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PERFORMANCE OF MERGER ARBITRAGE STRATEGIES IN THE EUROPEAN STOCK MARKETS

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ABSTRACT

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This thesis focuses on identifying the profitability of the merger arbitrage investment strategy in European markets during the 2002-2014 sample period. The data consists of the mergers and acquisition deals between the European publicly traded companies. The portfolios in the study are constructed by the payment method of the deal and weighted either by equally or value weighted methods.

The performance of the portfolios is examined by mean monthly return and Sharpe Ratio. Results are benchmarked against STOXX Europe 600 and European Total Market return indexes. Abnormal excess returns for the portfolios are studied with Capital Asset Pricing Model (CAPM) and Fama-French Three Factor model. Additional robustness to the traditional Sharpe ratio test results are obtained by Skewness and Kurtosis Adjusted Sharpe Ratio (SKASR). The results in this thesis indicate that all the constructed total merger arbitrage portfolios outperformed benchmark market return portfolios during the sample period. Moreover, merger arbitrage investment strategy proved to be very market neutral investment strategy in the most market conditions and potential strategy for investors aiming to catch relatively high return-to-risk ratio.

TIIVISTELMÄ

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Tutkielma pyrkii kartoittamaan yrityskauppa-arbitraasi investointistragian kannattavuutta Euroopan markkinoilla vuosien 2002-2014 välillä. Tutkimusaineisto koostuu yrityskauppatarjouksista julkisesti listattujen eurooppalaisten yritysten välillä. Tutkittavat portfoliot on rakennettu maksutavan perusteella ja kauppojen välinen painoarvo on laskettu joko tasa-arvoisesti tai markkina-arvon perusteella.

Portfolioiden suoriutumista on arvioitu keskimääräisellä kuukausituotolla ja Sharpen ratiolla. Tulosten suorituskykyä on mitattu STOXX Europe 600- ja European Total Market return -indekseihin verrattuna. Ylisuuria portfolioiden tuottoja on tutkittu Capital Asset Pricing Model (CAPM) ja Fama-French kolmifaktorimallien avulla. Lisäksi perinteisen Sharpen ration tutkimustulosten luotettavuutta on vahvistettu huipukkuus- ja vinouskorjatulla Sharpen ratiolla (SKASR). Tutkimustulokset osoittavat kaikkia maksutyyppejä sisältävien portfolioiden olleen tuottavampia kuin markkinatuotto tutkitulla aikavälillä. Lisäksi yrityskauppa-arbitraasi osoittaa olevansa hyvin markkinaneutraali investointistrategia suurimmassa osassa markkinatilanteita. Se on potentiaalinen strategia sijoittajille, jotka tavoittelevat korkeaa tuottoa suhteessa riskiin.

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I have to say that studying in Lappeenranta has been a wonderful experience. I have made many long-lasting friendships in the University. The atmosphere in Skinnarila campus is something you need to live before you can really understand how great it is.

The road from the beginning to finalizing my thesis has been long and longer than I expected. Without the great support from my friends, family and especially from Emma, I wouldn't have made it. I want to thank all the faculty in the Lappeenranta University of Technology for their excellence. Special thanks to my supervisor Eero Pätäri for the great comments and ideas how to develop this thesis even better.

After all, the thesis was like a puzzle, it took a lot of time with small steps, and I felt that it is never going to be ready. After all, now it is done.

Henri Nuppunen

Table of Contents

List of figures

List of tables

1 Introduction

The financial markets are packed of different kind of investors. There are players in the field of financial markets from small private investors to gigantic institutional investors. It doesn't matter who you are as everyone shares the same objective: they want returns for their investment. The evolution of the financial markets has developed investment opportunities to cover all kinds of investments and strategies. Some of the investment strategies and hedge funds claim to obtain abnormal returns, regardless of the existing market situation. The focus of this master's thesis is in the merger arbitrage which is one of those aforesaid investment strategies.

Merger arbitrage or risk arbitrage is an investment strategy that attempts to profit from the price difference between the stock price and the offer price of the target company after the merger announcement or an acquisition bid. After an announcement the share price will increase to a level near offered price, but because of a risk involved in deal completion there remains a small premium in the stock price, called the arbitrage spread. Investors involved in this type of investments are arbitrageurs who take long positions of a target company to take advantage of the arbitrage spread. If the merger is successful, investors successfully capture the price difference as a profit for their investment.

In contrast to classical risk-free arbitrage trade, there is a risk related in merger arbitrage. Risk in a merger arbitrage accrues from the losses if the merger fails, the target and acquirer stock prices could move unfavorably. Leading merger arbitrageurs to suffer a much higher loss than the profits if the deal consummates.
The alternative name of merger arbitrage is risk arbitrage which derives from the risk that the announced deal may or may not succeed.

In academic literature several studies have found large excess returns (i.e., risk-adjusted returns) related to the merger arbitrage investment strategy. Numerous earlier academic studies, e.g. Mitchell & Pulvino (2001), Baker & Savasoglu (2002), Maheswaran & Yeoh (2005), Kearney et al. (2008) have found statistically-significant evidence between merger arbitrage and excess returns. Investors are always

seeking for perfect and more profitable investment opportunities, raising questions why there are excess returns available on merger arbitrage investments. Larcker & Lys (1987) suggest that excess return is a compensation for obtaining expensive private information involved in investments. According to Mitchell & Pulvino (2001) merger arbitrageurs are providing liquidity to markets and excess returns are reflected to a premium paid for their presence, especially during severe market downturns.

Mergers and acquisitions are one of the most studied topics in finance research. However, the literature of the merger arbitrage is very limited, albeit it's part of the merger and acquisition research. Most of the existing studies have used US data as US markets are often said to be the most efficient markets in the world. Additionally, some other papers have used data from single countries outside the US e.g. from the United Kingdom, Canada, Taiwan, Germany and Australia. Also, it's intriguing to notice that all the most notable papers published in academic journals contain data prior the latest finance crisis and latest of them have used data that ends in the year 2008.

1.1 Research data, method and objectives

As opposed to existing literature in this master's thesis the focus is on European merger arbitrage markets. By authors' knowledge this is the most comprehensive study so far based on the European market data. Sample data consists of mergers and acquisition bids from 2002 to 2014. Data for this research is from Thomson One Banker and Datastream databases. In this paper sample is limited to mergers and acquisition bids between European public companies. Also, only bids that are either only cash, stock or mixture of cash and stock are included. Different type of deals that include other kind of payment method than above e.g. financial derivatives or stock options are excluded, because of their more complicated valuation methods. In 2002 Baker & Savasoglu proposed in their paper that the impact of transaction costs is rather small in the merger arbitrage returns. Due to the limitations of this study transaction costs are not accounted for. More specific information about the selected data and its limitations will be discussed in later chapters.

The main objective of this paper is to provide the first and consequently the most extensive study of the merger arbitrage investment returns in Europe. Needless to say that the use of data from the whole different continent and a time series that includes the latest financial crisis can provide unpredictable findings in this field of financial research. One can predict the results based on the earlier findings in the United States, Canada, United Kingdom, Taiwan and Australia, but the time series of this thesis can also be an interesting factor. Ji & Jetley (2009) found that the merger arbitrage spread has declined dramatically in the last decades and by more than 400 bps between 2002 and 2007. They suggest that some of the decline could be permanent; consequently, researchers and investors analyzing the profitability of merger arbitrage hedge funds should focus on returns since 2002. Considering the different continent and the time series between 2002 and 2014 there is a possibility that positive excessive returns reported in earlier literature have turned into negative if the downslide in the arbitrage spread has continued in a same pace as from the research by Ji & Jetley (2009).

This research is conducted quantitatively and uses statistical methods. The research data used in the empirical part consists of merger and acquisition bids of 344 European public companies. The dataset in this thesis is from the year 2002 to 2014. This time horizon is selected to provide as comprehensive time series as possible since 2002 as Ji & Jetley (2009) recommended not to focus on earnings prior to 2002.

The objective of this master's thesis is to answer to the question: *Are there existing large excess returns by using the merger arbitrage investment strategy in European markets in the time series since 2002 and does it make merger arbitrage to an exceptional investment strategy?* The following sub-questions are formed to provide appropriate information and to achieve an adequate answer to our main research problem:

Q1: Are there differences in the returns between cash, stock swap and mixed deals?

Q2: Are there differences in the returns between value and equal weighted portfolios?

Q3: How the latest financial-crisis has affected to the returns of merger arbitrage and can we see a declining trend in merger arbitrage returns?

Q4: The earlier literature has reported low volatilities involved in merger arbitrage trade; is it higher in this time horizon examined in Europe than in the earlier studies in North America?

Q5: Are the risk arbitrageurs facing more risk during the depreciating markets than the positive and flat market conditions?

In this paper different types of portfolios will be constructed by using merger arbitrage investment strategy. Portfolios will be formed by deal type, portfolio balance method and investment strategy. Returns will then be benchmarked against selected market indexes. The mean monthly return will be calculated for each of the portfolios as a performance measure. Merger arbitrage returns will be benchmarked against linear model. Tentatively, performance indicators in this thesis will include both Capital Asset Pricing Model (CAPM) and three-factor Fama-French model.

1.2 Structure of the thesis

This paper consists of nine chapters. The first chapter is an introduction, and second chapter is designed to provide an overall understanding of the merger arbitrage as an investment strategy. The third chapter provides a theoretical framework and literature review. The main research question and sub-questions are explained in the fourth chapter. The time series data is presented and analyzed in chapter five. The research methodology of this study is reviewed are processed in the sixth chapter. The results of empirical research are presented in the seventh chapter. The results are benchmarked different models in eight chapter and the conclusions are presented in the ninth and final chapter.

2 Merger Arbitrage

The press usually portrait merger arbitrageurs in an unfavorable way. Merger arbitrageurs are important players in the market, increasing the welfare, facilitating takeovers and increase the value of a company. Usually, acquirer offers a higher price per share than the current trading price in the markets is. Acquirer offers incentive to convince existing stock owners of the target company to vote favorably for the takeover bid. Therefore, the market price of the target share rockets after announcement close to the offer price, but usually trades bit lower than the bid offer. This means that the value of the stock holdings of the existing owners inflates heavily from the preannouncement value. Consequently, this attracts merger arbitrageurs that try to take advantage of that bid premium in takeover attempts. At the same time, they provide insurance to the other investors to cash out from their initial investment in case that the takeover attempt fails, and stock price will fall to the earlier trading price (Cornelli & Li 2002).

2.1 M&A deal types

In the financial markets, there are multiple types of merger and acquisition deals. In this paper, we are focusing to three different takeover types cash offer, stock offer and to mixed offer deals.

Cash Offer Deals: In a pure cash deal, acquirer offers a fixed amount of cash per target company share. Merger arbitrageur tries to take advantage of the existing bid premium and bets for the successful takeover deal. In case that the deal is successful merger arbitrageur catches the spread between the invested stock price, prior deal consummation and the offer price after the deal has gone through. The strategy is simple and means that the arbitrageur takes a long position in the acquirer shares and collects profit for the investment after the deal is completed.

The formula for cash deal arbitrage spread is given by the same method as mentioned earlier by Ji & Jetley (2009):

$$S_{cash,t} = \frac{P_{offer} - P_{target,t}}{P_{target,t}} \quad (1)$$

Where $S_{cash,t}$ is equal to the arbitrage spread for a cash deal on trading day *t.* P_{offer} is the price in cash that the acquiring firm offers to pay for each target firm's share. And $P_{target,t}$ is the closing price of the target firm's stock on trading day *t*.

The deal between Volkswagen and Scania represents a good example of a cash offer deal. On 21 February 2014, Volkswagen AG announced a public offer to the shareholders of Scania Ab to tender all shares in Scania to Volkswagen. Volkswagen offered SEK 200 in cash per share regardless of share class. Day prior public announcement day Scania was trading at SEK 147. After an announcement by Volkswagen Scania share price rocketed immediately close to offer price and was trading at SEK 194.5 on 24th of February 2014. The SEK 5.5 difference between the offered price by Volkswagen and an actual price in the markets present the premium that attracts merger arbitrageurs to invest in a deal. The offer was conditioned upon at least 90% of Scania's shares being tendered. On 13 May 2014 Volkswagen announced that the offer will be completed. Later, on 21 May 2014 Scania announced that NASDAQ OMX Stockholm has decided to delist Scania's shares and the last trading day for the Scania was 5th of June 2014 (Volkswagen 2014). In figure 1 the share price development of Scania AB is shown during the bid period. The share price of Scania was trading below the offered price for the announcement period. The Scania AB stock was trading with a smaller arbitrage spread in February and March, but the stock price fell in May as there were more uncertainty with the deal completion.

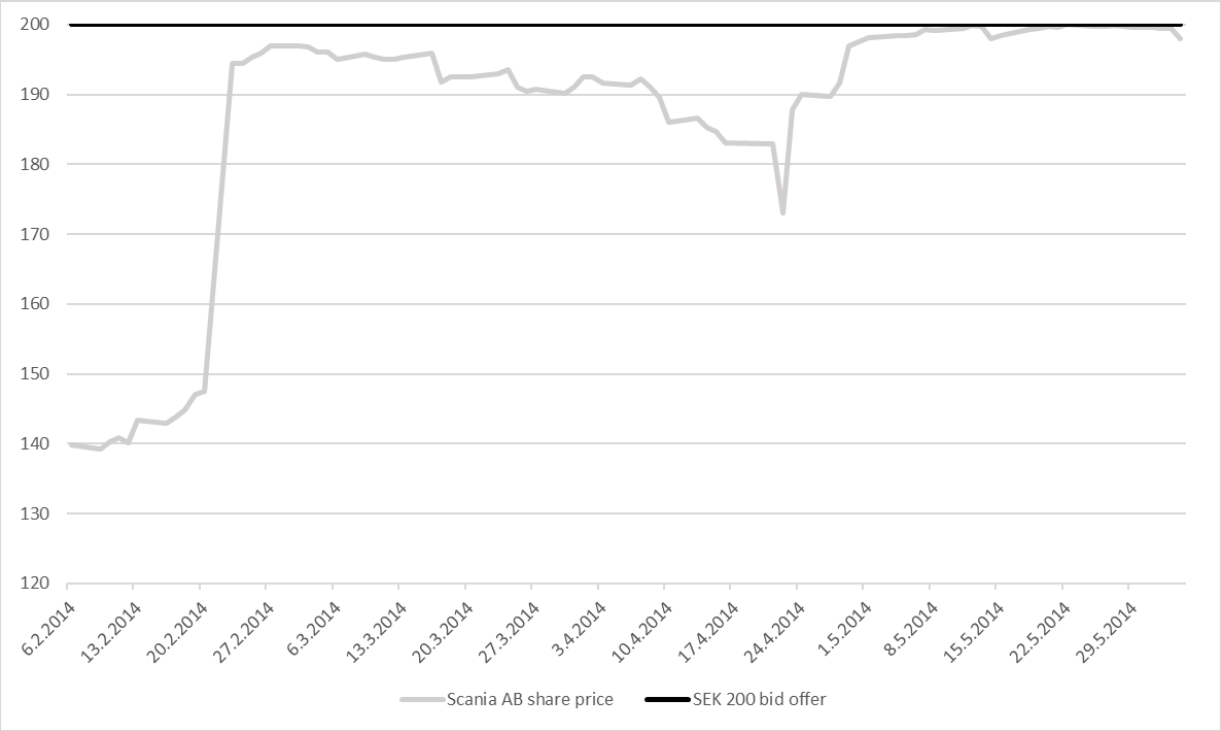

Figure 1. Scania share price development during Volkswagen AG SEK 200 bid offer

Stock Offer Deals: In a stock offer, acquirer doesn't offer cash in exchange for the target firm stock but offers to finance the takeover attempt with its own stock. Like as already explained in a cash offer case, the strategy is that merger arbitrageurs will take a long position in the target company stock in stock offers. Additionally, in stock offers arbitrageurs take a short position in the acquiring company stock, meaning that they will borrow acquiring company stock. The reason why arbitrageurs short acquiring stock is behind the fact that after a successful stock offer takeover they will receive a fixed amount of acquiring company shares anyway. In case that the target to acquirer stock ratio is fixed, investors will receive promised number of shares as long the deal is completed.

