advantages of being diversified, which allows transferring cash amongst divisions (for example, from more mature and low-growth divisions to the growth divisions) greater ability to spread corporate costs; in general, lowering the risks associated with their financial and investment decisions (Berk, DeMarzo and Harford, 2012).

Operational rationale for takeover synergies enables separate business units to combine together to access knowledge transfer, the economics of scale, the rapid expansion of new market and brand and customer base. Today’s business world is strategically important to gain access to necessary intellectual property rights (Porter, 1998; Ahuja and Katila, 2001). Therefore, M&A transactions are largely driven by corporate expenses and to improve business performance.

The managerial rationale for takeover synergies is related to the manpower of the corporation. M&A activities are a great way to tap into the greater talent pool of new specialists and experts, who possess strong planning and monitoring abilities that will improve the combined enterprise performance but most importantly maximizing shareholders’ wealth as a combined business entity (Jensen and Murphy, 2004).

The monopoly theory states that mergers are primarily motivated and executed to achieve market power. However, this cannot occur in horizontal acquisitions. The conglomerate acquisition enables cross-subsidized products to be produced and uses their market power when setting the price and quantity as well as undermining their competitor’s entry to the market (Trautwein, 1990).

The valuation theory states the standards for determining corporate valuations of the target company. The valuation is executed by the target firm’s managers who diligently investigate the feasibility of combining two entities into one and conduct valuations for the sale or purchase price of the company. Company valuation can vary significantly from the stock market valuation (Ravenscraft and Scherer, 1987). In the literature, M&A transactions are argued to be value creating or value destroying activities (Trautwein, 1990). Overall, empirical evidence indicates that the acquisition process is related to significant unexpected stock returns.

2.3 The development of mergers and acquisitions: M&A waves and their roots

M&As are not a new phenomenon. The practice of buying, selling, splitting and combining different companies into new entities has been around since the late 1880s and is motivated by the benefits of combining two business entities into one. The development of M&A activities occurs in cyclical waves as observed in studies by Claymen et al.(2008), Rhodes and Viswanathani, (2004), Brealey, Myers and Allan, (2008) (see table 1).

The neoclassical theory states that corporate takeover activities occur as a result of technological, regulatory or economic shock. In contrast, the behavioral theory states that waves are a largely
incorrect valuation between bidder and target firms (Harford, 2005). A recent study by Martynova and Renneboog (2011) summarized takeover waves patterns and motives. They found that waves occur in periods of economic recovery and that waves collapse with a period of credit expansion and a booming stock market. Furthermore, access to the external capital market is considered to be a prime motive for a takeover wave to emerge. The waves are mainly driven by industrial and technological shocks in the form of innovations, oil price shock, deregulation and foreign competition (see figure 1). The study indicated that the fifth wave was an international phenomenon motivated by cross-border transaction a corporate transaction between different countries. By the beginning of the 1990s, the U.S. and the UK takeover market was similar in size, and an Asian takeover market was emerging (Martynova and Renneboog, 2011).

Figure 1 U.S merger waves development and factors

Source: Martynova and Renneboog, 2008, p. 2150

Table 1The M&A Waves development

<table>
<thead>
<tr>
<th>Time period</th>
<th>Wave 1</th>
<th>Wave 2</th>
<th>Wave 3</th>
<th>Wave 4</th>
<th>Wave 5</th>
<th>Wave 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motives</td>
<td>To gain market power (formation of monopolies)</td>
<td>Formation of oligopolies and to gain complete control over value chain</td>
<td>Seeking growth through diversification</td>
<td>Elimination of inefficiencies</td>
<td>Globalization, talents and technology motives</td>
<td>Global expansion</td>
</tr>
<tr>
<td>Industries</td>
<td>Hydraulic power, textiles, iron</td>
<td>Steam engines, steel, railways</td>
<td>Electricity, chemicals, combustion engines</td>
<td>Petrochemicals, aviation, electronics, communications technology</td>
<td>Communications, information technology</td>
<td>n.a.</td>
</tr>
<tr>
<td>Dominant sources of financing/ mean of payment</td>
<td>Cash</td>
<td>Equity</td>
<td>Equity</td>
<td>Equity</td>
<td>Equity</td>
<td>Debt and Cash financed/Cash</td>
</tr>
<tr>
<td>Cross-boarder M&amp;A activity</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>Some</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

Source: Martynova and Renneboog, 2008, p. 2151
3 THEORETICAL FRAMEWORK

This chapter gives an overview of the literature on the topic of M&As. The theoretical framework focuses on efficient markets and more particularly, M&A announcements and the stock price reactions to M&A announcements. M&A leakages in academic literature are described by abnormal returns performance during the corporate takeover event, which helps to interpret the study results in chapter five.

3.1 Theoretical Framework

Fama’s (1970) article on Efficient Capital Markets lays out how the financial market functions, namely, the efficient market hypothesis that states that the stock market incorporates public and private information, which in theory is handled in an unbiased manner. The efficient market hypothesis consists of three forms of market efficiency: strong, semi-strong and weak forms (Fama, 1970). Fama’s assessment method to evaluate firm’s specific reactions were to use the abnormal return component to test the market efficiency hypothesis.

![Stock Price around Announcement date under the Efficient Market Hypothesis](image)

*Figure 2 Stock Price around Announcement date under the Efficient Market Hypothesis*

Source: Based on Fama et al., (1969) article

In academia, there has been greater attention to testing the validity of the market efficiency hypothesis. For that, academics have employed a testing method where theory has been applied to empirical observation of a company’s news announcement and stock market reaction (Brown et al., 1980)

According to the market efficiency hypothesis, M&A announcements contains information of upcoming corporate takeovers, which is incorporated in the security price correctly and instantaneously, as it becomes known to the market. M&A activity is associated with greater value seeking aims to conducting transactions to achieve optimal results when combining two enterprises into one and therefore, the market reacts positively to the M&A announcement. Schwert (1996) draws attention to the fact that security price reaction of target shareholders is not limited to the official announcement day but starts two days before the initial public announcement of the bid. This kind of run-up has been studied by Ascquith et al. (1983), Dennis and McConnell (1986) and Georgen and Renneboog (2004) found that the announcement effect on day 0 run-up is between 13% and 22% over a period of two months before the transaction announcement.

Nonetheless, security price reaction prior to a M&A transaction has created controversy in research related to the use of privileged information. M&A transaction insiders, who have access to certain
information that gives them an advantage over normal investors, make their trades based on information obtained and profit from it, which proves that in reality, markets are inefficient.

In general, based on the extensive studies conducted by Jensen and Ruback (1983), Andrade et al. (2001), and Aktas et al. (2004) findings can be summarized as publicly listed firms which engage in M&A activities experience a significant fluctuation in their security price. The literature shows that releasing the M&A announcement to the market affects the target firm’s stock price performance, which experiences a strong upward shift as the market positively evaluates the upcoming takeover and synergies of the combined enterprise. On the other hand, literature on the bidder firms shows that the bidder firm’s stock price performance experiences a moderate decrease or even slight increase.

A study by Schwert (1996) found evidence confirming that M&A target firm’s share prices tend to move up, and that information about the upcoming acquisition can be associated with leakage before the announcement time, and that causes significant abnormal returns around the takeover event. Corporate insider activities can explain Jabbour et al’s study on Canadian acquisition inference that the abnormal stock price performance increase before the announcement of the takeover. A study by Morck, Shleifer, and Vishny (1990) found that the bidder’s, the stock price falls because of different managerial aims and not because of the generation of value for shareholders.