The actual profit for the arbitrageur will be the combination of the increasing price of the target stock and the possibly decreasing acquirer's stock. There are alternative investment methods available for stock offers. The one option is that the acquirer offers a fixed amount of its own shares for an exchange for the target company share this it is called a stock swap. The second alternative of a stock offer is called collar transaction, meaning that the exchange ratio is not finalized until the consummation date. Generally, in collar merger transactions it's designed to provide a stable dollar

value for the target share exchanged nevertheless the volatile value of the acquiring company stock. Branch & Yang (2006b) said that compared to stock swap offer the use of the collar merger offer put managers of the acquiring firm to be more comfortable with the valuation of the target firm and/or the positive effect of the proposed merger attempt. On the other hand, they also mentioned that collar merger offers are more likely than stock swap offers to receive competing offers.

The formula for stock deal arbitrage spread is given by the same method as mentioned earlier by Ji & Jetley (2009):

$$S_{stock,t} = \frac{(P_{acquirer,t})(ER) - P_{target,t}}{P_{target,t}} \quad (2)$$

Where $S_{stock,t}$ is equal to the arbitrage spread for a stock deal on trading day *t.* $P_{acquirer,t}$ is the closing price of the acquiring firm's stock on trading day *t* and ER is the exchange ratio (i.e., the number of shares of the firm's stock offered to the target firm's shareholders in exchange for one share of the target firm's stock. Like in cash deal arbitrage spread formula $P_{target,t}$ is the closing price of the target firm's stock on trading day *t.*

Mixed Offer: It is common that the acquisition is paid not only with cash or either with stocks. Sometimes the deal is including the combination of a mix between cash and stock. In some cases, mixed offers (or hybrid offers) can include other kinds of financial derivatives and stock options, which set them harder to analyze than aforesaid deal types. These kind of tricky deal types will be excluded like in most of the prior studies in merger arbitrage literature. Consequently, in this study only the cash offer, stock offer and mixed offer deals that contain only stock and cash will be included.

The formula for mixed deal arbitrage spread is given by:

$$S_{mix,t} = \frac{P_{offer} + (P_{acquirer,t})(ER) - P_{target,t}}{P_{target,t}} \quad (3)$$

Where all other factors are familiar from cash and stock arbitrage spread formulas, but $S_{mix,t}$ is the arbitrage spread for a mixed deal consisting of cash and stock on trading day *t.*

2.2 Risk in Merger Arbitrage

Arbitrage is understood as an investment process of simultaneous selling and buying of an asset to profit from a price difference between the markets. The arbitrage exploits the price differences of equivalent financial instruments on different markets or in different forms. In an arbitrage trade the quantity of the underlying asset sold and bough should be the same. The payoff of the trade is the price difference between the underlying assets. Usually, the payoff is relatively small in percentage terms and to ensure the profitability of the trade it should also cover the transaction costs involved in trade. Arbitrage exploits the existing market inefficiencies.

Unlike the generalized arbitrage in merger arbitrage there is a risk involved, why it is often referred as risk arbitrage. Sometimes takeover deals fail, which can mean losses to risk arbitrageurs. When a takeover attempt fails prices of the target and acquiring company could undergo to the preannouncement levels or even further. However, there is no rule to determine whether unsuccessful deals will always cause undesirable losses to the merger arbitrageurs as Branch & Yang (2006a) reported higher profits in their sample data for an unsuccessful cash tender offer deals than in successful deals. However, the findings by Branch & Yang (2006a) were driven by the competing bids by different acquiring companies increasing the price of the target company. The rule of thumb could be that most likely investors will face losses in case of deal failure unless there will be competing or improved bid offers.

Like always in investments the diversifying to multiple investments and not to allocate all available cash to one single deal decreases the risk for investors. Many earlier studies have used two following investment strategies to allocate the portfolio by either value-weighted or equal-weighted strategy (e.g. Baker & Savasoglu 2002, Maheswaran & Yeoh 2005 and Kearney et al. 2008). Meaning that the weight of a single deal in a constructed merger arbitrage portfolio could be determined by the value of the deal or by equal weight for all running deals. Moore et al. (2006) reported in their merger arbitrage hedge fund survey results that 10% was the most common maximum limit for hedge funds in a single investment to control their risk, suggesting that merger arbitrageurs avoid to over-weight some specific deals too much in their portfolios.

2.3 Efficient Market Hypothesis

One of the most famous theories in the field of finance is efficient market hypothesis by Eugene Fama (1965). Fama (1970) suggested that there are three forms of the market efficiency “weak”, “semi-strong” and “strong”. The weak-form suggests that all the past available public information is already reflected to the market price and one cannot earn excess returns by analyzing historical data on share prices. Therefore, prices follow a random walk pattern, meaning that all price changes are random and cannot be predicted. Semi-strong-form suggests that in addition to weak-form all publicly available new information will adjust the share prices very rapidly meaning that no excess returns can be earned based on that information, one can only achieve excess returns by using insider information. The strong-form hypothesis suggests that no one can earn excess returns even with private insider information.

Afterwards, several studies have studied efficiency of the markets. Malkiel (1973) argued in his book “A Random Walk Down Wall Street” that stock prices generally follow random walk and it is not possible to beat the markets consistently. Later on, numerous researchers have found anomalies that distort market efficiency and create possibilities to build up trading rules (Ariel 1987, Agarwal & Tandon 1994, Cadsby & Torbey, 2003). It is extremely vital to understand the background of the market efficiency as a perquisite for arbitrage. Arbitrage can be said as an opposite

to market efficiency. Generalized arbitrage exploits the inefficiencies between the markets and earns an excess profit without risk with multiple risks. Contrary to other arbitrage trades in merger arbitrage investor is exposed to a risk so it's not a risk-free investment. Still merger arbitrageurs try to exploit the inefficiencies of the market with the continual pattern to earn excess returns, which is against the market efficiency.

Myers & Majluf (1984) suggested in their popularized study of pecking order theory that managers take advantage of asymmetric information as they know more about their company's prospects, value and risks than investors. Based on their theory managers prefer to pay acquisitions with shares rather than cash when they consider their company shares overvalued in the markets. If, acquiring company managers value their shares higher than the market price is they may prefer to pay the transaction with cash. The transaction method to pay with stock over cash puts price pressure to acquirer stock to shrink after a bid announcement. Consequently, pecking order theory advocates merger arbitrageurs to sell short acquirer's stock in case of stock bid. More detailed findings of the short selling in merger arbitrage trades will be presented later in the literature review part.

Collar offer could be one of the better examples how offer type can signal the inefficiencies in the markets. Compared to stock swap offers, the collar provides more time to the market to evaluate the values of acquirer and targets which possibly reduces information asymmetry. (Houston & Ryngaert 1997, Fuller 2003) Branch & Yang (2006) in their study of risk arbitrage focused on payment methods and acquisition types. Based on their findings, there are huge deviations between the generated losses between the different payment methods and acquisition types supporting the inefficiencies of the markets. Generally, failed stock swap mergers tend to generate higher losses than do failed collar mergers.

3 Theoretical Framework and Literature in Merger Arbitrage

The major part of the prior research has focused to the merger arbitrage returns in the U.S. markets. Ji & Jetley (2009) reported a significant 520bps lower first-day arbitrage spread in the 2001 compared to deals announced between 1990 and 1995. Therefore, it should be kept in mind that some of the earliest reported earnings are not possible to reach in later time periods. The first part of the chapter is focused to the earlier academic literature of merger arbitrage. In the second part of the chapter limitations raised from the earlier literature are raised.

3.1 Academic literature of merger arbitrage

Baker & Savasoglu (2001) used a sample of the deals announced between the years 1981 and 1996. Their diversified portfolio of risk arbitrage positions produced an abnormal return of 0.6% to 0.9% per month. They found evidence to support the idea that merger arbitrageurs provide liquidity and insurance to the markets when undiversified investors sell their holdings to decrease the risk in case of deal failure. In a return to their presence they require a premium for bearing the completion risk. Their cross-sectional analysis revealed that firm size and idiosyncratic risk are determinants of predicted returns. In the study, one standard deviation change in firm size leads to a 0.8% increase in average returns, suggesting that higher deal value also leads to a higher arbitrage return. On larger deals there is more information available supporting the correlation between the transaction costs and the returns of the deal. In idiosyncratic risk function they measured the probability of takeover success by the deal attitude and the takeover premium.

In merger arbitrage the possible returns are capped to the announced bid offer, unless there will be upward revisions or competing offers. Baker & Savasoglu (2001) report a total of about one third of the abnormal returns to be explained by the upward revisions or competing offers. In their data between 1992 to 1996 only 13%

of the deals were revised one or multiple times. Additionally, the revisions are not always upward and can be sometimes seen as revisions downwards. However, the downward revisions can be seen, as an unlikely event as it represented only 2.6% of the total deals.

Merger success predictions: One of the biggest factors determining the actual profit of the deal is the completion rate. To predict the completion of the deal Walking (1985), Schwert (2000) and Baker & Savasoglu (2001) all found the attitude of the deal to be the best single predictor of deal success. According to Baker & Savasoglu (2001) acquirer attitude explains 8% of the variation in outcomes.

Mitchell & Pulvino (2001) studied mergers between 1936 to 1998 and found that risk arbitrage returns are positively correlating to depreciating markets. However, their findings suggest that risk arbitrage returns are uncorrelated with market returns in flat and appreciating markets. It was the first paper to document high correlation between the down markets and the risk arbitrage returns. Not surprisingly, their findings also report deals to fail more often during market downturns than on flat or appreciating markets. A 5 percent or decrease in either the contemporaneous market return or the lagged market returns increased the probability of deal failure in their sample by 2.25 percent.

After controlling for transaction costs, they found that risk arbitrage generates excess returns of four percent per year. In conclusion, Mitchell & Pulvino (2001) suggest in financial markets exhibit systematic inefficiency in the pricing of firms involved in mergers and acquisitions. Some of the potential explanations for inefficiencies could be the transaction costs and other practical limitations that prevent investors to profit these extraordinary returns. Other suggestion by Mitchell & Pulvino (2001) could be the belief that risk arbitrageurs receive a risk premium to compensate for the risk of the potential deal failure.

Michell & Pulvino (2001) executed their study with two different methods: 1st method included value-weighted average of returns to individual mergers, the study ignored all transaction costs and other practical limitations. The 1st method accumulated statistically significant returns of 0,74% per cent per month equivalent to 9.25 per

cent annually. The 2nd alternative method included hypothetical transaction costs, consisting of all brokerage commissions and the price impact associated with trading less than perfect liquid securities. The difference of the returns is significant when the trading costs were included as the alpha declined to 0,29% per cent per month meaning total returns of 3.54 per cent annually. More importantly, they found risk arbitrage to generate 50 basis points excess returns per month greater than risk-free rate with essentially a zero-market beta. Although, during the months with 4 percent or higher decrease in market, the market beta of risk arbitrage portfolio increases to 0.50. They found risk arbitrage portfolio to generate moderate returns in most of the market environments, but in some cases to generate also large negative returns as well. In case, all of the transaction costs are excluded they found merger arbitrage portfolio to generate excess returns of 10.3% percent and CAPM results suggested 9.25% excess returns. The practical finding though is when transaction costs and other limitations are applied the merger arbitrage portfolio returns accumulated only excess returns of 4 percent annually, which is way below than the earlier studies have suggested. Their findings suggest that excluding the transaction costs and other limitations is the primary explanation for extraordinary large excess returns reported in earlier studies.

Deal length as an indicator for deal success is one interesting topic to cover in the mergers and acquisitions. Mitchell & Pulvino (2001) reported, on average 59,3 trading days duration for successful deals and 64,2 days to ultimately succeed, in contrast to ultimately failed deals to last on average 39,2 days. Branch and Yang (2006a) found in their sample that on average cash offer deal duration was 55 business days, shorter than the 101 days for stock swap offers.

Deal type is a one ruling factor to estimate the probability of deal failure or success. Mitchell & Pulvino (2001) found in their study that hostile deals have 12.8 percent greater profitability of deal failure than friendly deals, additionally they found leverage buyouts to have also higher failure than friendly deals. Hsieh and Walking (2005) didn't find evidence to support the deal attitude as a factor to affect in merger arbitrage decision making. According, to their study merger arbitrageurs are as likely to invest in friendly and hostile attitude deals and the existence of multiple bidders does not affect to their presence of the trade.

The existing literature on bidding company performance is mixed. Early studies by Jensen & Ruback (1983) and Jarrell et al. (1988) reported that bidding firm shareholders do not lose but generate positive gains during corporate takeovers. Agrawal, Jaffe and Mandelker (1992) studied post-merger performance in their sample between 1955 to 1987 and reported approximately 10% loss for stockholders of the acquiring firm over the five years following the merger completion.

Mitchell et al. (2004) claim that almost half of the negative announcement period share price reaction for bidding company shares of stock-financed takeover bids is caused by the pressure of short selling by merger arbitrage. Mitchell et al. (2004). They suggest that often the negative price reaction to acquiring company share price in stock financed bids is caused by investment and financial policy. The argument supports the idea of favoring stock-financing when the managers think that the markets overvalue their stock as mentioned earlier in chapter 2. Conversely, in an earlier study by Andrade et al. (2001) authors found, conversely flat to positive abnormal returns in total for acquirer stock under termination period. However, the earlier literature has reported negative abnormal returns for the acquirer share price for the announcement period from -1.3% to -3.3% in stock-financed takeover bids (Houston & Ryngaert 1997, Andrade et al 2001, Fuller et al. 2002, Mitchell & Pulvino 2004). Contrary to stock-financed returns, Andrade et al. (2001) and Fuller et al. (2002) both reported 0.4% positive abnormal returns for holding acquiring company stock over announcement period in cash-financed deals.

Later Hutson & Kearney (2005) studied the share price behavior of Australian companies involved in takeover bids between 1984 and 1994. They found strong interaction between the share price of the target company and acquirer in a stock-swap and mixed cases, where they saw the large price transfer effect from acquirer to target. They also found some small interaction in cash bids and in stock-swap takeovers from the target to the bidder. Hutson & Kearney (2005) found after the bid announcement 38% decrease in target company betas, but no significant change to bidder firms.

Blau et al. (2015) studied short selling activity and negative price pressure to bidder stock price around merger announcements. They tested Mitchell et al. (2004) claim

that nearly half of the negative announcement period acquirer stock price decline is caused by merger arbitrage short selling in fixed-exchange ratio stock mergers. Contrary to earlier study Blau et al. (2015) performed their research with daily data compared as the original study was done by the monthly data. They found evidence for over 2.5 times greater shorting activity for the two-day post-announcement period than during the ten-day pre-announcement period. Over the announcement period the shorting activity is abnormally high. Their results indicate that short activity is significantly higher for stock than cash-financed takeover bids, short selling turnover for stock-financed mergers was nearly three times higher than for cash-financed mergers in their sample. Contrary to earlier literature (Mitchell et al. 2004) they argue that short selling is uncorrelated to post-announcement returns and show that short selling does not increase price pressure around takeover period.

The role of merger arbitrageurs in takeover success was studied by Cornelli & Li (2002). According to their paper the new arbitrage has increased, narrowing the spreads, and after the takeover bid announcement the share prices are rising more rapidly than before. Their findings suggest that often merger arbitrage community controls approximately 30 to 40% of the stock and is the single most important factor to determine the success of a takeover, as the risk arbitrageurs are more likely to tender in favor the deal completion. According to Cornelli & Li (2002) there is a positive relationship between probability of takeover success and the trading volume. Additionally, this also implies a positive relationship between the stock price and the trading volume. Moreover, they found that the increase in the number of alternative takeover deals decreases the number of the expected arbitrageurs to invest in a specific deal, increasing the takeover premiums in the market and risk arbitrageur profits, suggesting inefficiencies and limited arbitrage capital in the markets.

Cornelli & Li (2002) find that the higher liquidity of stock increases the possibility to hide the trade by risk arbitrageurs. Therefore, the presence of risk arbitrageurs is higher in takeover bids with liquid stock and higher are their returns, in case they decide to invest in the takeover deal. Risk arbitrageurs try not to reveal their presence in the market not to fully reflect the increased probability of a deal success to buy more shares and earn higher profit. They also show that the higher competition between the risk arbitrageurs are reducing the profitability of merger

arbitrage. Hsieh & Walking (2005) confirmed in their study some of the findings earlier suggested by Cornelli & Li (2002). Hsieh & Walking (2005) found empirical evidence to support a change of risk arbitrageur holdings has a positive relationship to arbitrage returns, offer outcomes and bid premium.

Moore et al. (2006) did a survey-based research on the behavior of risk arbitrageurs in mergers and acquisitions. Their results confirm the findings by Cornelli & Li (2002) that risk arbitrageur community holds a significant share in target companies' stock. Hsieh and Walking (2005) estimated that immediately after the announcement the merger arbitrage community acquires approximately 15% share of the target company and Officer (2007) reported even higher 35% share in an average deal. Moore et al. (2006) reported that most of the merger arbitrageurs select their position already on the announcement day, but one third of the respondents said that they will select the position from a few days after an announcement to two weeks after. Merger arbitrageurs seem to unwind quite slowly after the deal cancellation; only less than 10% of the respondents sell their sales immediately an announcement day of failed deal. Most of the respondents seem to wait for an improved or competing offer after the takeover bid has been turned down. Moore et al. report also that there are professional hedge funds operating only focusing to risk arbitrage and multi-strategy hedge funds investing to risk arbitrage.

Officer (2007) tested the performance-based arbitrage hypothesis by Shleifer & Vishny (1997) suggesting that the returns of past arbitrage trades is affecting to the availability of funds in the future arbitrage trades and hence affecting to return. Officer (2007) suggests in his paper that arbitrage markets are well-functioning and large losses or number of investment opportunities do not have a significant impact on the prices and arbitrage opportunities neither returns, unlike performance-based arbitrage hypothesis suggests. Officer (2007) focused how merger arbitrageurs are preparing for 'disasters' and presents that merger arbitrageurs diversify their investments in a proper level for potential losses. However, Officer (2007) reported that after large arbitrage losses the merger announced shortly after trades on average with approximately 1-2% wider spread premium than normal supporting little evidence for performance-based arbitrage hypothesis.

Hansen (1987) argued in his paper that when the target company knows its value better than the acquiring company, the acquirer prefers to offer stock as a payment method for a deal, which has desirable contingent-pricing characteristics, rather than cash. Branch & Yang (2006a) analyzed the profitability of merger arbitrage by different payment methods with their sample between 1990 and 2000. Their results indicate that successful stock deals generate a higher return-to-total-risk-ratio to the investors than a successful cash offer. Their findings support an argument of asymmetric information (see. Myers & Majluf 1984, Hansen 1987) involved in mergers and acquisitions and its relationship to the profitability of merger arbitrage. Surprisingly, in their sample unsuccessful cash tender offers generated higher returns than successful deals due to the frequency of competing bids. Therefore, cash deals generated a higher annual return than stock swap deals when risk is excluded. Additionally, their results indicate that the payment method and the market conditions have a huge influence to a beta of typical risk arbitrage positions and portfolios. Stock swap and collar offers have a lower beta than cash tender offer deals due to the long-only position.

The betas of different payment methods are behaving differently during the down markets suggested by Branch & Yang (2006a). Their results suggest that the beta of cash and collar offers is not increasing, but for stock swap offers the beta is increasing during the down markets. As over 70% of their sample deals were stock swap deals compared to over 70% cash deal offers in Mitchell & Pulvino (2001) study also their aggregate results were in contrary during the down markets. They suggest that the deal type structure of the sample is an important factor for the down-market beta results. Comparing the acquirer and target stock betas Branch & Yang (2006a) found acquirer company stock betas to be higher than do target stock. Wang & Wedge (2012) reported a 1,30% average return to stock deal portfolios and 1,43% average return to cash deals with their US sample between 1996 to 2008. Turamari & Hyderabad (2017) found in their Indian sample data that cash-financed mergers perform better than stock-financed mergers, supporting payment method as a factor to estimate post-merger performance of firms. Hsieh & Walking (2005) argue in their study that merger arbitrageurs are more likely to get involved collar than cash or stock swap offers.

Stanley Block (2006) compared the performance of the merger arbitrage index to S&P 500 Index between the 1993 to 2004. Interestingly, during 2000 and 2002 he found that Merger Arbitrage index was negative only one year as S&P 500 was down by 3 consecutive years. During that time-period Merger arbitrage had a cumulative gain of 20,7% and in total outperformed S&P 500 index by over 59% which generated cumulative losses of over 38%. However, in a total of the 12year sample period cumulative results for the merger arbitrage and S&P 500 indexes were almost tied. These findings by Block (2006) suggest that merger arbitrage funds aren't attractive in strong market conditions, but most attractive in neutral and down markets.

As most of the existing literature is focusing on U.S. markets, it's important to realize that mergers and acquisitions are also happening outside the U.S. In the academic literature, most of the studies are focusing to domestic deals and relatively small amount of studies have focused to cross-border mergers and acquisitions. Erel et al. (2012) show that only 23% of the worldwide acquisitions were cross-border deals in 1998. By the year of 2007 Erel et al. (2012) reported that the number of cross-border deals reached to 45% in total and it's likely that more mergers in the future will involve companies from different countries.

Maheswaran & Yeoh (2005) studied profitability of risk arbitrage in Australia from 1991 to 2000. In their sample they found risk-adjusted returns ranging from 0.84% to 1.2% per month before any transaction costs. However, after adjusting transaction costs, the reported risk-adjusted returns were not statistically significant. They also reported higher standard deviation than the market portfolio for their risk arbitrage portfolios due to small number of deals versus market portfolio.

Hall et al. (2013) found in their Australian sample between 1985 to 2008 that merger arbitrage has been a highly profitable investment strategy in the Australian markets. They reported annualized returns to be close to 30%, which is higher than reported in the other markets. Needless, to say that in their paper all kinds of transactions were excluded, but still it's easy to say that the results indicate merger arbitrage to be

highly profitable in Australian markets. One of the more interesting findings in the research of Hall et al. (2013) was to realize how the compounded annual returns in their long position portfolio decreased from 40,7% between 1994-2000, to 19,4% between the period of 2001-2008. They as well reported a significantly higher rate of deal failure for stock swap deals during months of down-market performance compared to periods of up market performance. Though, they didn't find evidence to support that stock swap deal portfolios have higher risk than cash deal portfolios.

In the earlier study in the United Kingdom by Sudarsanam & Nguyen (2008) found annualized abnormal returns of 7.3% for portfolios that constrain the maximum portfolio allocation to a specific deal to 10% and 17,0% abnormal returns for unconstrained value-weighted portfolios. Kearney et al. (2008) studied risk and return of merger arbitrage in the UK in the 2001 to 2004. Kearney et al. found merger arbitrage strategy to generate significant risk adjusted returns and exhibits little systematic risk. Against prior research Kearney et al. didn't find support to an increase in systematic risk with their UK sample data in depreciating markets. Focus in their study was exclusively on a sample period with down market returns. Kearney et al. reported highest earnings in in their equally weighted portfolio with a risk-adjusted daily excess returns of 0,04% Their value weighted portfolio resulted 0,02% risk-adjusted daily returns and additionally they formed real world portfolio to model portfolio returns which includes all the transaction costs that investors are facing, which generated 0,009% daily returns. McDermott & Mulcahy (2017) reported annualized returns ranging from 14,9% to 57,9% in constructed portfolios in their German sample. Karolyi & Shannon (1999) reported an annualized excess return of 33,9% in their study in Canada.

In emerging markets there is a limited literature available for the returns of merger arbitrage. Lin et al. (2013) studied merger arbitrage in Taiwan between the 2000 and 2007. Interestingly, Lin et al. reported significantly higher 36,5% failure rate of all the deals examined in their study. As explained earlier, there is a connection between higher failure rate and lower profits. Including all the deals in the sample they reported, on average 5,8% annualized abnormal returns. Interestingly, Lin et al. reported very long time periods until deal resolution, for successful takeovers the time consumed on average from bid to completion was 203 days and 186 days on

average for failed deals. Mitchell & Pulvino (2002) reported 92 days length on average from bid to final resolution in their US sample which is distinctly less than the 196 days for all deals on average reported by Lin et al. (2013). In conclusion, it seems that the takeover bids last remarkably longer in Taiwanese markets until they are completed. As merger arbitrageurs are demanding a payoff for their investments, they should look for a higher premium in emerging markets for a longer time-period and higher failure rate than in the well-developed US markets to reach as high abnormal returns than in the US.

3.2 Limitations of earlier merger arbitrage literature

It is a well-known fact that there are multiple limitations affecting to the results in earlier academic studies. Most of the earlier studies have excluded transaction costs totally from their results and Mitchell & Pulvino (2001) argued that excluding transaction costs and other limitations sis the primary explanation for extraordinary large excess return in the earlier studies. They estimated transaction costs to be $0,05 per share between 1981 and 1990 and $0,04 per share for the time-period after 1990.

One big driving factor in merger arbitrage returns is depending when the deals are bought. If deals are bought on announcement day there is a potential to biased figures. A few days after bid most likely the information has transferred to stock prices and it should be more reliable for further analysis. Moore (2006) found that Merger arbitrageurs seem to unwind quite slowly after the deal cancellation; only less than 10% of the respondents sell their sales immediately an announcement day of failed deal. Most of the respondents seem to wait for an improved or competing offer after the takeover bid has been turned down. In most of the earlier merger arbitrage return studies, it is assumed that merger arbitrageurs sell their holdings immediately or within a couple of days after if the bid is turned down.

Most of the earlier studies have assumed that merger arbitrageurs have unlimited access to capital which is clearly not realistic. It is assumed in the merger arbitrage

analysis that merger arbitrageurs have optimal availability of cash and money is invested only in merger arbitrage operations. No doubt that this assumption is made to simplify the analysis in merger arbitrage return, but in real-life this is not possible. Also, it is assumed that merger arbitrageurs have unlimited access to short selling markets and they can get out of the deal whenever they want which is of course one limitation not reflecting to reality of investors.

The merger waves are often linked to merger arbitrage returns. Mitchell & Pulvino (2001) argues deal flow not to be a strong determinant of risk arbitrage returns. Their findings suggest the correlation between the merger activity and risk arbitrage portfolio returns to be weak. However, the number of active running merger arbitrage deals is varying over time and during the big merger waves there are more available deals running than e.g. in economic downturns. It is assumed in most of the studies that merger arbitrageurs have possibility to balance their portfolios actively on a daily basis with no additional costs which is clearly unrealistic. When there is a low number of available merger arbitrage investment opportunities, investors are facing issues with diversification and even in equal-weighted portfolio strategies the share for single deal could rise enormously higher than when there are more investment opportunities available.

In multiple earlier studies the merger arbitrage results have been benchmarked against market returns. However, in most of the cases the beta factors have stayed close to zero and in some studies have correlated only in depreciating markets (e.g. Mitchell & Pulvino 2001). Consequently, explanatory factors with constructed linear models have been relatively low and probably are not the most plausible models to measure the abnormal returns gained in merger arbitrage.

4 Research Question and Sub-Questions

The objective of this master's thesis is to answer to the question: *Are there existing large excess returns by using the merger arbitrage investment strategy in European markets in the time series since 2002 and does it make merger arbitrage to an exceptional investment strategy?* The following sub-questions are formed to provide appropriate information and to achieve an adequate answer to our main research problem:

Q1: Are there differences in the returns between cash, stock swap and mixed deals?

Earlier studies by Baker & Savasoglu (2002), Branch & Yang (2006a) and Wang & Wedge (2012) have reported mixed results in return by deal type. Therefore, there is a research cap to study, if there is a difference in return by payment method.

Q2: Are there differences in the returns between value and equal weighted portfolios?

Baker & Savasoglu (2001) reported higher returns for value weighted portfolios and one standard deviation change in firm size leads to a 0,8% increase in average returns, suggesting that higher deal value also leads to a higher arbitrage return. However, Maheswaran & Yeoh (2005) and Kearney et al. (2008) reported higher returns for equally weighted deals. Hence, there is no consensus in opinion and literature is still lacking the absolute resolution.

Q3: How the latest financial-crisis has affected to the returns of merger arbitrage and can we see a declining trend in merger arbitrage returns?

To the author's knowledge the field of study is still lacking a proper study in the U.S or in multiple European countries with a sample later than 2008. Lately Ji & Jetley (2009) and Hall et al. (2013) have reported decreasing trend in merger arbitrage

return. According to Officer (2007) arbitrage markets are well-functioning and large losses or number of investment opportunities do not have a significant impact on the prices and arbitrage opportunities neither returns, unlike performance-based arbitrage hypothesis by Shleifer and Vishny (1997) suggests. Therefore, there is a clear research cap to study the differences in later time-period compared to prior series.

Q4: The earlier literature has reported low volatilities involved in merger arbitrage trade; is it higher in this time horizon examined in Europe than in the earlier studies in North America?

Earlier studies in North America (e.g. Mitchell & Pulvino 2001, Baker & Savasoglu 2002, Branch & Yang 2006a) have reported relatively low volatilities in return compared to market volatility. As there are no significant studies in multiple European countries to author's knowledge. The volatility of merger arbitrage return is still unstudied in multiple European countries. We will try to answer this question in this paper.

Q5: Are the risk arbitrageurs facing more risk during the depreciating markets than the positive and flat market conditions?

Mitchell & Pulvino (2001) and Branch & Yang (2006a) found in their studies nonlinearity between the merger arbitrage and market returns in different market conditions. Findings suggest market arbitrage returns to be uncorrelated with market returns in most market conditions. Nevertheless, during market downturns Mitchell et al. (2001) reported for a dramatic increase in the relationship between the market and merger arbitrage returns. Block (2006) found merger arbitrage to be more attractive in neutral and depreciating markets, but less attractive for investors in strong market conditions. Accordingly, there is a need to analyze returns in different market conditions.

5 Research Data and Analysis

This paper uses data from the Thomson One Mergers & Acquisitions database. The data consist of deals announced between the 1st of January 2002 to 31st of December 2014, meaning that some of the deals were completed later than the aforementioned time frame. Some of the announced deals were completed later than the end of 2014 and in these cases the returns until the 31st of December were included and returns later than the date mentioned are excluded from the analysis. Contrary, to the major part of prior research in merger arbitrage focusing to the U.S. markets, the data of this research are limited to, include only the deals announced between the public companies in Europe. Specifying that only the domestic deals and cross-border deals between the companies in Europe will be included. The majority, of the prior research has studied domestic deals in Mergers and Acquisition (Erel et al. 2012) and to our knowledge, none of the prior papers have included as a high number of countries to analyze risk arbitrage returns as in this paper. One other major restriction to the data is to include only deals worth at least €100 million. The limitation to include deals worth at least €100 million decreases the number of deals but guarantees higher liquidity for the stock and decreases the transaction costs involved in arbitrage investments. The limitation is to mimic the situation that could be reflected to real-life situation and not to present biased results with highly illiquid stocks.

All daily stock data for the target and acquirer was obtained from the Thomson Reuters Datastream database. In some cross-border deals the offer was made in a different currency than the acquirer was trading in the markets. In this research historical daily exchange conversion rates were used to value the cross-border deals between the companies, using different currencies in the markets. Thomson Reuters Datastream was the source for the currency conversion data. Stock transactions were made two days after deal announcement, this was to avoid the potential distortion about deal announcement.

The total number of 883 announced deals were gathered from the Thomson one Mergers and Acquisitions database before prior data screening. Due to the limitations

some of the deals contained imperfect data or the data was unreliable, and these deals were excluded from the final analysis. Furthermore, in some of the deals the trading price of the target was higher than the bid announced, and these deals were also excluded from the data. The final data consisted of the total number of 344 deals. The decrease from the original sample to the final research sample is comparable with the prior academic literature in risk arbitrage, as the final sample of the Baker & Savasoglu (2002) had only left 46% and Maheswaran & Yeoh (2005) had 35% of the deals left from the original sample.