Hirshleifer (1971) and Fama (1971) noticed the possible relationship between insider trading and publication information. They found that managers or inside traders who possess insider information have a tremendous advantage over other investors and more power in the market when the news is released to the market. Seyhun’s (1986) study revealed that insider trading around corporate announcement indicates significant changes in trading patterns before the public announcement.

Keown and Pinkerton, (1981), Meulbroek, (1992), Bhattacharya, Daouk, Jorgenson and Kehr, (2000) mainly discussed trading liquidity around M&A announcement and researchers found evidence confirming the existence of insider trading to be related to large volume stock trading activities.

The period between prior to the announcement and an initial announcement is considered to be very sensitive and highly related to information leakage, which has been debated in academia as a result of illegal insider trading activities or market early incorporated press leaks (Aktas et al., 2007) The earlier studies of Ellert (1976) and Langetieg (1978) on corporate takeover used the effective date of the merger as the event study day 0. The results of their study revealed that the announcement date occurs in a random time period prior to the effective date based on historical data. Their findings have been widely criticized due to the issue of precision of estimates. It is complicated to evaluate historical stock price movements during the announcement period as the stock price reaction can also be linked to several another event occurrences such as dividend announcement, earning announcement, macroeconomic factors and other related corporate affairs that might affect the company’s share price performance (Fama, 1998). Thus, there is always an issue with biased data. However, researchers have always highlighted the stock market data issue in their studies, and this study will control these effects.

In the literature M&A announcement ‘timing’ is the result of corporate managers’ intentions to announce the corporate takeover at a time when their share price performance has reached a peak (see e.g., Rhodes-Kropf and Viswanathan (2004), Goel and Thakor (2008)). Due to the fact that managers are taking advantage of temporarily overvalued equity during strong economic times
and market inefficiencies, in practical terms, managers use overvalued equity as a cheap currency for acquiring real assets (Myers and Majluf, 1984).

In more recent empirical papers, emphasis on the M&A timing process and getting the transaction process time right is an essential component of the transaction success. Interestingly, their findings confirmed that the target firm intentionally proposes corporate takeover information leakage to increase their premium, whereas the acquiring firm needs to pay a higher price for the target (Moeller et al., 2015).

The literature shows no consensus on information leakage, whereas the researcher is validating unexpectedly early press over corporate insider trading as an explanation behind announcement leakage (Fuller, Netter and Stegemoller, 2002).

### 3.2 Insider trading legislation and its enforcement

Insider trading is treated according to rules prohibiting or criminalizing insider trading activities around the world. The aim of insider trading enforcement is to improve the integrity and liquidity of stock markets by encouraging ordinary investors to participate (Bhattacharya and Daouk, 2002).

Insider trading activities are monitored by the Securities and Exchange Commission in the U.S., the Securities and Exchange Surveillance Commission in Japan, the Financial Services Authority in the UK, are few examples of financial authorities, which are aimed to ensure fair transactions in both side on securities and financial markets. Furthermore, they are re-evaluating the effectiveness of laws and enforcement, although, the enforcements vary considerably country to country (Summe and McCoy, 1998).

After 2008 financial crisis insider trading incidents have increased significantly and calls for improvements in regulations are needed. Moreover, studies found that increasing use of private information for insider trading activities result that the cumulative abnormal returns are positive and negative in the days prior to the M&A announcement (see e.g. Seyhun (1986), Lakonishok and Lee (2001), Piotroski and Roulstone (2005) and (Meulbroek (1992))).
3.3 LITERATURE REVIEW

Abnormal returns

In recent years empirical corporate finance studies have investigated the relationship between M&A activity and stock price performance of the corporations concerned using daily stock prices around M&A announcement. Evidence shows that bidder firm shareholders earn a significantly negative abnormal return, which is statistically different from zero.

A review of the academic findings for six M&A waves indicated in literature that M&A transactions have been widely studied in the U.S and the UK as these countries represent the largest amount of M&A transactions. Studies investigated short and long-term abnormal returns and stock liquidity and volatility around the pre and post M&A period. The major strand of corporate takeover literature focused on whether M&A creates value for the shareholders (Andrade, Mitchell and Stafford (2001). The primary indicator of value creation is abnormal returns around M&A announcement.

The abnormal returns have been studied extensively around M&A activities (see e.g. Fama (1969), Brown and Warner (1980, 1985), Dodd and Ruback (1977) Dyckman, Philbrick and Stephan (1984), see table 2 for a list of studies. A review of studies on abnormal returns performance during different M&A waves indicates that target firms shareholder returns yield, on average, significant positive returns (see e.g. Bruner, 2001). On the other hand, studies on bidding firms indicate significantly lower returns or even negative returns which are statistically insignificant (see e.g. Akbulut and Matsusaka, 2010, Firth, 1980, Varaiya & Ferris (1987)). Moreover, some controversial studies found that engaging in M&A creates little or no value (see, e.g., Beitel, Schiereck and Wahrenburg (2002), Houston, James and Ryngaert (2001) Langetieg (1978)).

Georgen and Renneboog (2002) studied large European takeover abnormal returns on target and bidder firms in the fifth M&A wave implementing different event windows. Their study finds weak abnormal returns for the bidder firm.

A working paper by Martynova and Renneboog (2006) examined the European takeover market in the fifth takeover wave in the period of 1993-2001. Their comprehensive study indicated a -3% negative abnormal returns and statistically significant results for a three-month period.

Moeller et al., (2005) studied large-scale acquisitions in the U.S. inbetween the fourth and fifth merger waves from 1980 to 2001 and used in their event study a (-2, +2) event window. Their findings indicate that in the case of large transactions, acquiring either one or more a firms the bidder, shareholders experience significantly negative abnormal returns, which led the investor to rethink the high standalone value of the bidder firm.

There are a limited number of studies conducted in M&A announcement and information leakages in the Asian stock market. Ma et al., (2009) investigated 1,477 M&A transactions between 2000 and 2005 and covered China, South-Korea, Malaysia, Singapore, the Philippines, India, Hong Kong, Indonesia, Taiwan and Thailand. The study analyzed three event windows including (0,+1), (-1,+1) and (-2,+2). Their study found that on average, the bidding firm’s share price generated 0.96% in (-1,+1), 1.28% in (-1,+1) and 1.7% in (-2,+2) respectively. On the whole, the study
findings indicate that the emerging Asian stock market reacts positively to M&A announcement and that the valuation effects of information leakage regarding M&A announcement are statistically significant.

Studies conducted in the 1990s indicated both positive and negative returns. Andrade, Mitchell and Stafford (2001) conducted a comparative study and found that abnormal returns are statistically insignificant and do not differ across takeover waves. Short-term studies that focused on share price reaction one month before an M&A announcement indicated statistically insignificant abnormal returns (close to zero). As studied by Dodd (1980), Dennis and McConnell (1986), and Schwert (1996). In contrast, abnormal return on the bidder firm has mixed results of significant abnormal returns and insignificant abnormal returns (Jensen and Ruback, 1983). The abnormal return for bidding ranges from a 2.4% to 6.7%. In the case of merger transactions, the returns are approximately zero and statistically insignificant (see e.g. Asquith & Kim (1982), Dodd (1980), and Eckbo (1983)).