5.1 Country Data

In the final sample the total number of deals was 344 and total number of European countries involved as an acquirer or target company was 29. Not surprisingly, 217 deals were domestic deals, meaning the acquirer and the target are from the same country, only 127 deals were cross-border deals involving bidder and target from the other countries. Because total of 74 deals and over 20% of the deals are domestic deals between the companies registered in the UK it's easy to say that the results should be benchmarked to the earlier studies done in the UK by Sudarsanam & Nguyen (2008) and Kearney et al. (2008). After United Kingdom the second highest number of domestic deals involved in the data sample is from France and Italy, but the share of the total sample is significantly lower than in the United Kingdom and therefore the results shouldn't be biased by the too high share of the domestic deals in certain countries (see Figure 1).

In the final sample the top 10 highest ranked countries by the number of total deals had an enormous 82.6% share of the total. Results reveal some specific countries to appear more often in deals than the others. The countries outside the top 10 are mostly smaller countries and have smaller capital exchange markets. One explanation for a small number of deals outside the top 10 ranked countries could be due to strict limitations on minimum deal value in the sample.

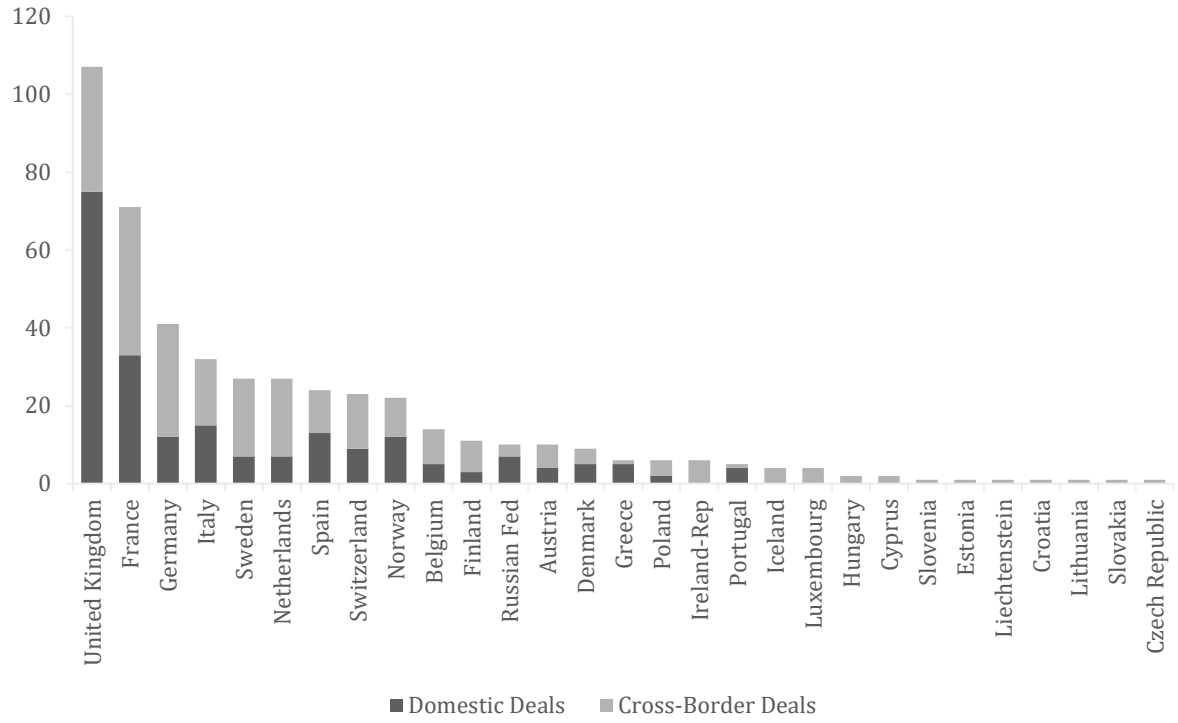

Figure 2. Number of Deals by Country

Looking closer to the cross-border deals by country illustrated in figure 2, the results offer an interesting content compared to the domestic deal characteristics illustrated in figure 3. In the United Kingdom the total number of deals included in the sample was the highest in the any country. Contrary to the high number of domestic deals in the United Kingdom it's surprising to see France involved more often than the United Kingdom in cross-border deals. The more interesting fact for the cross-border deals reveal that the companies from France, Germany, Sweden, the Netherlands and Italy ranked higher when measuring the total number of cross-border deals involved as an acquirer. However, the companies in the United Kingdom were targeted more often in cross-border deals than by any other country companies. The total share of the United Kingdom companies targeted in cross-border deals was 72%, suggesting that UK firms prefer to target domestic companies rather than companies from the other European countries. To the rest of Europe, companies in the United Kingdom seem to be the most popular targets.

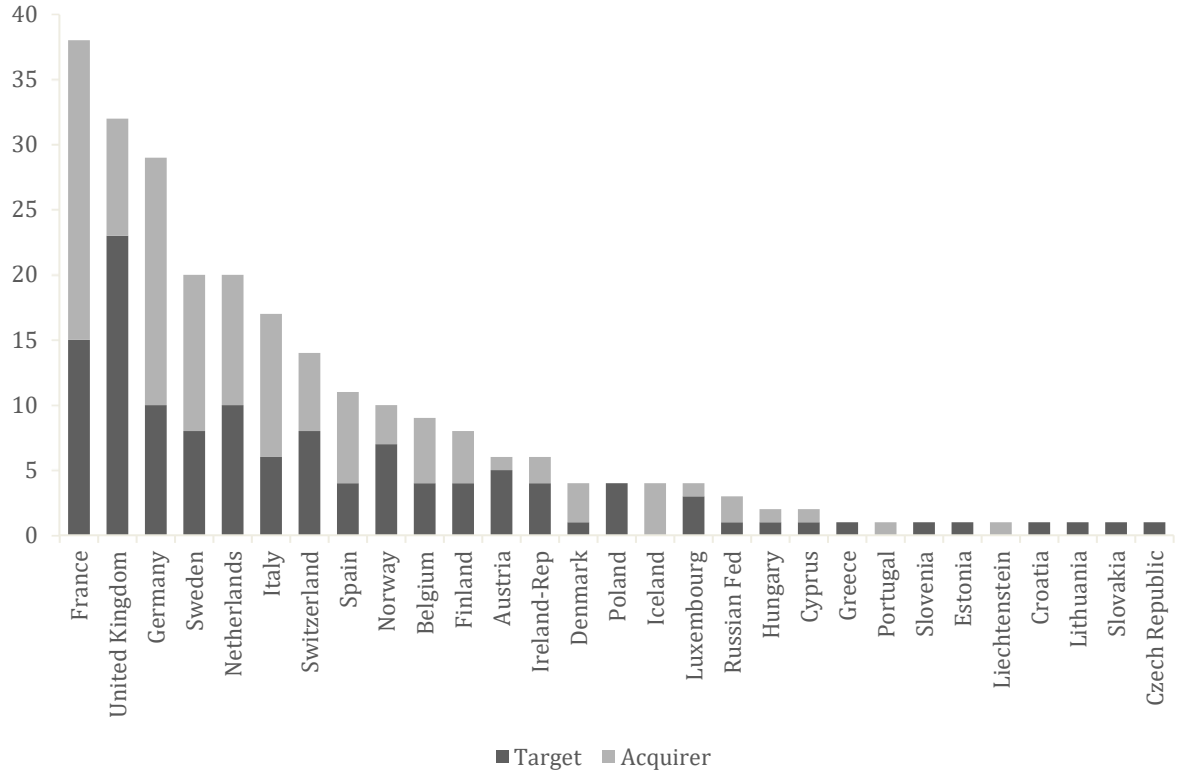

Figure 3. Cross-Border Deals by Country

5.2 Deal data

After summarizing the statistics of the country level data, the second step is to focus on the data by deal type. As mentioned earlier, there are three kinds of deals included in this analysis by the payment type, cash, stock and mixed deals that aren't either pure cash or stock deals, but typically a hybrid mixture between these two options. The deal is considered as a cash deal where the acquirer bids for a fixed amount of any currency in payment. Stock deals are classified as deals where acquirer and the target of a merger and acquisition deal consider predetermined stock exchange ratio as a payment method. Some earlier studies have excluded the hybrid or mixed deals from the analysis as those are more complicated to analyze than the pure cash or stock deals. The final sample in this paper includes 344 deals, which consists of 266 cash deals, 78 stock deals and a total of 40 mixed deals.

Table 1 represents the deals by announcement year and is split into two sections. The first section describes the number of deals by bid announcement year. The first section is divided into four subcategories by the following deal types: cash deals, stock deals, mixed deals and total number of deals. The second section of the table represents the share of annual deals by deal type. The second section is broken down into three subcategories cash deals, stock deals and mixed deals and each of the subcategory stand for their share of the total annual deals.

As earlier literature has reported huge merger waves in the history (see e.g. Martynova & Renneboog 2008) we can see the effect of the sixth merger wave which was estimated approximately between 2003 to late 2007 by Alexandridis et al. (2012). During the sixth merger wave the number of the announced deals was the highest in the time-period. After the sixth merger wave there was a huge decline in the number of deals and it should be mentioned that there weren't any mixed deals in years 2009 and 2012. The major part of the total deals in the sample are cash deals representing approximately two thirds of the total sample.

The share of the cash deals in the sample is 66%, stock deals are 23% of the sample and mixed deals are only 12% of the total sample. The sample distribution is in line with the prior academic literature and the 66% share of the cash deals from the all deals a was bit smaller than the 73% share reported by Mitchell & Pulvino (2001). However, it's good to remember that most of the earlier studies have included only cash and stock swap deals and have excluded mixed deals totally from their sample. Contrary to the sample of this paper, Branch & Yang (2006a) had more stock offers than cash offers in their sample. Branch & Yang (2006a) reported positive betas for the cash tender offers and negative betas for the stock swaps during the down markets, and therefore the nature of the sample can affect to the overall risk exposed in the portfolio. Following the findings by Mitchell & Pulvino (2001) merger arbitrage returns in this paper should predict a positive correlation between merger arbitrage returns and market returns in down markets.

One important thing to remember before analyzing the returns of the deals is to realize an enormous difference between the share of the cash deal flow from 2002 to 2008 and from 2009 to 2014. In the period between 2002 to 2008 the share of cash

deals accumulates approximately 70% of the deals during the time-period, but between the 2009 to 2014 the share of the cash deals is approximately only 53% of the total sample. As earlier literature has already found the difference between the cash and stock risk and return (see for example Baker & Savasoglu 2002) it's likely that this could affect to the overall returns of the sample when comparing the risk and return prior and after the end of the year 2008.

Table 1.Number of deals by announcement year

	Number of deals announced				Share of total		
	Cash	Stock	Mixed	Total	Cash	Stock	Mixed
2002	21	4	4	29	72 %	14 %	14 %
2003	10	8	5	23	43 %	35 %	22 %
2004	20	8	1	29	69 %	28 %	3 %
2005	38	7	7	52	73 %	13 %	13 %
2006	32	11	3	46	70 %	24 %	7 %
2007	40	5	9	54	74 %	9 %	17 %
2008	18	3	2	23	78 %	13 %	9 %
2009	5	6	0	11	45 %	55 %	0 %
2010	11	8	2	21	52 %	38 %	10 %
2011	11	3	2	16	69 %	19 %	13 %
2012	4	4	0	8	50 %	50 %	0 %
2013	3	4	1	8	38 %	50 %	13 %
2014	13	7	4	24	54 %	29 %	17 %
Total	**226**	**78**	**40**	**344**	**66 %**	**23 %**	**12 %**

In figure 4 is shown the average duration for the cash and stock deals by the announcement year. Mixed deals were excluded from the figure as the sample is so small and there aren't any deals on years 2009 and 2012. However, running time for the mixed deals was. on average 150 days, which is a bit longer than the 147 for cash deals but less than 166 for stock deals. In most of the years the average duration for the cash deals was less than for the stock swap deals, but in some years the duration for the stock deals was less than for the cash deals. Branch & Yang (2006) reported distinctly longer duration for the stock deals from the announcement to resolution than for the cash deals. Based on the earlier findings it's no surprise that on average the running time for the cash deals was shorter than for the stock and

mixed deals. Though, the spread between the cash and stock deal duration was less than the earlier studies (see for example Branch & Yang 2006a) have reported. Analyzing the deal duration with the mean of the total sample provides a bit more variation to the results between the deal types. Median for the cash deals between the 2002 to 2012 was 102, and 128 for the cash deals and 131 for the mixed deals. Therefore, in a relatively small sample even one extremely long running deal can affect heavily to the average results, therefore median could be better indicator to analyze the duration between the deals.

It's important to study the duration the deal as after the investment decision merger arbitrageurs close their arbitrage spread position and wait for the deal resolution. Usually the deals are completed more often with the pre-agreed terms than withdrawn or the deal terms are sweetened (Noro 2010). This puts the deal duration into special attention as the arbitrage spread is already locked after an investment decision, afterwards the deal duration is the only variable affecting to annual deal return, assuming the deal is completed with pre-agreed terms. Consequently, short deal running time is more desirable for the arbitrageurs to receive higher return

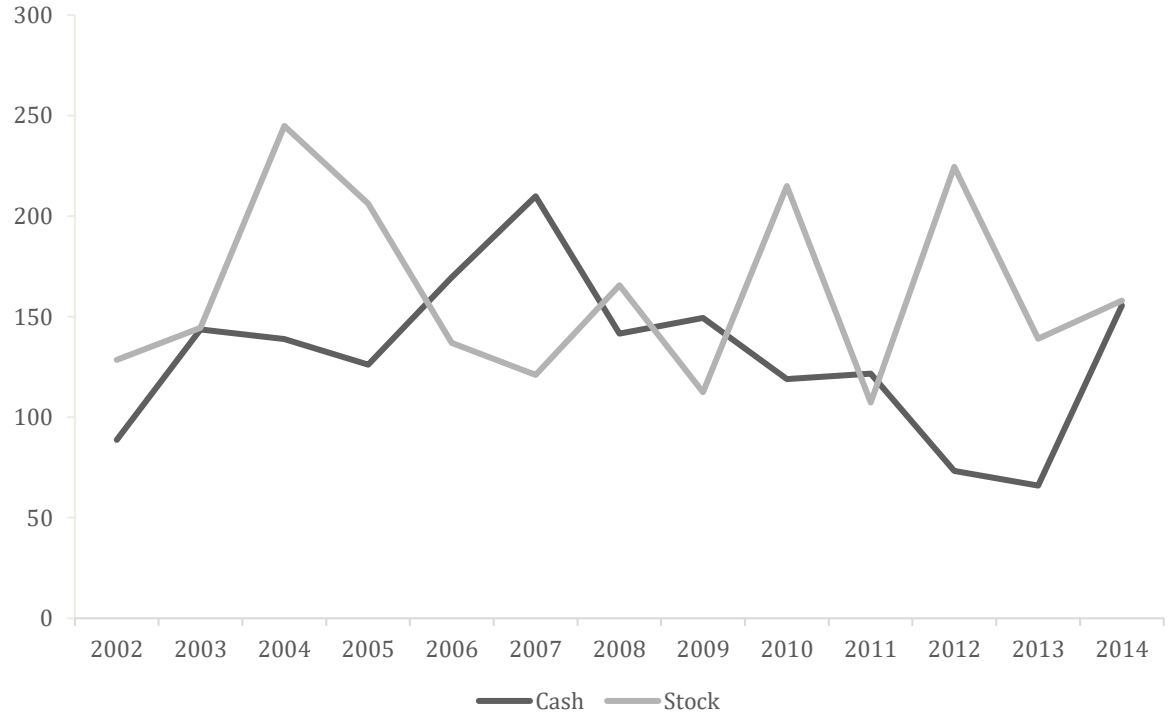

Figure 4. Average duration of the deal by announcement year

Already explained earlier in the table 1, we can see the effect of the 6th merger wave in the number of announced deals and the same effect is seen in the number of running deals illustrated in figure 5. In the figure 5 are displayed the number of running deals at the same time from 2002 to 2014, the figures are calculated by using the daily data, but are presented by annual average in the graph. The highest peak for the pending deals was in 2006 when the number of deals was, on average 27,4, and the lowest number of deals was on 2013 and averaged only 3,3 deals at the time. The total number of deals is mainly driven by the cash deals and after the 6th merger wave there is a huge drop in the number of running deals on average. The drop in the number of deals after 2008 decreases the possibilities to merger arbitrageurs to diversify their portfolio with the number of deals and possibly exposes them to more risk than they could prefer.