Studies in the 1960s and 1970s indicated positive abnormal returns in the range of 0.2% and 0.1%, as studied by Asquith (1983) and Eckbo (1983). On the other hand, studies conducted at the end of the 1970s and in the 1980s indicated negative abnormal returns in the range of -1.2% to -0.7%, as studied by Morck, Shleifer and Vishny (1990), Byrd and Hickman (1992), and Chang (1998). Andrade, Michell and Stafford (2001) studied bidder firm’s short-term abnormal returns during the fourth wave between 1973 and 1998, and their results indicated that abnormal returns in the bidder firm are statistically insignificant.

Akbulut and Matsusaka (2010) conducted a comprehensive study on corporate diversification announcement in four M&A waves from 1950 to 2006 in the United States and their event study used an event window (-1,+1). The study findings indicated that combined transaction, where the acquirer plus the target is involved, announcement returns are positive and statistically significant.

Studies of Starks and Wei (2004) and Wang and Xie (2009) showed negative abnormal returns for the acquirer. Bouwman et al. (2009) showed that abnormal returns in 1993-2001 were higher than after 2001, even though, both waves are classified as “high valuation” periods with a high number of transactions. The majority of the studies found negative abnormal returns for bidders (see e.g. Mulherin and Boone, 2010).

On the other hand, studies on large transactions in 1992-2009 has shown positive abnormal returns for bidder firms (Netter, Stegemoller and Wintok, 2011, and Barraclough et al., 2013).

Overall, the reviewed literature showed that target shareholders earn significant positive abnormal returns and the bidder shareholders earn significantly less but do not lose too much. It is certain that through M&A, the transaction is expected to increase the combined market value of both parties involved in the transaction. However, abnormal returns performance for the bidder firm is still quite ambiguous, hence, it is very much an ongoing area of research in academia (Moeller et al., 2005).
Table 2 Summary of short-term abnormal returns in M&A literature dealing with cross-country data and using the market model

<table>
<thead>
<tr>
<th>Study authors</th>
<th>Sample period (Year)</th>
<th>Event period$^2$ (Day)</th>
<th>Abnormal return (in the range of)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barraclough et al., (2013)</td>
<td>1996-2008</td>
<td>(-1,+1)</td>
<td>+0.45%</td>
</tr>
<tr>
<td>Betton, Eckbo, and Thorburn (2008)</td>
<td>1980-2005</td>
<td>(-1,+1)</td>
<td>+2.2%</td>
</tr>
<tr>
<td>Schiaf and Steenbeek (2004)</td>
<td>1993-2003</td>
<td>(-1,+1)</td>
<td>+0.57%</td>
</tr>
<tr>
<td>Goergen and Renneboog (2002)</td>
<td>1993-2000</td>
<td>(-2,+2)</td>
<td>-7.48%</td>
</tr>
<tr>
<td>Akbulut and Matsusaka (2003)</td>
<td>1950-2002</td>
<td>(-2,+1)</td>
<td>-0.68%</td>
</tr>
<tr>
<td>Bhagat et al. (2005)</td>
<td>1962-2001</td>
<td>(-5,+5)</td>
<td>+1.01%</td>
</tr>
<tr>
<td>Faccio and Stolin (2006) and Faccio, McConnell and Stolin (2006)</td>
<td>1996-2001</td>
<td>(-2,+2)</td>
<td>-0.38%</td>
</tr>
<tr>
<td>Martynova and Renneboog (2006)</td>
<td>1993-2001</td>
<td>(-5,+5)</td>
<td>+1.07%</td>
</tr>
<tr>
<td>Berkovitch and Narayanan (1993)</td>
<td>1963-1988</td>
<td>(-5,+5)</td>
<td>-0.03%</td>
</tr>
<tr>
<td>Morck, Schleifer and Vishny (1990)</td>
<td>1980-1987</td>
<td>(-1,0)</td>
<td>-1.78%</td>
</tr>
<tr>
<td>Franks and Harris (1989)</td>
<td>1955-1985</td>
<td>(-1,0)</td>
<td>+1%</td>
</tr>
<tr>
<td>Bradley, Desai and Kim (1988)</td>
<td>1981-1984</td>
<td>(-5,+5)</td>
<td>-2.9%</td>
</tr>
<tr>
<td>Jarrell and Poulsen (1988)</td>
<td>1980-1986</td>
<td>(-2,+1)</td>
<td>-0.54%</td>
</tr>
<tr>
<td>Asquith, Bruner and Mullins (1987)</td>
<td>1973-1983</td>
<td>(-1,0)</td>
<td>-0.85%</td>
</tr>
<tr>
<td>Jennings and Mazzeo (1987)</td>
<td>1979-1985</td>
<td>Day 0</td>
<td>-0.8%</td>
</tr>
<tr>
<td>Travlos (1987)</td>
<td>1972-1981</td>
<td>(-1,+1)</td>
<td>-0.70%</td>
</tr>
<tr>
<td>Varaiya and Ferris (1987)</td>
<td>1974-1983</td>
<td>(-1,0)</td>
<td>-2.15%</td>
</tr>
<tr>
<td>You, Caves, Smith &amp; Henry (1986)</td>
<td>1975-1984</td>
<td>(-1,+1)</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Panel, Dodd and Ruback (1977)</td>
<td>1958-1978</td>
<td>(-20,+20)</td>
<td>+3.12 -1.71%</td>
</tr>
<tr>
<td>Kummer and Hoffmeister (1978)</td>
<td>1956-1974</td>
<td>(-20,0)</td>
<td>+5.20%</td>
</tr>
<tr>
<td>Bradley (1980)</td>
<td>1962-1977</td>
<td>(-20,+20)</td>
<td>+4.36-2.96%</td>
</tr>
<tr>
<td>Bradley, Desai and Kim (1983)</td>
<td>1963-1980</td>
<td>(-10,+10)</td>
<td>-0.27%</td>
</tr>
<tr>
<td>Bradley, Desai and Kim (1982)</td>
<td>1962-1980</td>
<td>(-10,+10)</td>
<td>+2.35%</td>
</tr>
<tr>
<td>Ruback (1983)</td>
<td>1962-1981</td>
<td>(-5,0)</td>
<td>-0.38%</td>
</tr>
<tr>
<td>Dodd (1982)</td>
<td>1970-1977</td>
<td>(-1,+1)</td>
<td>-7.22-5.50%</td>
</tr>
<tr>
<td>Asquith (1983)</td>
<td>1962-1976</td>
<td>(-1,+1)</td>
<td>-0.10+5.9%</td>
</tr>
<tr>
<td>Eckbo (1983)</td>
<td>1963-1978</td>
<td>(-1,+1)</td>
<td>+0.07+1.2%</td>
</tr>
<tr>
<td>Wier (1983)</td>
<td>1962-1979</td>
<td>(-10,+10)</td>
<td>+3.99%</td>
</tr>
</tbody>
</table>

Source: Researcher’s summary of previous studies, 2016

To the extent of my knowledge looking at the numerous studies done, especially between 2003 to 2013 study period has not been intensively investigated; as the literature in this time frame is limited. Therefore, further studies to carry out this matter are needed to get a better overview of the last two merger waves.

As we already know M&A activity was high in the sixth merger wave, indicating large-scale merger, acquisition and diversification of corporate restructuring events with a high valuation in terms of pricing. Based on the reasons highlighted above, it seems that this is a very attractive area to conduct further studies on, particularly to investigate the large-scale transactions security reaction to M&A announcement and to find potential evidence of insider trading activity that can be associated with the large-scale transactions.

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$^2$ Event period in days.
3.4 Research hypothesis

This chapter presents the purpose of the study conducted by the researcher. Based on the literature review conducted and the evaluation of the previous literature, this study section will develop the research hypothesis which sets the framework for the study.

During M&A announcement, a substantial amount of information is revealed about the target and acquiring firms, which can be used to assess the stock market’s reaction to an acquisition or merger depending on the type of transaction. The aim of the study is to examine stock market reaction to M&A announcement during the prior announcement period (-15 days) to find potential signs of M&A leakage occurrence through significant abnormal returns at that time using the sample of the largest M&A valued transaction that occurred between 1998 and 2013. Information leakage is defined in the market model as significant abnormal returns that can be from either a positive or negative change in the stock price. Thus, the hypothesis of the study is that M&A announcement generates significant abnormal returns in the short-term time frame including prior and post announcement days as well as announcement day. This study investigated fifteen days prior and ten days after the official announcement data and stock price reaction to the announcement to test the significance of the event windows.

The hypothesis of this paper is:

**H0** The largest M&A transactions do not generate significant abnormal returns around the short-term event window for the bidder shareholders.

As explained in the literature review, the abnormal returns for bidder firms indicate significantly lower or even negative returns which are statistically insignificant.

**H1** The largest M&A transactions generate significant abnormal returns around the short-term event window for the bidder shareholders.

This hypothesis has been set up to test the bidding firm’s stock reaction to M&A announcement and to detect potential M&A leakage to the market. The study uses five different event windows to test the significance of abnormal returns: (-15, +10), (-10, +10), (-5, +5), (-2, +2) and (-1, +1) as they are widely used in the previous studies. Pre-set event windows are extensively used in the short-term studies in M&A literature. For more elaboration, see section 5.1 Research Design. The study hypothesis will be tested by using t values at 5% level of significance. A two-tailed test has been applied to test the significance of the abnormal return and cumulative abnormal return.
This chapter of the study will describe the scientific and econometric methods applied to the study.

4.1 Research Methodology

Event study methodology was used in this study. By definition, an event study is an econometric technique used to examine and interpret a given event’s impact on the firm’s share price. Event studies are widely used to study the information content of corporate events, such as M&A, earning and dividend announcements, issues of new equity or debt and macroeconomic factors’ reactions to the stock price (MacKinlay, 1997). For this study, the MacKinlay (1997) paper is considered to be an inspirational paper to study market efficiency as commonly used methodology and limitations are presented.

The purpose of event study can be summarized by Prabhala, 1997, p.2 as follows:

i) “to test for the existence of an “information effect” (i.e. the impact of an event on the announcing firm’s value) and to estimate its magnitude

ii) to identify factors that explain changes in firm value on event date”

Initially, the event study methodology was developed by Fama, Fisher, Jensen and Roll (1969) in their study on stock splits and the efficient market hypothesis.

The primary step when conducting an event study is to define the event of interest and the timeframe of the security price behavior of the firm that is being investigated. The event window period is defined, which is designed to capture the security price reaction to the event announcements and can be extended to periods before and after the event announcement. The event study can be used daily, monthly and yearly data depending on the research interest. In practice, the timeframe of interest extends to numerous days, including the announcement day and at least a day after and a day before the announcement day (MacKinlay, 1997).

In this study as an event, an initial M&A public announcement and five different event periods are employed. More particularly, the event study technique enables the researcher to investigate how the stock market values the upcoming corporate takeover event at the time it is announced.

![Figure 3 The timeline of events surrounding M&A announcement](Image)

Source: Researcher creation based on MacKinlay (1997)
4.2 Defining M&A leakage

M&A leakage to the market is measured as significant daily stock price changes around the initial public announcement for the bidder firm. The event is the initial M&A announcement, which is defined as day 0 and hereafter T. Firstly, the study needs to calculate the abnormal returns for the period which is considered a normal trading period without M&A announcement. For that, the normal returns are calculated based on the estimation window (T-40 to T-20).

Secondly, the study calculates abnormal returns for the pre-event window (T-15 to T-0) and post-event window (T-0 to T+1), which is the event study base. This period is divided into five different event estimation periods, which are significantly tested. The first event estimation period is 15 days before the announcement, where the event window is designed to capture T-15 days (prior), and the announcement day (day 0) and T+10 days (after) the public announcement. The second event period is designed to capture T-10 days (prior), and the announcement day (day 0), and day T+10 days (after) the public announcement. The third event window is designed to capture T-5 days (prior), the announcement day, the day T+1 (after) the day of the public announcement. The fourth event window is designed to capture T-1 days (prior), and the announcement day (day 0), and T+1 day (after) the public announcement. The penultimate event window is designed to capture T-1 days (prior), the announcement day (day 0), and T+2 day (after) the public announcement to see the stock market’s reaction to the official announcement. Thereby, the cumulative observation periods are 26, 21, 11, 5 and 3 days respectively.

These five event windows are employed to isolate the event of interest from events such as earnings releases, dividend announcements or other related corporate affairs, which might significantly affect the stock price reaction, thereby having an impact on the final results. The study uses time periods which are conventional and used by the previous researcher. (see Table 2:overview of studies conducted in M&A announcement)

This study uses a short-term approach which is more appropriate to investigating the M&A announcement and possible leakage in the capital markets before the official announcement. With a long-term study approach, it would be difficult to isolate the M&A event from other corporate events.

The second step is to determine the selection criteria for the firms used in the study. The validation of the study will depend on data availability. Therefore, it is important to recognize potential biases at an early stage which may have an impact on the results and should be identified in the sample selection stages of the study. This is covered in section 4.6 Data Sample.

According to the theory, M&A announcement contains information about the upcoming takeover activity which should be incorporated into the security price correctly and instantaneously as it becomes known to the market. Therefore, the event study uses the abnormal returns to assess the security reactions of an announcement. The abnormal returns are defined as the ex-post return of the security over the event window minus the normal return of the firm over the event window. Then normal returns are expected returns which indicate that the event is not taking place. This reaction can be measured by using the return as the value of price changes or by using abnormal return.
4.3 The market model

The study’s methodology is designed to analyze stock price daily movements using the systematic abnormal returns around the corporate event. The market model is a standardized method used in corporate finance and economics to measure the stock price and market reaction to the event of interest.\(^3\) In this study, M&A announcements can be considered as prime evidence of the market reaction to presumed leakage information around the M&A transaction.

In this research, the M&A event is tested by the reaction of the related security. Previous studies have confirmed evidence of corporate takeover stock prices and market reaction to the announcement positively or negatively (see e.g., Brown and Warner (1980), Mackinlay 1997, Jensen and Ruback, 1983).

The stock price and market reaction can be measured by using the stock and market returns as the value of price changes and abnormal return performance. The market model uses daily price changes and corporate takeover as an event study. In this matter, abnormal returns which appear before and after the public announcement of M&A have been estimated.

The daily price series is converted into the daily return series using the following formula:

\[
R_{it} = \left[ \frac{R_t - R_{t-1}}{R_{t-1}} \right] \times 100\% \tag{1}
\]

\(R_{it}\) = security daily return,  \\
\(R_t = \) closing price of the security, and \(R_{t-1} = \) previous day’s closing price of the security.

A similar procedure with the daily market price series is converted into daily market return series using the following formula:

\[
R_{mt} = \left[ \frac{R_{mt} - R_{mt-1}}{R_{mt-1}} \right] \times 100\% \tag{2}
\]

\(R_{mt}\) = daily market return,  \\
\(R_{mtt} = \) closing price of the market index, and \(R_{mtt-1} = \) previous day’s closing price of the market index.

The market model is an empirical model developed by Sharpe (1963) and indicates a linear relationship between security returns and returns of the market portfolio. The market model is based on the Markowitz portfolio theory.