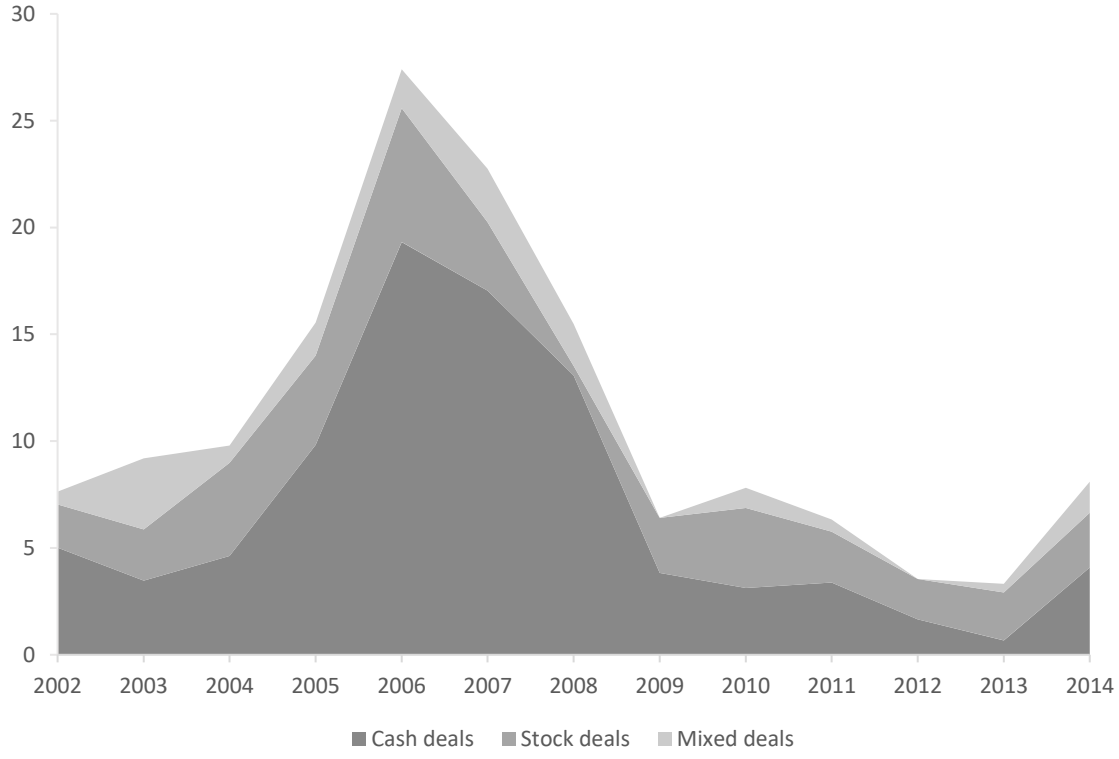

Figure 5. Average number of running deals

Ji & Jetley (2009) noticed in their study a huge decline 520bps in first-day arbitrage spread comparing the time-series 1990 to 1995 and 2002 to 2007. They were using U.S. cash and stock deal data in their study, but the more fascinating is to study if the same trend can be seen in this sample. However, in this paper the arbitrage spread is calculated two days after the announcement not on first-day. Between the 2002 to 2008 the median arbitrage spread for the cash deals is 2,7% and 3,5% for the stock, both spreads are higher than Ji & Jetley (2009) had reported as a median spread for the successful deals from 2002 to 2007, but less than they reported for the prior time-series. It turns out to be more interesting findings when analyzing the spread premiums between 2009 to 2014. In the latter series the mean arbitrage spread for the cash deals is almost the same 2,8%, but the mean spread for stock deals is remarkably higher 5,7%.

There could be some explanations for the remarkably higher arbitrage spread for the stock deals after 2008 and one of them could be the financial-crisis in Europe that increased the uncertainty in stock markets. Other possible explanations could have been the agency theory with overvaluation hypothesis. Nonetheless, the nature of the sample could have been one reason why the arbitrage spread was declining so much in the Ji & Jetley (2009) study, as the share of cash deals compared to stock deals was higher in their last than prior time-periods. Based on the median deal duration by the deal type it's no surprise that stock deals are typically trading with a higher spread than cash deals two days after a bid announcement. One other reason could be the fact that Ji & Jetley (2009) only included the completed deals in their arbitrage spread findings and Mitchell & Pulvino (2001) notable difference in arbitrage spread between the failed and successful deals. In this sample the median arbitrage spread for withdrawn cash deals is 9,7% and for successful deals it is only 2.3%. Based on these findings, it seems that the markets can evaluate efficiently the probabilities for the deals to succeed.

One of the most interesting things to discover in the sample is to analyze the success rate between the deal types and years. The data of the deals withdrawn and completed is illustrated in table 2. It's obvious to say that over time the cash deals have had the highest success rate by the possible payment methods. Cash deals had 88% success, rate which is a bit below than some other papers have

documented (Ji & Jetley 2009, Noro 2010). Additionally, stock deals had a bit lower 83% success rate and mixed deals had only 75% success rate. In total sample the success rate for the all deals together was 86%. There can be seen two extremely successful time-periods for the deal success from 2002 to 2005 and from 2010 to 2011, predicting high returns for the periods. Contrary to prior mentioned periods the was a decline in the success rate from 2007 to 2009 and from 2012 to 2014. It could be expected to see lower returns for the years when the success rate was relatively lower.

Table 2. Success rate of the deals

	Cash			Stock			Mixed			Total		
Year	Completed	Withdrawn	Success rate %	Completed	Withdrawn	Success rate %	Completed	Withdrawn	Success rate %	Completed	Withdrawn	Success rate %
2002	21	0	100 %	3	1	75 %	3	1	75 %	27	2	93 %
2003	10	0	100 %	7	1	88 %	4	1	80 %	21	2	91 %
2004	18	2	90 %	8	0	100 %	1	0	100 %	27	2	93 %
2005	34	4	89 %	7	0	100 %	6	1	86 %	47	5	90 %
2006	28	4	88 %	7	4	64 %	1	2	33 %	36	10	78 %
2007	34	6	85 %	4	1	80 %	6	3	67 %	44	10	81 %
2008	17	1	94 %	2	1	67 %	1	1	50 %	20	3	87 %
2009	5	0	100 %	4	2	67 %	0	0		9	2	82 %
2010	10	1	91 %	8	0	100 %	2	0	100 %	20	1	95 %
2011	10	1	91 %	3	0	100 %	2	0	100 %	15	1	94 %
2012	3	1	75 %	3	1	75 %	0	0		6	2	75 %
2013	1	2	33 %	3	1	75 %	1	0	100 %	5	3	63 %
2014	9	4	69 %	6	1	86 %	3	1	75 %	18	6	75 %
Total	**200**	**26**	**88 %**	**65**	**13**	**83 %**	**30**	**10**	**75 %**	**295**	**49**	**86 %**

6 Merger Arbitrage Returns

This master's thesis analyzes the returns of merger arbitrage by forming time-series portfolios of the European Mergers and Acquisition deals. To the authors knowledge, none of the earlier studies in merger arbitrage returns have included the data from as many countries as in this study. None of the deals from the final sample is excluded or picked separately and a passive investment strategy includes all the deals in the sample. All the deals included in the portfolio and the portfolio is rebalanced on a daily level as old deals are completed, and new deals are announced. However, in the results part the results will be represented only in a monthly or annual level, as we are measuring the abnormal returns over the time-series and to get a better picture of the development of returns. It should be noted that the results, are based to the assumption that merger arbitrageurs have unlimited access to capital and face no transaction costs. In real-life, merger arbitrageurs don't have unlimited access to capital and face transaction costs. This is something to keep in mind as some earlier studies (see for example Mitchell & Pulvino 2001) have reported lower abnormal returns when transaction costs are applied.

Each deal included in the portfolios is unique and there could be variations in risk level, duration or size. The portfolios constructed in this paper are either *equal weighted* or *value weighted* portfolios. The portfolios are constructed separately for *cash, stock and mixed* deals. The stock and mixed deals are also divided into two subsections measuring returns with shorting the acquirer's stock and without short selling. Earlier studies with the US data have used a short selling strategy when measuring the stock deal returns, but the late naked short selling ban in European countries and short selling ban in Russia, Greece, Cyprus and Croatia restricts the short selling in 9 deals from the total sample (Jain 2013).

Later in this chapter there will be presented the calculation methods for each deal type, the calculation for the annual and monthly returns and at last will represented the construction of the portfolios.

6.1 Calculating Deal Returns

Returns for different deal types are calculated differently due to varying payment methods. The cash deal returns are the easiest to calculate. For each cash deal, the returns are constructed to take a long position in the target company stock and it will be held until the deal termination day. In this analysis the termination day returns are calculated by the price of two days after the termination day as already explained in chapter 5. The returns for the cash and stock deals are calculated in a same method as presented earlier by Baker & Savasoglu (2002). As the merger arbitrageurs will receive the predetermined fixed payment for the cash deals if the deal is completed, the only uncertain in payment is when the deal fails. The return R for the cash deal can be calculated in a following equation, where T is the target firm, i is the specific deal on day t:

$$R_{it} = R_{it}^{T} \tag{4}$$

For stock swap deals without short selling the acquirer's stock, the return can be calculated in the same method as for cash deals. Therefore, investor imitates cash deal investment and takes a long position in target share, but in case of a completed deal the return is uncertain until the investor converts the received acquirer's shares to cash. The returns for the stock deals including the short selling acquirer's stock is calculated in a more complex equation derived from Baker & Savasoglu (2002):

$$R_{it} = R_{it}^{T} - \left(R_{it}^{A} - R_{ft}\right)\Delta\frac{P_{it-1}^{A}}{P_{it-1}^{T}} \tag{5}$$

In a completed stock swap deal the acquirer offers a fixed amount Δ of acquirer's shares for each target company stock. At the time of the investment the share price of acquirer share is stated as P_{it-1}^{A} and the share price of target share is P_{it-1}^{T}. To receive a fixed amount payment assuming the deal success, each target share must be balanced by a short position in Δ of the acquirer company's shares. Earlier studies (e.g. Mitchell & Pulvino 2001 and Baker & Savasoglu 2002) have assumed that merger arbitrageurs can short sell acquirer stock and stock deals with short selling require the same up front P_i^T investment as in cash deals. Baker & Savasoglu (2002)

assumed that merger arbitrageurs will receive R_{ft} risk-free return for short selling acquirer's stock, but in real-life they often receive less than the risk-free return and get exposed to the risk that the lender recalls the short position before the deal is completed. Based on this we can simplify the earlier formula for the stock deal returns and assume zero return for short selling acquirer's stock:

$$R_{it} = R_{it}^{T} - R_{it}^{A}\Delta\frac{P_{it-1}^{A}}{P_{it-1}^{T}} \quad (6)$$

As already mentioned most of the prior studies have excluded mixed deal returns and have focused to pure cash and stock deal returns as they are not as complicated to measure than mixed deals. The return of the completed mixed deal consists of two components the first one is the return of the cash payment and the second one is the return of the stock swap. Practically, the only additional component to stock deal return calculation formula presented in equation 3 is to include additional cash payment to target stock return R_{it}^{T} in completed deals with short selling the acquirer's stock. The returns for the mixed deals without short selling consist only for the returns for investing to a long position of the target share and in the completed deal returns consist of the cash payment of the target share and for the stock swap returns of the acquirer's share after deal completion. In mixed deals without short selling the return calculation imitates the same equation as for the cash deals and for the stock deals without short selling shown in equation 1.

6.2 Calculating Portfolio Returns

To calculate the return of the portfolio, the daily returns of every individual deal must be calculated first. The risk arbitrage portfolio can be comprised of multiple unique deals active at the same time. The daily portfolio returns are the total of weighted returns of all running deals. In this paper there are two different types of portfolios constructed. The first one is the equally weighted portfolio, scaling each position equally. The weight of the individual deal in an equal weighted portfolio is the ratio of one to the total number of active deals in a portfolio on a given day. A value weighted portfolio weights the market value of the target company equity to the market value of

the portfolio. Therefore, the weight of an individual deal in a value weighted portfolio is the share of the equity in a deal of the total equity in active deals. The portfolio return formulas are following the same method as presented earlier on Mitchell & Pulvino (2002). Equal weighted portfolio returns are calculated by the following equation:

$$R_{Pm} = \sum_{i=1}^{N_m} \frac{V_i(\prod_{t=m}^{M}(1 + R_{it}) - 1)}{N} \tag{7}$$

R_{Pm} is the monthly return of the portfolio, where V_i is the market value of the target company on the deal announcement date. N_m is the number of active deals during the month m. Returns of the value weighted portfolio are calculated as presented in the equation 5:

$$R_{Pm} = \sum_{i=1}^{N_m} \frac{V_i(\prod_{t=m}^{M}(1 + R_{it}) - 1)}{\sum_{i=1}^{N_m} V_i} \tag{8}$$

Both portfolios assume that merger arbitrageurs don't face any transaction costs involved in the procedure. Also, the assumption is that the merger arbitrageurs have unlimited access to capital. In real-life, merger arbitrageurs do face transaction costs and have limited access to capital. However, most of the earlier studies have made the same assumptions when measuring the returns of the merger arbitrage portfolios. The magnitude of transaction costs could be expected to be about the same as for example Mitchell & Pulvino (2002) have documented before. Still and all, even if there will be some costs not included in the portfolio returns it should give a good approach if the merger arbitrage is a profitable investment strategy or not in Europe.

6.3 Comparing profitability between the portfolios

An overall overview of the constructed portfolio performance will be measured by Sharpe ratio. It measures the excess return per unit of deviation. The ratio characterizes the performance of the investment compensated for the risk taken. Comparing two assets against each other, the one with a higher Sharpe ratio provides better compensation for the same risk. (Sharpe 1966) Sharpe ratio can be calculated by the following formula:

$$Sharpe\ ratio = \frac{\bar{r}_i - \bar{r}_f}{\sigma_i} \tag{9}$$

In Sharpe ratio formula $\bar{r}_i$ refers to a monthly return of an asset, $\bar{r}_f$ is the risk-free rate of market return and σ_i is a monthly standard deviation of returns (Sharpe 1966). The Sharpe ratio is the most widely-used and leading performance metrics for 45 years (Pätäri 2011). Despite its simplicity as an advantage it can be seen, as downside as well, as the model is often criticized for oversimplifying the concept (Pätäri 2011). In a model all the effects deviating from the mean return have increasing effect to standard deviation. Therefore, even the positive deviations from the mean return have a negative impact to Sharpe ratio. From investor point-of-view it's highly favorable to have investments positively right-skewed.