The market model is well specified and considered a powerful model to use under several conditions. One major concern is the use of market index in the model, also known in literature as reference portfolio, which can lead to biased evidence as shown by the studies of Limmack (1991); Kothari and Warner, (1996); Barber and Lyon, (1996); Lyon et al. (1999). Fama and French (1996) argued that in the market model, beta and actual returns have a weak relationship between each other.

The alternative models are the Capital Asset Pricing Model (CAPM), the Arbitrage Pricing Theory (APT) and the Fama-French -three-factor model. The CAPM is widely used, but the model for pricing an individual security or portfolio has drawbacks. Namely, the information asymmetries

\(^3\) The market model is an extensively used method to conduct an event study. In order to gain more a precise overview of the research results, the market model was adjusted. See more elaboration on Armitage, S.,1995. Event Study.
do not explain the variation in stock returns and market anomalies adequately, thus leading to biased estimates (Fama and French, 2004). The APT has been criticized as a model that has little explanatory power. However, it eliminates the bias problem in the estimates introduced by CAPM. The Fama-French model is problematic when used in the emerging market context and does not explain the market value of equity (Foye and Pahor, 2013). Despite several disadvantages of using the market model, it is conventional and has been used by the majority of researchers in abnormal return behavior and for this study the model is the most appropriate.

In this study, the bidder firm’s abnormal returns are investigated 15 days before and 10 days after the announcement period, which is divided into five different time frames and classified according to whether the returns are significantly different from zero. As an event, the M&A initial announcement was identified and the study interest variables are laid out as follows: (1.) the stock daily trading returns, (2.) the M&A announcement date used in the econometric model and (3.) the market index corresponding to the stock price trading stock exchange. The market model uses OLS regression estimates.

The market model

\[ R_{it} = \alpha_i + \beta_i R_{mkt} + \varepsilon_{it} \]  

(3)

\[ \text{E}(\varepsilon_{it} = 0) \text{ var}(\varepsilon_{it}) = \sigma^2_{it} \]

Where \( R_{it} \) represents the daily rate of return on security,
\( R_{mkt} = \) the daily rate of return on market index of the day (e.g. S&P 500) corresponding to the market the stock is trading at,
\( \beta_i = \) a covariance between \( R_{it} \) and \( R_{mkt} \) divided by the variance of \( R_{mkt} \) (i.e., covariance \( R_{it}, R_{mkt} \)) / Var \( (R_{mkt}) \) see equation (4.) - (6.) and slope term in the regression and estimated parameters of the market model,
\( \alpha_i = \) the intercept, expected value of the difference in \( R_{it} - \beta_i R_{mkt} \)
\( \sigma^2_{it} = \) the parameters of the market model,
\( \varepsilon_{it} = \) an error term of security \( R_{it} \) and also known as the zero mean disturbance term.

This study is applying the general conditions ordinary least squares (OLS), which are a consistent estimation procedure for the market model parameters. Given that OLS is efficient, for that the following function was used to calculate the return for firm i during the M&A announcement time \( t \) as well as for a market proxy using adjusted stock prices. The OLS estimators of the market model parameters for an estimation window of observations are:

\[ \beta_i = \frac{\sum_{t=T0+1}^{T1} (R_{it} - \mu_i) (R_{mkt} - \mu_m)}{\sum_{t=T0+1}^{T1} (R_{mkt} - \mu_m)^2} \]  

(4)

\[ \alpha_i = \mu_i - \beta_i \mu_m \]  

(5)

\[ \sigma^2_{it} = \frac{1}{L-2} \sum_{t=T0+1}^{T1} (R_{it} - \alpha_i - \beta_i R_{mkt})^2 \]  

(6)

where
\( \mu_i = \frac{1}{L} \sum_{t=T0+1}^{T1} R_{it} \) and \( \mu_m = \frac{1}{L} \sum_{t=T0+1}^{T1} R_{mkt} \)

\( R_{it} \) and \( R_{mkt} \) are calculated return in event period \( t \) for security \( i \) and the market respectively. Hence, a set of observation periods is examined through calculus, which indicates security abnormal return existence.

The abnormal returns are computed as the difference between actual returns and estimated expected return.
\[ AR_{it} = R_{it} - \alpha_i - \beta_i R_{mkt} = (\text{Actual Return})_{it} - (\text{Expected Return})_{it} \quad (7) \]

where, \( AR_{it} \), is the estimated abnormal return for stock \( i \) over day \( t \), where \( t \) is the day of the analysis period measured in relation to the official acquisition announcement date, \( R_{it} \), is the daily rate of return on stock \( i \) over day \( t \), \( \alpha_i \) and \( \beta_i \) are the estimated parameters of the abnormal returns.

To evaluate how stock prices react to M&A announcements, cumulative abnormal returns are widely used to examine short-term stock performance (Fama et al., 1969). The Average Abnormal Return (AAR) in security for an individual period \( t \) in the estimation period and after is obtained by aggregating abnormal returns (including initial announcement date return) on day \( t \) divided by \( N \) (the number of days in this study case is 26 days).

The AR is calculated as:

\[ \overline{AR}_t = \frac{1}{N} \sum_{i=1}^{N} AR_{it} \quad (8) \]

To draw study inferences about the M&A announcement effect. Therefore, the abnormal return observations must be aggregated. The aggregation is studied through time and particular security price.

The Cumulative Abnormal Returns (CAR) is calculated as:

\[ CAR(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{\tau} \quad (9) \]

where,

\( CAR = \) prior and post Cumulative Abnormal Returns and the sum of abnormal return before the event date and includes the event date \( AR_{\tau} \) and abnormal return after the announcement time.

**Significance of the estimates is tested**

The market model uses the bid announcement and where significant trading in the stock of the target company as significant trading in the stock of the bidder company is conceived as an indication of information leakage about the corporate takeover.

\[ t = \frac{CAR}{\sigma_{AR}/\sqrt{n}} \quad (10) \]

To calculate CAR statistical significance for the CAR the cumulative abnormal returns at time \( t \), \( CAR \) the cross-sectional standard deviation of the abnormal returns for the sample of \( n \) firms at time \( t \) and \( n \) is the sample size.

This study cannot give absolute confirmation of a leak occurrence. However, the patterns and trends that can be related to significant trading around the prior period of the official announcement are considered a sign of leakage activity. The market model enables researchers to measure the stock price performance through abnormal returns, which only captures the unanticipated part of the corporate takeover information around the event (Malatesta and Thomson, 1985).
4.4 Econometric limitations of the study

In order to conduct an event study with reliable output, it is very important to consider the econometric limitations of the study.

Use of daily data and non-parametric tests

Brown and Warner (1985) highlighted that using daily stock returns to conduct an event study may produce some econometric issues. The use of daily returns departs from the normality assumption when comparing to monthly data (Brown and Warner, 1985). Also, Fama (1976) argued that distribution of daily returns normally contains excess kurtosis which applies to daily excess returns. On the other hand, the central limit theorem states that if these returns are identical and independently distributed from cross-sectional samples result in distributions, they converge to normality by augmenting the data size (Brown and Warner, 1985). Dyckman, Philbrick and Stephan (1984) criticized that non-normality of daily return residuals have little effect on inferences drawn from a t-test. Berry, Gallinger and Henderson (1990) studied event study testing methodologies and found that parametric tests work well in combination with daily returns, while non-parametric tests do not do a sufficient job due to an unnecessary complication. Overall, the OLS market model and standard parametric tests are the most appropriate econometric approaches to be applied to the event study. Due to that, this study is based on the regular OLS regression that is combined with the market model and standard t-test for drawing inferences from analysis.

Benchmark of market model

As discussed earlier, a major concern of the market model is the use of a market index, which is used to estimate the expected and the abnormal returns. This study uses market indicators around the world according to stock data which has the highest liquidity in the market as the stock can be listed on multiple exchanges around the world. The market index is put together based on the weighted average market capitalization with index emphasis on a few large companies within the market, which can lead to biased estimates (Lyon et al.,1999). However, the market index represents the most appropriate benchmark available to use as there are not any similar indexes available.

Homoscedasticity and robust standard errors

The assumption of homoscedasticity states that the variance of the sampling error is constant over time (Brooks, 2008). The study graphically plotted the standard errors to detect heteroscedasticity. The plotted graph did not indicate signs of heteroscedasticity as the standard error variance is constant and therefore, there is no need to use robust standard errors.

Clustering and cross-correlation of events

Given the complicated nature of stock market data, there is always an issue with data biased estimates. Clustering is defined as event clustering, which is the result of several events occurring within the same timeframe. The stock price reaction can also be linked to several other event occurrences, such as dividend announcement, earning announcement, macroeconomic factors and other related corporate affairs that might affect the company’s share price performance (Fama, 1998).

However, researchers have always highlighted the stock market data issue in their studies, and this study will control these effects. In economic terms, the study will suffer from cross-correlation between different events that will affect the study results. The issue with clustering is a very
common problem when conducting an event study (Henderson, 1990). This economic issue is part of the data set of this paper. Therefore, this study takes care to treat data in a way which aims to eliminate possible clustering and cross-correlation issues. The data treatment is designed for this study only. Carefully checked M&A announcements and dividend adjusted stock data for 325 companies are used. By doing so, this will certainly diminish issues with clustering and cross-correlation.

### 4.5 Testing the aggregate return

The last step in the event study is to test the significance of abnormal returns and correspondence to reject or accept the null hypothesis which is stated in section 4. The parametric test is conducted to examine the significance of regression results. This study performs a difference of means test to detect the significance of abnormal returns.

### 4.6 Data Sample

In the study, the data sample is constructed by using M&A announcement data from Bureau van Dijk’s Zephyr database. The total sample consists of 500 M&A transaction announcements on target firms. The sample search strategy was set up by using historical M&A deal values in Euros and the top 500 deals regarding valuations globally, which includes cross-border transactions and represents a wide range of industries. The sample is made up of the largest M&A transaction values of more than 10 billion Euro over a 15- year time frame; from January 1st 1998 to December 31st 2013. It represents the fifth and sixth M&A waves in literature. The top 500 M&A deals were selected because those transactions’ valuations can signal potential synergies to the market that can result from combining two firms. The initial sample was 500 transactions and Bloomberg, and Thomson Reuters was used to check the data quality regarding the M&A announcement date and an involved party of the transaction. The checking procedure reduced the sample to 325 announcement dates, mainly due to the use of publicly traded firms and historical stock data available (see appendix 1).

In brief, the study defines the announcement day as 0, this also known as the official date when the acquiring company announces their plan to acquire another company. The estimation period covers 60 days in total, which includes 40 days before the announcement. This data was used to calculate the normal event abnormal returns. The event window of interest starts from the day -15 days prior to the announcement and ends on the day +10 days after the announcement. The total observation period covers 26 trading days, which includes day 0; this period is compared with the estimation period.

The daily stock price of historical data is collected from Yahoo Finance, where the dividend adjusted stock price data is used. In the market model for the stock index, the corresponding countries’ stock market index is used. The stock indexes are conducted based on the principle of diverse constituency industries and weighted portfolio methodology is used. This study uses security indexes from S&P 500, FTSE 100, CAC40, DAX Kurs Price Index, Nikkei 225 Index, Shanghai SE Composite Index and Madrid SE General Index respectively (see appendix 2). The daily market price-dividend adjusted data is extracted from Yahoo Finance, where the dividend adjusted market index data is used. The interested firm’s share price is detected from the market index to reduce the “noise” in the data and better “isolate” the effect of the transaction. The abnormal security returns are tested around the announcement day using the bidder’s stock price abnormal returns to stock market index abnormal returns.
The model market methodology is conducted by using the statistical software program R to calculate the abnormal returns and cumulative returns.

To evaluate statistical results, it is important to test the significance of the estimates to control whether the average abnormal returns for each stock is statistically different from zero. The t-values are calculated using the standard normal distribution value of 1.96 at the 95 percent level. The t-statistics to be statistically significant should be between ±1.96. Thus, t-statistics greater than 1.96 indicate that the average abnormal return for the stock is significantly different from zero at the 5 percent level.

4.7 Sustainability

The efficient market hypothesis (EMH) is the practical application of economics. EMH is an intriguing area in the academic literature that states it is not possible to “beat the market” as the stock market is efficient and share prices always incorporate and reflect all information available in the market (Fama, 1970).

The sustainability factor is important to acknowledge in this academic study. According to Cato (2009), who discussed “three pillars of sustainability” which are environmental, economy and society that are constrained by environmental limits. More particularly, this study contributes to the economic literature and therefore to the economic sustainability. To emphasize the importance of ensuring that information about insider trading has negative consequences to financial market development. Due to the nature of this study, I do not see a particular implication to the environment and social sustainability.
5 EMPIRICAL RESULTS

This section of the study presents and analyses the empirical results. The study was mostly concerned with the pre-announcement and announcement price to test abnormal return performance in different event windows and to analyse the significance of these results. Therefore, empirical results are focused on the pre-announcement and announcement movements of the market activities using the cumulative abnormal returns and plotting cumulative abnormal returns to infer any kind of presence of information leakage in the stock market.

The study presents the time series analysis of the bidder’s share price reaction to the M&A announcement on 325 publicaly traded companies, with 21,450 event observations measuring cumulative abnormal and statistically significant at the 95 percent confidence level during the 26 day trading event window. This consists of fifteen days prior to the announcement, announcement day (day 0) and ten days after the announcement. Figure 3 illustrates the announcement of abnormal returns and cumulative abnormal return results for the entire 26-day event window.

The study analyses the M&A announcement on bidder firm stock price characteristics, namely trading liquidity. Table 3 shows that trading date relative to announcement date and abnormal returns and cumulative abnormal returns fluctuate significantly, however, some of the patterns can be analyzed.

To start with these results strongly support widely confirmed evidence in the finance literature that the market reacts to M&A transaction announcement intently and immediately after the announcement, and that bidder firm stock is highly sensitive around the announcement period. The general study result is that the bidder firm is not earning/generating abnormal returns as identified by Dodd (1980) during the announcement time. Dodd claimed that for 60 successful merger bidders on the day before and the day after the public announcement of the merger bids are, on the average negative, which leads to zero net present value investments.