Assessing the problem with the Sharpe Ratio, Pätäri (2011) developed SKASR (Skewness and Kurtosis Adjusted Sharpe Ratio), which is a modification from the traditional Sharpe ratio. SKASR is correcting the errors with skewness and kurtosis with the Cornish-Fisher (1937) expansion. The Cornish-Fisher expansion formula is:

$$Z_{CF} = Z_C \frac{1}{6}(Z_C^2 - 1)S + \frac{1}{24}(ZC_C^3 - 3Z_C)K - \frac{1}{36}(2Z_C^3 - 5Z_C)S^2 \tag{10}$$

In equation 10 Z_C is the critical value of probability based on the standard normal distribution. In this study, Z_C is -1,96 and equal to 95% probability as proposed by

Favre & Galeano (2002). K denotes kurtosis and S skewness of the return distribution. Therefore, formulas for kurtosis and skewness are calculated as follows:

$$K = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{r_{it} - \bar{r}_i}{\sigma}\right)^4 - 3 \tag{11}$$

$$K = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{r_{it} - \bar{r}_i}{\sigma}\right)^3 \tag{12}$$

In equations 11 and 12 $\bar{r}_i$ is the average return and N represents the number of outcomes, σ is the standard deviation of the portfolio. The SKAD is calculated with the following formula with the Z_{CF} Cornish-Fisher expansion, the critical value of probability on standard deviation Z_C and standard deviation σ as follows:

$$SKAD = \frac{Z_{CF}}{Z_C}\sigma \tag{13}$$

Finally, as we have figured out SKAD, we can calculate SKASR with the following formula developed by Pätäri (2011):

$$SKASR = \frac{\bar{r}_i - \bar{r}_{if}}{SKAD_i^{(ER/|ER|)}} \tag{14}$$

In equation 14 for SKASR ER represent mean excess return of the portfolio i over the time period. Compared to original Sharpe ratio divisor is now substituted with a new model that according to Pätäri (2011) takes into the account all distributional asymmetries of returns discovered by measures of kurtosis and skewness.

Jobson-Korkie (1981) developed Z-test to measure the significance for the Sharpe ratio. Later, Memmel (2003) modified the test to the following form:

$$z = \frac{\hat{S}h_i - \hat{S}h_n}{\sqrt{\hat{V}}} = z_{JK} \tag{15}$$

$$NV = 2 - 2\rho_{in} + \frac{1}{2}(Sh_i^2 + Sh_n^2 - 2Sh_i Sh_n \rho_{in}^2) \tag{16}$$

In equations 15 and 16 presented above N is the number of observations in the time-series in this study representing the number of months. $\hat{V}$ represents the asymptotic variance of the Sharpe ratio difference. Sh is the Sharpe ratio of the portfolio replaced by the comparable portfolio and market portfolio SKASR-values. $\rho_{in} = \frac{\sigma_{in}}{\sigma_i \sigma_n}$ is the correlation of the return between the portfolios.

7 Results and Discussion

In this chapter the focus point will be on the merger arbitrage portfolio returns. The analysis includes all the public merger arbitrage deals valued over €100 million in Europe between 2002 to 2014. In the first part of the section merger arbitrage portfolio returns are displayed in a monthly level. The second part focuses on cumulative portfolio returns. In both parts there will be presented the total number of 14 different merger arbitrage portfolios and to get a perspective for the return portfolios are benchmarked against STOXX Europe 600 stock index and Market Return data, including all stock data from following European countries: Austria, Belgium, Germany, Denmark, Finland, France, Great Britain, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and Switzerland. Additionally, to answer the research hypotheses presented in chapter 5 we will examine the risk of the merger arbitrage portfolios and benchmark the results to benchmark index and to earlier academic studies. All the returns in this chapter are calculated by the formulas and methods explained earlier in chapter 6.

7.1 Merger arbitrage portfolio returns

In this paper there are portfolios constructed for each deal type; cash, stock and mixed deals and one portfolio including all the deal types. Based on the deal types, there are two different strategies to construct the portfolios either value-weighted or equal-weighted portfolio. Monthly merger arbitrage portfolio returns in this sample are presented in table 3. In some European countries short selling is illegal and there are more limitations and restrictions for short selling than in the U.S., where most of the earlier merger arbitrage studies are focusing. Considering these market specific facts in table 3 there are two different strategies presented. *Panel A* merger arbitrage portfolio returns are calculated when investors short sell acquirer's stock in mixed and stock deals. In *Panel B* portfolios take only long position in target stock and will not short sell acquirer's stock. Though, it should be noted that investors never short sell acquirer's stock in cash deals, therefore *Panel A* and *Panel B* results are the same for cash deals. *Panel C* is presenting returns for the benchmark index STOXX Europe 600 and Risk-free rate of return.

Table 3. Monthly merger arbitrage portfolio returns in Europe 2002-2014

	Value-Weighted			Equal-Weighted		
Portfolio	Mean (%)	Standard Deviation (%)	Sharpe Ratio	Mean (%)	Standard Deviation (%)	Sharpe Ratio
Panel A: Arbitrage Porfolios, Short Selling Acquirer Stock in Stock Swap and Mixed Deals						
Cash deals	2,02 %	2,66 %	0,76	1,89 %	2,13 %	0,89
Stock deals	0,77 %	3,25 %	0,24	0,81 %	3,34 %	0,24
Mixed deals	1,26 %	4,97 %	0,25	1,70 %	4,46 %	0,38
All deals included	1,43 %	1,24 %	1,15	1,52 %	1,13 %	1,34
Panel B: Arbitrage Portfolios, Long Position Only						
Cash deals	2,02 %	2,66 %	0,76	1,89 %	2,13 %	0,89
Stock deals	1,66 %	3,51 %	0,47	1,57 %	3,13 %	0,50
Mixed deals	1,60 %	4,96 %	0,32	1,97 %	4,51 %	0,44
All deals included	1,81 %	1,88 %	0,96	1,84 %	1,38 %	1,34
Panel C: Market Data						
STOXX Europe 600	0,25 %	4,46 %	0,06	0,25 %	4,46 %	0,06
Total Market Return	0,94 %	5,61 %	0,17	0,94 %	5,61 %	0,17
Risk-free Rate	0,11 %	0,14 %		0,11 %	0,14 %	

Monthly merger arbitrage returns in the sample between 2002 to 2014 are shown in table 3. In the sample unhedged portfolios in *Panel B* outperformed hedged portfolios in *Panel A.* The majority, of the academic literature has excluded unhedged returns from their studies, but Branch & Yang (2006a) reported as well higher returns for the unhedged merger arbitrage portfolios in their sample. However, it should be noted that unhedged portfolios get exposed to higher risk than hedged portfolios. Comparing market benchmark STOXX Europe 600 stock index only constructed mixed deal portfolios had a higher standard deviation than the benchmark index. All the constructed merger arbitrage portfolios reported lower standard deviation than total market return index.

There was a slight difference in cash offer merger arbitrage portfolio mean returns in value-weighted (2,02%) and equal-weighted (1,89%) returns. Unsurprisingly, volatility of the value-weighted cash deal portfolio was higher than in equal-weighted portfolios. Though, on average value-weighted cash deals had a bit higher return

than equal-weighted cash deal portfolio. Compared to mixed and stock deal portfolios cash deal portfolio had a lower standard deviation which is likely to be driven by the higher total number of deals.

In constructed stock deal portfolios there can be seen a significant difference in mean return between the hedged and unhedged strategies. The highest mean stock portfolio return was for the long only position value weighted stock portfolio (2,02%), and in contrary the lowest was for the hedged value-weighted stock deals. This finding indicates the problem in the sample where short selling acquirer's stock accumulates negative returns. Again, these supporting results are supporting the earlier findings by Branch & Yang (2006a), but in the contrary, with the most studies in the U.S. markets (Andrade et al. 2001, Fuller et al. 2002, Mitchell et al. 2004). Therefore, in unhedged stock swap deals, it is visible that investors gain additional return when acquiring company stock price increases during the deal running period. The mean monthly returns for the constructed stock deal portfolios range from 0,77% to 1,66%.

The four constructed mixed deal portfolios generate monthly mean returns from 1,26% to 1,97%. Like in stock swap deal portfolios the returns of the unhedged portfolios are higher than portfolios that include short selling acquirer's stock. Due to the smaller sample size than other deal types the standard deviation of monthly mixed returns is higher than in other deal types.

Interestingly, every other portfolio strategy than stock deal portfolios with short selling beat STOXX Europe 600 and Total European market return indexes during the time-period in average return. The difference in returns is remarkably high and one explanation for that could be the low volatility in merger arbitrage portfolios. All four merger arbitrage portfolios, including all deal types posted relatively low standard deviations ranging from 1,13% to 1,88%, which is lower than any other portfolio by deal payment method alone. These findings suggest that in the European markets, it's better to combine more deal types than one to the portfolio and by diversifying, investors can minimize the exposed risk in their portfolios. As in the other deal type portfolios, the combination portfolios using long position strategy scored higher mean

returns than portfolios short selling acquirer stock. In total combination portfolios posted high mean returns ranging from 1,43% to 1,84%.

Benchmarking the results to earlier academic literature, there was only a small difference in monthly cash deal portfolio mean returns compared to Baker & Savasoglu (2002) and Branch & Yang (2006a). Compared to earlier academic studies (Mitchell & Pulvino 2001, Baker & Savasoglu 2002, Maheswaran & Yeoh 2006, Branch & Yang 2006, Hall et al. 2013) stock swap portfolio using short selling strategy to acquirer's stock, scored remarkably lower mean returns than in most of the earlier studies. These findings challenge the short selling acquirer's stock as a profitable merger arbitrage investment method in the European markets. In overall the portfolio results are in line with the earlier academic literature presented in chapter 3. Because, there is no real benchmark yet for authors' knowledge including data from multiple European countries, the results can be seen a good baseline for the future studies. The arbitrage spread and deal running time alone don't support this high return on average. Therefore, it seems that the total returns are highly driven by the competing bids and other upward revisions resulting extraordinary returns, as Baker & Savasoglu (2002) earlier reported.

In a big picture, the Sharpe ratios higher than market benchmarks are in line with the earlier academic literature (Mitchell & Pulvino 2001, Baker & Savasoglu 2002, Maheswaran & Yeoh 2006, Branch & Yang 2006a, Hall et al. 2013). The reported standard deviations are lower than in some of the earlier studies, for example Baker & Savasoglu (2002). However, in some studies, (see, e.g. Branch & Yang 2006a) the monthly standard deviation was below 3% in stock swap deals, which is lower than in any of the stock swap portfolios in this paper.

In chapter 4 main research question and sub-questions were presented. Based on the findings in table 3 we can evaluate the outcome to *Q1:*

Q1: Are there differences in the returns between cash, stock swap and mixed deals?

In the results we can see that using by using typical merger arbitrage, including short selling acquirer's stock in stock swap and mixed deals cash deals generated the highest return by mean. Second, there were mixed deal returns and in third place stock deals. The difference in cash deal and mixed deal mean returns is really small compared to stock deal returns. Therefore, the proposed hypothesis stands and there are differences by deal type. However, when we focus to long position only strategy the difference by deal type in average return is smaller. For value-weighted portfolios cash deals posted the greatest return second to stock deals and mixed deals in last place. Opposite to value-weighted portfolio returns with long only strategy mixed deals posted greater mean return than cash and stock deals.

Using long only strategy mixed and stock deal portfolios posted remarkably higher returns shown in *Panel B* compared to *Panel A* in table 3 which decreases the difference in returns by deal type. Still, there is a difference by the deal types in *Panel B* as well. It seems that cash and mixed deals performed better than stock deals using equal weight strategy. Cash deal portfolios also had lower volatility with returns than stock and mixed deal type portfolios and consequently remarkably higher Sharpe ratios. It is very likely, that the nature of the sample consisting more cash deals than stock swap and mixed deals highly correlates to volatility results in this paper. Findings that cash deals generated higher returns than stock swap deals are supporting earlier findings by Branch & Yang (2006a) and Wang & Wedge (2012).

The second question presented in chapter 4 was the following:

Q2: Are there differences in the returns between value and equal weighted portfolios?

Earlier Baker & Savasoglu (2002) reported that one standard deviation change in firm size leads to a 0,8% increase in average returns, suggesting that higher deal value also leads to a higher arbitrage return. Therefore, the prediction is that value-weighted portfolios with a higher weight to large deals should have higher mean return than equal weighted portfolios.

Comparing portfolios, including all deal types equal-weighted portfolios posted higher mean returns with lower volatilities than value-weighted portfolios. The volatility is not surprising as value-weighted portfolios weight more for the single large deals and therefore are not diversified for failure risk as well than equal-weighted portfolios.
The monthly mean return difference between the cash deal portfolios was only 0,12% which is a slight difference. Though, value-weighted cash deal portfolios generated higher average return than cash deals. During the total sample period for stock and mixed deals using short selling strategy, equal-weighted portfolios performed better than value-weighted portfolios. Contrary to short-selling strategy, for stock and mixed deals with long only strategy, value-weighted portfolios beat equal-weighted portfolios by average return. The most notable difference between the equal-weighted and value-weighted investment methods is the standard deviation. It is notable to see that all, but one equal weighted portfolio had lower volatility than their comparable value-weighted portfolios. All equal-weighted portfolios scored higher Sharpe ratio than comparable value-weighted strategy. Therefore, it can be said that in total sample equal-weighted portfolios performed better than their value-weighted alternatives and there are differences especially with the risk-adjusted returns and proposed hypothesis stand.

Skewness and Kurtosis adjusted Sharpe ratio (SKASR) results, where value-weighted portfolios are compared to similar equally weighted strategy portfolio are presented in appendix 1. SKASR analysis favors equal weighted portfolios to perform better than value weighted portfolios in all other, but stock deal portfolios with high significance levels. SKASR results don’t support either weighting strategy to be significantly better than other for stock deals. Despite the fact, that SKASR results don’t recommend either weighting strategy, it suggests a long strategy to be more attractive than short selling strategy as shown in appendix 2. In this sample period there was no significant difference between short and long strategy SKASR results for mixed deals.

Portfolio weighting strategy results for Sharpe ratio and standard deviation findings are in line with the earlier literature by Baker & Savasoglu (2002), Maheswaran & Yeoh (2005). Baker & Savasoglu (2002) also reported higher mean returns for value-weighted cash deal portfolio than equal-weighted portfolio, but the results were

opposite for stock deal portfolios and in total sample the difference in mean return was only 0,01% between value-weight and equal-weight portfolios. The findings in this paper claiming equally weighted portfolios to perform better than value weighted portfolios are in line with the earlier academic studies by Maheswaran & Yeoh (2005) and Kearney et al. (2008), but in contrary to earlier findings by Baker & Savasoglu (2002).

The monthly and annual performance of the portfolios is shown in table 4 below. Only the months when there was at least one deal running in the portfolio were included. In the left side of the table are value-weighted portfolio and on the right side there are equal-weighted portfolio performances. The table 4 results are sectioned into three parts *Panel A* shows the performance when market merger arbitrageurs take a short position to acquirer stock in stock swap and mixed deals. *Panel B* follows the strategy when investor takes only long position to target stock and in *Panel C* there are results for the benchmark indexes STOXX Europe 600 and total European market return index. However, cash deal portfolio results presented in *Panel A* and *B* is always investing for long position only and there is no difference in strategy between the panels.

Table 4. Monthly and annual performance of the merger arbitrage portfolios

	Value-Weighted						Equal-Weighted					
Portfolio	Positive monthly return (%)	Positive return vs. STOXX 600 Europe (monthly) (%)	Positive return vs. total market return (monthly) (%)	Positive annual return (%)	Positive return vs. STOXX 600 Europe (annual) (%)	Positive annual return vs. total market return (annual) (%)	Positive monthly return (%)	Positive return vs. STOXX 600 Europe (monthly) (%)	Positive return vs. total market return (monthly) (%)	Positive annual return (%)	Positive return vs. STOXX 600 Europe (annual) (%)	Positive annual return vs. total market return (annual) (%)
Panel A: Arbitrage Porfolios, Short Selling Acquirer Stock in Stock Swap and Mixed Deals												
Cash deals	95 %	61 %	57 %	100 %	77 %	77 %	95 %	60 %	54 %	100 %	77 %	54 %
Stock deals	88 %	55 %	51 %	77 %	62 %	38 %	90 %	57 %	50 %	85 %	62 %	38 %
Mixed deals	89 %	66 %	66 %	69 %	38 %	46 %	88 %	71 %	67 %	77 %	38 %	54 %
All deals included	96 %	54 %	54 %	100 %	69 %	62 %	94 %	57 %	51 %	100 %	77 %	54 %
Panel B: Arbitrage Portfolios, Long Position Only												
Cash deals	95 %	61 %	56 %	100 %	77 %	77 %	95 %	60 %	54 %	100 %	77 %	54 %
Stock deals	66 %	64 %	57 %	69 %	85 %	69 %	71 %	69 %	56 %	69 %	77 %	54 %
Mixed deals	86 %	77 %	70 %	69 %	62 %	62 %	85 %	77 %	73 %	69 %	62 %	62 %
All deals included	83 %	60 %	56 %	85 %	92 %	77 %	92 %	63 %	54 %	100 %	85 %	69 %
Panel C: Market Data												
STOXX Europe 600	57 %			69 %			57 %			69 %		
Total Market Return	61 %			69 %			61 %			69 %		

The monthly performance reveals that cash deal portfolios generated positive returns in 95% of the months and during all the sample years. However, all the constructed merger arbitrage portfolios posted remarkably high rates of the positive returns by monthly and annual level, especially compared to STOXX Europe 600 index market returns during the time-period. One interesting finding is that the portfolios including all deal types posted smaller share of positive months versus benchmark index than each deal type alone using the same investment strategy. The lower rate of positive months versus benchmark in portfolios including all deal types is caused by the more limited returns with lower volatilities. Though, on the other hand low volatilities have a relationship with lower monthly losses and therefore in annual level these portfolios beat market annually in a very high rate.