5.1 Pre-announcement abnormal returns on bidding firm

<table>
<thead>
<tr>
<th>Trading date relative to announcement date</th>
<th>%</th>
<th>p-values</th>
<th>t-statistic</th>
<th>95% confidence interval</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event Window (-15:+10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>-0.79638</td>
<td>0.3285</td>
<td>1</td>
<td>-0.0066</td>
<td>0.0162</td>
</tr>
<tr>
<td>CAR</td>
<td>-11.1507</td>
<td>0.0001676</td>
<td>6.1496</td>
<td>0.0633</td>
<td>0.1282</td>
</tr>
<tr>
<td>Event Window (-10:+10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>-0.48167</td>
<td>0.3293</td>
<td>1</td>
<td>-0.0087</td>
<td>0.02469</td>
</tr>
<tr>
<td>CAR</td>
<td>-12.3661</td>
<td>0.01036</td>
<td>2.8264</td>
<td>0.0126</td>
<td>0.06339</td>
</tr>
<tr>
<td>Event Window (-5:+5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>-0.27548</td>
<td>0.3409</td>
<td>1</td>
<td>-0.0768</td>
<td>0.0493</td>
</tr>
<tr>
<td>CAR</td>
<td>-12.2349</td>
<td>0.000081</td>
<td>3.4641</td>
<td>0.0327</td>
<td>0.15056</td>
</tr>
<tr>
<td>Event Window (-2:+2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>1.445128</td>
<td>0.5198</td>
<td>-0.655249</td>
<td>-3.3422</td>
<td>1.7381</td>
</tr>
<tr>
<td>CAR</td>
<td>-10.7751</td>
<td>1.25×10^-9</td>
<td>1.2×10^-9</td>
<td>-13.234</td>
<td>-8.3181</td>
</tr>
<tr>
<td>Event Window (-1:+1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>3.166213</td>
<td>0.9747</td>
<td>-0.0359</td>
<td>-23.755</td>
<td>23.3631</td>
</tr>
<tr>
<td>CAR</td>
<td>-9.8414</td>
<td>0.4607</td>
<td>0.90566</td>
<td>-10.753</td>
<td>16.486</td>
</tr>
</tbody>
</table>

Source: Research findings, 2016
The abnormal returns over the twenty-five event windows (T−15 days (prior) and T+10 days (after)) based on the efficient market theory the announcement with a t-value of 6.1496 (p-value of 0.0001676 substantially lower than p>0.05). The CAR is statistically significant and negative 11.15 percent for bidder firms. Therefore, the stated hypothesis can be rejected, and the study provided evidence that bidder firms generate significant cumulative abnormal returns during 26 trading days.

The study results for T−10 days (prior) and T+10 days (after) applied event window indicated a t-value of 2.8284 (p-value of 0.01038 substantially lower than p>0.05). The CAR is statistically significant and decreased by 13 percent for the bidder firm. Therefore, the stated hypothesis can be rejected, and the study provided evidence that bidder firms generate significant cumulative abnormal returns during 21 trading days.

The study results for T−5 days (prior) and T+5 days (after) applied event window indicated a t-value of 3.4641 (p-value of 0.006081 substantially lower than p>0.05). The CAR is statistically significant and decreased by 12 percent. Therefore, the stated hypothesis can be rejected, and the study provided evidence that bidder firms generate significant cumulative abnormal returns during 21 trading days.

Abnormal returns performance closer to the official announcement date, and on T−2 days (prior) and T+2 days (after) applied event window indicated a t-value of 0.00000000018 (p-value of 1.78E-09 substantially lower than p>0.05). The CAR is statistically significant and decreased by 11 percent. Therefore, the stated hypothesis can be rejected, and the study provided evidence that bidder firms generate significant cumulative abnormal returns around M&A announcement during 5 trading days.

The abnormal returns for T−1 days (prior) and T+1 days (after) applied event window indicated a t-value of 0.90566 (p-value of 0.4607 substantially higher than p>0.05). The CAR is statistically insignificant and decreased by 10 percent. Therefore, the stated hypothesis cannot be rejected, and the study provided evidence that bidder firms do not generate significant returns around M&A announcement during 3 trading days.

In general, this study confirms that the highest and most reliable abnormal returns are close to the announcement day. Although, by shrinking the event window the cumulative abnormal returns together with t value increased. The study’s findings were statistically significant prior to the day (-2,+2) event window and insignificant during (-1,+1) and (-2,+2). The findings reject the hypothesis that the largest M&A transactions generate significant abnormal returns around the short-term event window for the bidder shareholder before (-2,+2) event window. Therefore, the study accepted the hypothesis that the largest M&A transactions generate significant abnormal returns around the short-term event window for the bidder shareholders. Despite the fact that the event window of (-1,+1) and (-2,+2) indicated slightly different results closer to the event date, bidder firm stock performance does not provide significant returns around the announcement date. Hence, the assumption of efficient markets still holds in the case of a large transaction during the event window of (-1,+1) and (-2,+2).
5.2 Discussion

The discussion part of the study will elaborate on the statistical and aggregated abnormal returns findings around M&A announcements compared to previous researchers’ findings and to investigate if the study findings were consistent with previous research or if they revealed new patterns. The discussion section concludes with the contribution of the study to the field.

This study investigates the information content of abnormal returns of 325 highly valued M&A announcements. The study hypothesis stated that the largest M&A transactions generate or do not generate significant abnormal returns around the short-term event window for the bidder shareholders. These paper study results are divided between significant and insignificant depending on the event window and if it is cumulative abnormal return or abnormal return (see table 3).

The study findings rejected the null hypothesis and agreed with the alternative hypothesis, which stated that the largest M&A transactions generate significant abnormal returns around the short-term event window including event windows (-15,+10), (-10,+10) and (-5,+5) for the bidder shareholders, whereas for the event window (-2,+2) and (-1,+1) showed that during the closure to M&A announcement time transactions do not generate significant abnormal return. This results are controversial but are consistent with existing literature on the bidder firm M&A announcement abnormal returns performance as proposed by Aktas et al., (2001), MacKinlay, (1997) and Brown, (1985) and (1986).

These study findings indicated that abnormal returns are statistically insignificant around the M&A announcement during the event window of 15 days prior and 10 days after. This study used the short-term time frame, which was enlarged up to three-weeks security trading. In their study, of
large European takeovers on abnormal returns in target and bidder firms in the fifth M&A wave. Georgen and Renneboog (2002) highlighted that by enlarging the time frame, the abnormal returns become insignificant. The insignificant study results can be explained by the enlarged period.

Reviewing event windows closer to M&A announcement, especially for the short-term event windows and abnormal return development at that time, the study results indicate a -0.46% abnormal returns for event window of (-10,+10). This finding is consistent with Bradley, Desai and Kim’s (1983) study on the rationale behind interfirm tender offers based on information or synergy, where their findings indicated an abnormal return of -0.27% occurrence in the period of 1963-1980. Jensen and Ruback (1983) generalized bidder firm returns to be approximately zero during the announcement period, which also explains this study’s results.

The abnormal returns for event window of (-5, +5) indicated a -0.3%, however, it is not precisely consistent with previous researchers’ findings but somewhere between Berkovitch and Narayanan (1993) a -0.03%, whose study used the correlation among target, acquirer and total gains. They used a sample of tender offers in 1963-1988 and found both positive and negative gains. Many scholars view is that M&A announcement generates mixed findings; this has been widely debated in the literature and this study results also revealed mixed findings.

The study findings for event window (-2,+2) indicated a +1.45% increase in abnormal returns, which shows that market incorporates the M&A announcement from the event window (-2:+2). This contrasts with Georgen and Renneboog (2002) who studied abnormal returns of the large mergers extensively and acquisition transaction in Europe and argued that bidder firms do not generate abnormal returns. Their study found abnormal returns for (-2,+2) event window indicated a -7.48% negative abnormal returns occurred in 1993-2000.

The study findings for (-1,+1) event window indicated a +3.2% increase in abnormal returns, which is consistent with Asquith’s (1983) study of M&A announcement reactions which occurred between 1962-1976 indicated in the range of -0.10 to +5.9% abnormal return performance. This study aimed to examine the effect of mergers on the wealth of bidding firms during the twenty-one-day event window. Asquith found that the shareholders of bidding firm generate cumulative excess returns, which challenges the academic opinion that more likely target firms generate a minimum of 20% abnormal returns. In general, the study results for close to the announcement day (-1,+1) are consistent with previous researchers’ findings of the abnormal return performance for the bidder firm. Dodd (1980) and Eckbo’s (1983) study was designed to capture pre-announcement leakage of merger-related information and any immediate post-announcement development, as studied in this paper. Their study presented abnormal returns for bidding firms ranging from 2.4% to 6.7%, and in comparison to this study indicated a +3.2% in abnormal returns, which is consistent.

In their influential study, Keown and Pikerton (1981) stated that price adjustment occurs before the public announcement date as the impending merger announcements are poorly held secrets and that the pre-announcement price adjustment reflects insider trading and leakage to the market. The most interesting finding that during closer to the announcement time in the event period (-1,+1) and (-2,+2) the possible leaked transaction will provide excess retruns for the acquirer, and confirms the academic literature on M&A announcement.

Overall, this study conducted event study using a very sensitive sample of corporate transactions, which can be related to greater attention in the stock market, and the majority of the earlier abnormal returns and gains can be associated with some sort of intentional leakage by the target firm to increase their premium as discussed by Moeller et al., (2015). Despite the fact that this study cannot indicate strong evidence of insider trading, but based on bidder firm’s abnormal
returns and performance results, it appears that particularly in the event window of (-2, 2) and (-1, 1) the trading was statistically significant in the stock market and acquiring firms earned substantial positive abnormal returns during the pre- announcement phase. Therefore, further studies are important to carry out.

The study conducted attempted to contribute to existing literature by using the unexplored fifth and sixth M&A waves in the period of 2003 up to 2013 and by using the largest transactions regarding the valuation amount in monetary terms, therefore, likely related to some sort of noise in the market. In academia, large transactions on the bidder side have not been widely investigated, as the majority of the studies have focused on abnormal returns on target firms engaged in M&A transactions. In addition, this study applied different event windows to test the reaction of stock price to the announcement, and in fact, focuses on the prior announcement period to find evidence of prior information leakage to the market. In the classical event study approach the researchers used not more than three time frames, whereas this study applies five different time frames to give a more detailed overview of the stock performance around the M&A announcement. Furthermore, this study will have a practical application for fund managers, who hold large size corporation stocks in their portfolio, and know how to set their investment strategy when the portfolio firms are undertaking corporate merger and acquisition transactions.
6 CONCLUSION

In this section the conclusion and research design are reviewed, and limitations of the study together with a potential recommendation for future research is presented.

Despite the extensive discussion in M&A literature regarding whether M&As generate or destroy wealth for shareholders, it is still a debatable topic, largely depending on announcement timing and insider leakage occurrence. This paper investigated the information content of the M&A announcement, focused on the prior announcement period to find evidence about the potential leakage activities in the case of 325 highly valued M&A transaction announcements from 1998 to 2013. The study findings on cumulative abnormal returns and abnormal returns showed that the largest M&A transactions generate significant and insignificant negative and positive abnormal returns around the short-term event window for the bidder shareholders. Therefore, no market inefficiency was detected, and the information is incorporated in the stock price. The study findings are consistent with Keown and Pikerton (1981), Brown (1985) and (1986) and Mackinlay (1997). However, this study used aggregated abnormal return and time variance, which might not be enough to find out statistically significant evidence of potential M&A leakage information. Thus, the study suggested adding trading volume on top of abnormal return to get a more detailed overview of trading activities in the market. This paper contributed to the existing M&A corporate literature on large scale bidder firm stock reaction prior announcements and intended to detect any kind of possible leakage by using large deals announced in 1998 up to 2013 during the fifth and sixth merger waves and by applying detailed time frame analysis that examined data 15 days prior to the announcement and ten days after the announcement.


6.1 Limitations and future research

In this section the research design is reviewed and limitations of the study together with potential recommendations for future research are presented.

This study used event study as the methodology to detect the presence of non-zero abnormal returns and possible information leakage in the stock market. The study findings were insignificant which suggested a need for a modification of the study design. This study was designed as a short run study and investigated the information content of abnormal returns around the M&A announcement and more specifically pre-announcement period up to announcement day (day 0). This study’s inference is that the study cannot precisely conclude leakage activities. Therefore, additional research in the area with similar data samples, event windows and other characteristics should be used to carried out further studies.

More recent empirical papers emphasized that the M&A timing process has increased the importance of getting the transaction process time right and is therefore an essential component of the success of the transaction. Interestingly, their findings confirmed that corporate takeover information leakage is intentionally proposed by the target firm to increase their price premium, whereas acquiring firms are not interested in revealing M&A announcement information earlier, as on average the acquiring firm’s stock price drops by 30 percent (Moeller and Whitchelo, 2012).

This study evaluated only abnormal return content because of the limited data available. Many studies on insider trading have used trading volume content as the evidence has indicated large trading volumes related to insider trading activities during M&A announcement (see e.g., Keown and Pinkerton, (1981), Meulbroek, (1992), Bhattacharya, Daouk, Jorgenson and Kehr, (2000)). By adding the abnormal trading volume to the abnormal return will validate the data results significantly. Overall, give a better picture of the security performance during the M&A announcement. The model that volume related studies are using is Easley and O’Hara (1987), who developed the probability of information-based trading that can be used to more closely evaluate volume trading.

Major advantages of applying the probability of an information-based trading model are that the model takes account of several another event occurrences, such as dividend and earning announcements, macroeconomic factors, and other corporate affairs, which are possible to control more effectively. More importantly, this will increase the validity of the study findings.


Barber, B.M. and Lyon, D. J., 1996. How can long-run abnormal stock returns be both positively and negatively biased?. Working paper.


Jensen, M.C. and Murphy, K.J., 2004. Remuneration: Where we’ve been, how we got to here, what are the problems, and how to fix them, *Finance Working Paper* No 44.


APPENDICES : A Supplementary Information

1. Data sample from Zephyr download from Bureau van Dijk

Overview of study sample made according to the industry

<table>
<thead>
<tr>
<th>From</th>
<th>Zephyr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Announcement period</td>
<td>Deal value (EUR): top 500 (including estimates)</td>
</tr>
<tr>
<td>Transaction Type</td>
<td>Cross- border</td>
</tr>
<tr>
<td>Industry</td>
<td>325 Companies</td>
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<tr>
<td>Financial services</td>
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<td>Telecommunication</td>
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<td>Information</td>
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<td>Technology</td>
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<td>Oil and Gas</td>
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<td>Pharmaceutical</td>
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<td>Real Estate</td>
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<tr>
<td>Internet</td>
<td>29</td>
</tr>
</tbody>
</table>

2. The main stock market Index for each country

<table>
<thead>
<tr>
<th>Country</th>
<th>Price Index ((R_{mkt}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Nikkei Stock Average 225</td>
</tr>
<tr>
<td>Canada</td>
<td>S&amp;P TSX Composite Index</td>
</tr>
<tr>
<td>China</td>
<td>Shanghai SE Composite Index</td>
</tr>
<tr>
<td>France</td>
<td>France CAC 40</td>
</tr>
<tr>
<td>Germany</td>
<td>DAX Kurs Price Index</td>
</tr>
<tr>
<td>United States</td>
<td>S&amp;P 500</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>FTSE 100</td>
</tr>
<tr>
<td>Spain</td>
<td>Madrid SE General Index</td>
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</table>