7.1.1 Returns in positive and negative market conditions

Block (2006) found merger arbitrage to be more attractive in neutral and bear markets, but less attractive in strong market conditions. Consequently, there is a need to analyze returns in different market conditions. In table 5 the constructed merger arbitrage portfolio performance is benchmarked against European total market return index in different market conditions. In a month when market index records return higher than 0% is counted as a positive month, and in a month when index returns are below 0% it is counted as a negative month.

Table 5. Share of the months when portfolio beats total market index by return in different market conditions

	Total Market index positive month		Total Market index negative month	
	Value-Weighted	Equal-Weighted	Value-Weighted	Equal-Weighted
Portfolio	%	%	%	%
Panel A: Arbitrage Porfolios, Short Selling Acquirer Stock in Stock Swap and Mixed Deals				
Cash deals	28 %	23 %	97 %	98 %
Stock deals	16 %	15 %	94 %	92 %
Mixed deals	26 %	29 %	92 %	90 %
All deals included	24 %	20 %	100 %	100 %
Panel B: Arbitrage Portfolios, Long Position Only				
Cash deals	28 %	23 %	97 %	98 %
Stock deals	29 %	25 %	88 %	92 %
Mixed deals	32 %	39 %	92 %	90 %
All deals included	31 %	24 %	97 %	100 %

The performance of the constructed merger arbitrage portfolios is surprisingly weak in the strong market conditions versus market return. As merger arbitrageurs are aware of their limited return related to the investment position they rarely beat markets in strong months. In months when market return was positive, merger arbitrage portfolios beat market index in return only from 15 to 39% of the total positive months. After all, the trick is happening in down markets when constructed

portfolios beat markets in a rate ranging from 88% to perfect 100%. The lower volatility related to merger arbitrage limits the losses in down markets and portfolios can even reach positive stable return no matter of the market conditions. It has been well recorded in the earlier studies (Mitchell & Pulvino 2001, Branch & Yang 2006a) that merger arbitrage returns are nonlinear with market returns and these results support earlier academic findings.

Table 6. Merger arbitrage monthly returns in positive and negative market return months

	Positive Total Market Return				Negative Total Market Return			
	Value-Weighted		Equal-Weighted		Value-Weighted		Equal-Weighted	
Portfolio	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Panel A: Arbitrage Porfolios, Short Selling Acquirer Stock in Stock Swap and Mixed Deals								
Cash deals	2,02 %	2,50 %	1,83 %	2,05 %	2,03 %	2,89 %	1,99 %	2,23 %
Stock deals	0,90 %	2,92 %	1,02 %	2,98 %	0,55 %	3,77 %	0,43 %	3,88 %
Mixed deals	1,53 %	3,91 %	1,95 %	4,14 %	0,91 %	6,06 %	1,38 %	4,83 %
All deals included	1,54 %	1,04 %	1,57 %	1,04 %	1,27 %	1,49 %	1,45 %	1,26 %
Panel B: Arbitrage Portfolios, Long Position Only								
Cash deals	2,02 %	2,50 %	1,83 %	2,05 %	2,03 %	2,89 %	1,99 %	2,23 %
Stock deals	1,86 %	3,39 %	1,94 %	2,98 %	1,29 %	3,69 %	0,89 %	3,29 %
Mixed deals	2,28 %	3,85 %	2,64 %	4,17 %	0,73 %	5,98 %	1,10 %	4,77 %
All deals included	1,95 %	1,75 %	1,96 %	1,37 %	1,58 %	2,05 %	1,66 %	1,37 %
Panel C: Market Data								
Total Market Return	4,33 %	3,30 %	4,33 %	3,30 %	-4,35 %	4,23 %	-4,35 %	4,23 %

It can be seen clearly in the returns that cash deal portfolio returns are behaving very neutrally during the negative total market return months seen in table 6. Surprisingly, every single cash deal portfolio posted slightly higher mean return in negative months compared to positive market return months. Every other merger arbitrage portfolio a had slightly lower mean return in negative total market return months compared to positive months. Still, every single constructed merger arbitrage portfolio had positive mean return during the samples despite the high difference in total market returns between the two samples. Notably, during the negative market return the standard deviation was higher than in the positive month sample. Again, it's likely that the higher number of positive months 95 compared to 61 total market return negative months is biasing standard deviation result comparability in some scale.

7.1.2 Returns prior 2008 and onwards

One of the research questions was to test, if there are differences in merger arbitrage portfolio returns before and after European debt crisis and Great recession:

Q3: How the latest financial-crisis has affected to the returns of merger arbitrage and can we see a declining trend in merger arbitrage returns?

Earlier Officer (2007) tested the performance-based arbitrage hypothesis by Shleifer and Vishny (1997) suggesting that the returns of past arbitrage trades is affecting to the availability of funds in the future arbitrage trades and hence affecting to returns. According to Officer (2007) arbitrage markets are well-functioning and large losses or number of investment opportunities do not have a significant impact on the prices and arbitrage opportunities neither returns, unlike performance-based arbitrage hypothesis suggests. Later academic studies by Ji & Jetley (2009) and Hall et al. (2013) have reported decreasing trend in merger arbitrage return in later time-series compared to earlier time-series.

The sample is divided into two parts, one focusing to monthly returns from 2002 to end of 2007 presented in the left-hand side in table 7. The monthly returns from 2008 to end of 2014 are presented on the right-hand side. In this sample year 2007 is still assumed as a year prior recession and debt crisis as annual total market return in 2007 was positive, but in 2008 the annual total market return was -45,9%.

Table 7. Monthly returns 2002 to 2007 and 2008 to 2014

	Monthly Returns 2002 - 2007				Monthly Returns 2008 - 2014			
	Value-Weighted		Equal-Weighted		Value-Weighted		Equal-Weighted	
Portfolio	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Panel A: Arbitrage Porfolios, Short Selling Acquirer Stock in Stock Swap and Mixed Deals								
Cash deals	2,09 %	1,86 %	1,76 %	1,27 %	1,96 %	3,22 %	2,01 %	2,68 %
Stock deals	1,04 %	1,80 %	1,14 %	1,90 %	0,55 %	4,10 %	0,53 %	4,18 %
Mixed deals	2,18 %	5,18 %	2,60 %	5,33 %	0,08 %	4,42 %	0,54 %	2,55 %
All deals included	1,61 %	1,12 %	1,65 %	0,88 %	1,28 %	1,32 %	1,41 %	1,30 %
Panel B: Arbitrage Portfolios, Long Position Only								
Cash deals	2,09 %	1,86 %	1,76 %	1,27 %	1,96 %	3,22 %	2,01 %	2,68 %
Stock deals	1,41 %	3,25 %	1,13 %	2,77 %	1,88 %	3,70 %	1,94 %	3,37 %
Mixed deals	2,76 %	4,99 %	3,17 %	5,22 %	0,11 %	4,50 %	0,41 %	2,66 %
All deals included	2,04 %	1,61 %	1,71 %	1,03 %	1,60 %	2,06 %	1,96 %	1,61 %
Panel C: Market Data								
STOXX Europe 600	0,23 %	4,36 %	0,23 %	4,36 %	0,26 %	4,55 %	0,26 %	4,55 %
Total Market Return	1,45 %	4,11 %	1,45 %	4,11 %	0,49 %	6,61 %	0,49 %	6,61 %

As presented in the figure 5. in chapter 5 there was a significant decrease in the number of running deals from 2008 and onwards compared to prior years. This is most likely one factor affecting to higher standard deviation between 2008 to 2014 for most of the merger arbitrage portfolios compared to results between 2002 to 2007. Prior 2008 market index portfolio Total Market Return portfolios recorded on average 1,45% monthly return, but between 2008 to 2014 the monthly returns dropped to 0,49%. Anyhow, only 3 out of 4 mixed merger arbitrage portfolios posted lower than mean Total Market return index, all other portfolios beat both market indexes in returns during 2008 to 2014. It must be emphasized that all constructed merger arbitrage portfolios scored lower standard deviation than the market indexes during the later analysis period. In the earlier analysis period between 2002 to 2007 only all stock deal portfolios performed worse than the total market return index, other constructed portfolios beat the market index portfolios.

Focusing to return for merger arbitrage portfolios it can be said that only both long position stock deal portfolios and equal weighed cash and total long position portfolios had higher mean returns in later time-period than 2002 to 2007 out of 14 constructed portfolios. Compared to market returns in later time-period it is visible that merger arbitrage portfolios outperformed market portfolios with higher difference than in year 2002 to 2007. However, in 10 out of 14 merger arbitrage portfolios the

mean return was lower in later sample. One big factor affecting to standard deviation is the smaller sample size in later period, possibly even affecting to total returns in a negative way. From 2002 to 2007 there was 233 announced deals compared to only 111 announced deals from 2008 to 2014. It is likely that the lower number of deals is one factor to be considered when comparing the difference in merger arbitrage portfolios between the two time-series, and it's most visibly seen in a development of the mixed deal returns.

Analysis between the two time-series leaves some questions open and don't answer if the lower number of merger arbitrage deal investment opportunities have been driving some results down or not. When focusing purely merger arbitrage portfolio returns, decreasing in three out of four merger arbitrage total portfolios, which could support the earlier findings by Ji & Jetley (2009) and Hall et al. (2013) reporting shrinking trend in merger arbitrage returns in later time-series.

Based on earlier analysis by Maheswaran & Yeoh (2005) claiming merger arbitrage to be market neutral investment strategy and Block (2006) suggesting it to be more attractive in neutral and down markets than in strong market conditions. Mitchell & Pulvino (2001) and Branch & Yang (2006a) have reported a higher correlation between merger arbitrage returns and down markets, which will be tested more thoroughly in chapter 8. In the period between 2002 to 2008 the share of cash deals accumulated approximately 70% of the deals during the time-period, but between the 2009 to 2014 the share of the cash deals was approximately only 53% of the total sample. As earlier literature has already found the difference between the cash and stock risk and return (see for example Baker & Savasoglu 2002) and cash deal returns were more market neutral than other deal types, it can be said that the total results between the two time-periods are also driven by the portfolio deal type balance differences.

8 Benchmarking Merger Arbitrage Returns

The results of constructed portfolios shown in chapter 7 are benchmarked against the two linear models: Capital Asset Pricing Model (CAPM) and the Fama-French Three-Factor Model. Benchmarking results against the models will discover the sensitivity to non-diversifiable risk, and to evaluate the excess returns generated by the constructed merger arbitrage portfolios. Mitchell & Pulvino (2001) suggested in their paper that the non-linear model is a better benchmark for merger arbitrage returns than linear-models. Therefore, this section will be divided into two parts, in the first part the merger arbitrage portfolios will be benchmarked against linear and non-linear models. In the second part of the chapter the portfolios are tested with SKASR to show the robustness in the results.

8.1 Benchmarking against linear models

In the first part of the linear models section the results will be benchmarked against Capital Asset Pricing Model (CAPM) and in the second part the focus will be in Fama and French Three-Factor Model. In the final part of this chapter, the results are benchmarked in different market conditions.

8.1.1 Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model often written as the CAPM was introduced by Sharpe (1964), Lintner (1965) and Mossin (1966). The model is used to calculate the costs of capital and measure portfolio performance. The CAPM assumes that in a well-diversified portfolio there will not be unsystematic risk and there will be only systematic risk left. The systematic risk is the market risk investors are facing as consequence to market conditions and cannot be eliminated through diversification. The measure of risk in a model is called market beta β, and the risk premium per unit of increased risk is the same across all assets. The CAPM states a linear relationship between the expected risk premium on individual assets and their market beta. The CAPM expresses that returns vary across assets only because the market betas are

different. The level of market risk in a portfolio can be measured by the beta β. When portfolio returns move in line with the market returns the beta is 1. Beta higher than 1 denotes that the portfolio returns vary more heavily than the market returns and beta below 1 indicates that returns vary less than the market returns. When portfolio returns move in to opposite direction than the market returns the beta is negative. The CAPM model equation for portfolio returns is:

$$R_p - R_f = \alpha_p + \beta_p(R_M - R_f) + \epsilon_P \quad (17)$$

In an equation R_p is a return of portfolio and R_f is a risk-free rate of return. Alpha α_p measures the size of excess return, positive alpha indicates that the portfolio has outperformed the market return $R_M - R_f$. β_p is the portfolio beta, the error term ϵ_P is the idiosyncratic risk which is assumed as zero in the CAPM.

The CAPM is a linear pricing model that predicts a linear relationship between the constructed merger arbitrage portfolio returns and the market returns. In this analysis STOXX Europe 600 index is used as a proxy for the market returns. Regression analysis is performed for each merger arbitrage portfolio to measure the linear relationship between the portfolios and market return. The CAPM results are presented in table 8:

Table 8. Capital Asset pricing model (CAPM) total sample results for the constructed portfolios

		Intercept		$R_m - R_f$	
CAPM Total Sample	adj. R^2	α	*P-value*	β	*P-value*
Value Weighted Portfolios					
Cash	0,00	0,018 **	0,00	0,02	0,57
Stock Short	0,01	0,005 *	0,04	0,08	0,09
Mix Short	-0,01	0,008 *	0,03	0,02	0,69
Total Short	0,01	0,013 **	0,00	0,02	0,18
Stock Long	0,03	0,013 **	0,00	0,11 *	0,02
Mix Long	0,01	0,009 **	0,01	0,09	0,15
Total Long	0,01	0,017 **	0,00	0,04	0,11
Equal Weighted					
Cash	-0,01	0,017 **	0,00	0,00	0,97
Stock Short	0,02	0,006 *	0,03	0,09	0,06
Mix Short	-0,01	0,011 **	0,00	-0,01	0,88
Total Short	0,00	0,014 **	0,00	0,01	0,57
Stock Long	0,06	0,012 **	0,00	0,14 **	0,00
Mix Long	0,00	0,012 **	0,00	0,06	0,26
Total Long	0,01	0,017 **	0,00	0,04	0,07

**= Statistically significant at 99% confidence level
* = Statistically significant at 95% confidence level

CAPM regression adjusted R^2 results are low and close to zero in all the constructed portfolios. The sample period is including all the findings from 2002 to 2014 and in total consist of 156 months. The low R^2 is not surprising when considering earlier academic literature, e.g. Mitchell & Pulvino (2001) reported R^2 values ranging from 0,006 to 0,057 in their CAPM regression analysis for the total sample. Hall et al. (2013) reported adjusted R^2 ranging from -0,002 to 0,05 and Kearney et al. (2008) announced adjusted R^2 ranging from -0,002 to 0,06. However, Baker & Savasoglu (2002) reported bit higher R^2 values ranging from 0,09 to 0,15 in their sample with higher correlation to market returns than in this sample. Considering the total sample almost all the intercept values are statistically significant, but only in two model beta values for stock long portfolios are statistically significant with at least 95% confidence level. Though, all the models resulted positive intercept for monthly portfolio returns in CAPM model the market return does not seem to be best variable to explain excess returns alone for the total sample. Though, focusing for intercept values those are in line with earlier studies (for example Baker & Savasoglu 2002, Branch & Yang 2006a, Hall et al. 2013).

8.1.2 Fama and French Three Factor Model

The Fama-French three-factor model is based on the Capital Asset Pricing Model by Fama and French (1993). The basis of the model is the same as the CAPM, but they increased the number of factors from market risk in the original model to the total number of three factors. Earlier Fama and French observed that stocks with small market capitalization and stock with high market to book ratio had outperformed the markets. Therefore, Fama and French added size factor *SMB* and value factor *HML* to the original CAPM model. *SMB* stands for Small Minus Big measuring the outperformance of small versus big companies. *HML* means High Minus Low indicates the outperformance of high book-to-market companies versus small book-to-market companies.

Historical values used in this paper for *SML* and *HML* were obtained from the Kenneth French's web page. The formula for Fama and French Three Factor model regression analysis is:

$$R_p - R_f = \alpha_p + \beta_p(R_M - R_f) + \beta_{SMB}SMB + \beta_{HML}HML + \epsilon_P \quad (18)$$

Table 9. The results from the Fama and French Three Factor model regression analysis for total sample

		Intercept		$R_m - R_f$		SMB		HML	
FF Total Sample	$adj.R^2$	α	*P-value*	β	*P-value*	β	*P-value*	β	*P-value*
Value Weighted Portfolios									
Cash	-0,02	0,018 **	0,00	0,01	0,81	-0,05	0,68	0,05	0,62
Stock Short	0,00	0,005 *	0,05	0,08	0,11	0,08	0,51	-0,02	0,89
Mix Short	0,02	0,007	0,05	-0,04	0,53	0,09	0,62	0,40 *	0,02
Total Short	-0,01	0,013 **	0,00	0,03	0,19	-0,02	0,74	-0,02	0,70
Stock Long	0,06	0,012 **	0,00	0,14 *	0,01	0,35 *	0,01	-0,07	0,62
Mix Long	0,03	0,008 *	0,01	0,04	0,58	0,22	0,19	0,35 *	0,05
Total Long	0,01	0,016 **	0,00	0,05	0,11	0,11	0,16	-0,01	0,91
Equal Weighted									
Cash	-0,02	0,017 **	0,00	-0,01	0,79	0,02	0,84	0,05	0,57
Stock Short	0,01	0,005 *	0,04	0,09	0,08	0,07	0,62	0,00	0,97
Mix Short	0,04	0,010 **	0,00	-0,08	0,19	0,10	0,50	0,43 **	0,01
Total Short	0,01	0,014 **	0,00	-0,01	0,73	0,02	0,72	0,09 *	0,05
Stock Long	0,08	0,012 **	0,00	0,16 **	0,00	0,30 *	0,02	-0,07	0,59
Mix Long	0,04	0,011 **	0,00	0,01	0,88	0,25	0,12	0,36 *	0,02
Total Long	0,03	0,017 **	0,00	0,03	0,24	0,09	0,12	0,08	0,19

**= Statistically significant at 99% confidence level
* = Statistically significant at 95% confidence level

Regression results for Fama- French three factor model for the total sample period are shown in table 9. The sample period is including all the findings from 2002 to 2014 and in total consist of 156 months. Like earlier for CAPM model the results are mostly significant for intercept, but not for other factors. Again adjusted R^2 results are relatively low, ranging from -0,02 to 0,08 suggesting Fama-French three factor model not to be much better model to explain monthly excess returns than CAPM. The intercept values are ranging from 0,005 to 0,018 suggesting positive monthly excess returns for all the constructed portfolios. However, beta values are mostly statistically insignificant and relatively low, ranging from -0,08 to 0,16. Therefore, regression results for the total sample suggest merger arbitrage returns to be highly uncorrelated with market returns. Other factors in model SMB and HML are not either correlating much to merger arbitrage portfolio returns. Other notable academic studies have experienced the same kind of problems with Fama-French three factor model like Mitchell & Pulvino. (2001) reported R^2 results ranging from 0,014 to 0,076 and beta values from 0,0176 to 0,1052. Baker & Savasoglu (2002) represented higher R^2 values from 0,12 to 0,20 in their paper for constructed merger arbitrage portfolios with higher beta values from 0,25 to 0,37. Though, focusing for intercept

values those are in line with earlier studies (for example Baker & Savasoglu 2002, Branch & Yang 2006a and Hall et al. 2013).

8.1.3 Benchmarking results in different market conditions

Mitchell & Pulvino (2001) and Branch & Yang (2006a) found in their paper nonlinearity between the merger arbitrage and market returns in different market conditions. Their findings suggest market arbitrage returns to be uncorrelated with market returns in most market conditions. However, during market downturns Mitchell & Pulvino (2001) reported for a dramatic increase in the relationship between the market and merger arbitrage returns. As the results in the earlier regression analysis in chapter 8.1 for the total sample suggest there is no great correlation between the market and merger arbitrage returns in the total sample. Therefore, the next step is to find out, if there is a positive correlation between the merger arbitrage and market returns in different market conditions which is also answering to the fifth research question presented in chapter 4, which is the following:

Q5: Are the risk arbitrageurs facing more risk during the depreciating markets than the positive and flat market conditions?

To determine the linearity in merger arbitrage in different market conditions we are estimating linear model that meets the predetermined *Threshold* conditions given for the sample. One can see that model shown in equation 19 is a CAPM formula with an extension of *Threshold*-dummy factor.

$$R_{pThreshold} - R_f = \alpha_{PThreshold} + \beta_{MktThreshold}(R_m - R_f) \quad (19)$$

The *Threshold*-dummy factor is derived from the earlier piecewise regression model presented by Mitchell & Pulvino (2001), but due to the higher number of different portfolios measured in this paper compared to earlier academic studies (e.g. Mitchell & Pulvino 2001, Maheswaran & Yeoh 2005, Branch & Yang 2006a, Hall et al. 2013) the models will be presented to multiple *Threshold*-values in a 1% interval. The

Threshold value is a Market return – risk free rate of return. As an example, if the *Threshold*-value is <-2% all the months when Market return – risk free rate was below -2% are included in the model and months with higher returns than -2% are excluded from the sample.

The CAPM regression results for different market conditions are shown in table 10. The predetermined *Threshold*-values are >+1%, >0%, <0%, <-1%, <-2%, <-3% and <-4%. It can be seen from the regression results that in, there is only some statistically significant beta values in some of the selected *threshold*-values. The earlier academic literature by Mitchell & Pulvino (2002) reported that betas are high in depreciating markets, but close to zero in appreciating and flat markets. Seen in regression results it seems that during this sample none of the portfolios were highly correlated to market results neither in positive nor more negative markets and stayed relatively close to zero in all market conditions.

Table 10. Sensitivity analysis showing the relationship between the merger arbitrage return in different market conditions

Threshold $R_m - R_f$	>+1%			>0%			<0%			<-1%			<-2%			<-3%			<-4%		
	adj. R^2	α	β	adj. R^2	α	β	adj. R^2	α	β	adj. R^2	α	β	adj. R^2	α	β	adj. R^2	α	β	adj. R^2	α	β
Number of months		77			92			64			52			46			33			21		
Value Weighted Portfolios																					
Cash	0,00	0,013 *	0,10	0,00	0,014 **	0,08	-0,01	0,022 **	0,06	-0,01	0,023 **	0,00	-0,01	0,023 **	0,07	-0,03	0,018	0,03	0,00	0,026 **	0,09
Stock Short	-0,01	0,011 **	0,01	0,01	0,002	0,14	0,00	0,008	0,09	-0,01	0,006	0,10 *	-0,02	0,004	0,05	-0,03	0,001	0,03	-0,05	-0,005	-0,02
Mix Short	0,02	0,012 **	-0,13	0,02	0,016 **	-0,18	0,02	0,016	0,22	0,01	0,016	-0,01	0,01	0,018	0,24	-0,02	0,007	0,14	-0,04	0,007	0,18
Total Short	-0,01	0,014 **	0,00	-0,01	0,013 **	0,01	0,01	0,015 **	0,05	-0,01	0,014 **	0,02	-0,02	0,012 **	0,03	-0,02	0,013 *	0,04	-0,05	0,011	0,02
Stock Long	0,00	0,015 *	0,09	0,01	0,011	0,14	0,00	0,014 *	0,11	-0,01	0,012	0,05	-0,02	0,008	0,05	0,02	0,022	0,19	0,00	0,025	0,20
Mix Long	0,02	0,019 **	-0,15	0,03	0,022 **	-0,19	0,05	0,019 *	0,32 *	0,04	0,019	-0,01	0,04	0,020	0,33	0,01	0,013	0,27	-0,04	0,000	0,17
Total Long	-0,01	0,018 **	0,01	-0,01	0,017 **	0,08	0,01	0,019 **	-0,03	0,00	0,018 **	0,02	-0,02	0,014 **	0,00	-0,01	0,019 **	-0,04	-0,05	0,015	-0,02
Equal Weighted Portfolios																					
Cash	0,00	0,013 *	0,09	0,01	0,013 **	0,14	-0,01	0,017 **	0,10	-0,02	0,020 **	0,02	-0,02	0,019 **	0,03	-0,02	0,015 *	0,01	-0,05	0,017	-0,06
Stock Short	-0,01	0,013 **	-0,01	0,01	0,002	0,14	0,00	0,008	0,10	-0,01	0,005	0,11 *	-0,02	0,001	0,03	-0,03	-0,002	0,01	-0,05	-0,011	-0,06
Mix Short	0,03	0,016 **	-0,16	0,03	0,020 **	-0,22 *	0,01	0,018 *	0,17	0,00	0,016	-0,06	0,01	0,019	0,17	-0,02	0,011	0,10	-0,05	0,006	0,06
Total Short	-0,01	0,014 **	0,01	0,00	0,013 **	0,03	-0,02	0,013 **	-0,01	-0,01	0,012 **	0,03	-0,01	0,010 **	-0,04	0,00	0,009 *	-0,05	-0,01	0,007	-0,07
Stock Long	-0,01	0,019 **	0,04	0,02	0,011 *	0,16	0,02	0,012 *	0,13	-0,01	0,008	0,08	-0,02	0,004	0,05	0,01	0,014	0,14	0,00	0,020	0,19
Mix Long	0,03	0,022 **	-0,17	0,03	0,024 **	-0,21	0,06	0,021 **	0,28 *	0,05	0,018 *	-0,06	0,05	0,020 *	0,27	0,04	0,016	0,23	-0,02	0,009	0,18
Total Long	-0,01	0,018 **	0,04	0,01	0,016 **	0,05	-0,01	0,016 **	0,02	-0,02	0,015 **	0,03	-0,02	0,013 **	-0,01	-0,03	0,014 **	0,00	-0,05	0,018 *	0,03

**= Statistically significant at 99% confidence level

* = Statistically significant at 95% confidence level

One possible explanation for the different results compared to some earlier studies in depreciating market conditions could be the completely different sample in this study. In appendix 1 there are regression results shown with different *Threshold*-values when months with over 10% of negative market return are excluded as outlier values. When the most radically negative months are excluded it seems that especially cash and stock deal portfolios are having higher beta values with increasingly negative *Threshold*-values. When the most negative market return months are excluded from the sample findings are supporting the earlier findings by Mitchell & Pulvino (2001) that merger arbitrage results are having higher beta values in the negative than flat and positive market conditions.

In all given *Threshold*-value beta coefficients are close to zero and highly insignificant in the total sample, unless the most negative market returns are excluded from the regression analysis. Therefore, it can be said that based on these regression results there is no significant relationship between merger arbitrage cash deal portfolio returns and market return. Based on this European merger arbitrage cash deal sample between 2002 to 2014 merger arbitrage cash deal portfolio can be seen, as a neutral investment strategy in any given market conditions.

In the market downturns with negative risk-adjusted market return and the months with over 10% negative return excluded, the beta coefficients are increasing from the values close to zero, and even statistically significant for stock short, mix short, mix long portfolios with some specific *Threshold*-levels. However, for long position stock deal portfolios the beta values are increasing with the lower market returns, but statistically beta coefficients are not reliable. Therefore, the greater correlation to market returns in market downturns can't be confirmed for long position stock portfolios. Consequently, stock long portfolio returns seem to behave likewise cash deal portfolio returns with no remarkable correlation to market returns in any given condition. Branch & Yang (2006a) found that some merger arbitrage deal type portfolios were more highly correlated to the negative markets than other deal types. Contrary to Branch & Yang (2006a) findings, in this sample cash deals were really market neutral and mostly stock and mixed deal portfolios recorded higher beta values than cash deals portfolios.

8.2 SKASR portfolio results compared to market portfolio

In chapter 6 SKASR (Skewness and Kurtosis Adjusted Sharpe Ratio) was introduced. In this subchapter the merger arbitrage portfolios are benchmarked against Total Market Return index. In this analysis all the returns from 156 months are included. In case, that there aren't any deals running for the deal returns are negative by the amount of risk-free rate like in the prior regression analysis. The benchmark portfolio for SKASR results is European total market return index. The portfolio SKASR results benchmarked to total market return are shown in table 11:

Table 11. Portfolio SKASR results versus Total Market return index

	Value-Weighted		Equal-Weighted		
Portfolio	SKASR	Significance	SKASR	Significance	number of months with no investments
Panel A: Arbitrage Porfolios, Short Selling Acquirer Stock in Stock Swap and Mixed Deals					
Cash deals	0,60 **	0,00	8,35 **	0,00	6
Stock deals	0,12	0,88	0,12	0,88	13
Mixed deals	0,08	0,88	0,29	0,09	46
All deals included	0,61 **	0,00	1,14 **	0,00	0
Panel B: Arbitrage Portfolios, Long Position Only					
Cash deals	0,60 **	0,00	8,35 **	0,00	6
Stock deals	0,33 *	0,03	0,32 *	0,03	13
Mixed deals	0,11	0,92	0,28	0,10	46
All deals included	0,73 **	0,00	1,20 **	0,00	0
Panel C: Benchmark					
Total Market Return	0,10		0,10		

**= Statistically significant at 99% confidence level

* = Statistically significant at 95% confidence level

The portfolio has overperformed against a benchmark, if the SKASR value is higher than benchmark value and the results are significant with a chosen confidence level. SKASR results in table 10 reveal that all cash deal and total portfolios performed better than total market return index with a statistically significant level. The

difference with these portfolios is relatively high compared to benchmark portfolio SKASR values. The results are highly significant for all total portfolios and consequently it can be said that merger arbitrage portfolios ultimately produced a return than the benchmark. Additionally, long position stock deal portfolios resulted higher SKASR values than the benchmark index with 0,10 and the results are significant with 95% confidence level. However, none of the mixed deal portfolios and short position stock deal portfolios result statistically significant results versus benchmark portfolio.

It is remarkable to mention that for some of the portfolios the skewness and kurtosis values were relatively high affecting and hence affecting to the SKASR values. Equally weighted cash portfolio is a one good example of a portfolio that is highly skewed to the positive side. Excluding five of the most profitable months for equally weighted portfolio would drop the SKASR value from over 8 to around 1. Additionally, It is likely that especially mixed deal portfolios suffer from the higher number of months with no running deals than other portfolios. In the future studies with different sample with a lower number of months with no running deals, it could be possible to see statistically significant results for the deal types that didn’t result statistically significant SKASR results in this study.

The regression results with CAPM and Fama-French three factor model didn’t result statistically significant results for most of the tested portfolios. Additionally, the explanatory factor was relatively low with the regression models as the correlation between the market return and merger arbitrage portfolio returns were relatively weak. Therefore, for future studies SKASR could be a better benchmark to compare excess returns of the merger arbitrage portfolios than the traditional linear models that have been used in the numerous studies discovering the returns of merger arbitrage.

9 Conclusions

The study examined the profitability of the merger arbitrage in Europe between 2002 to 2014. The main findings are summarized in this section, after which conclusions and implications of them are drawn. Topics for the further research are made in connection to the previous academic literature in merger arbitrage. The limitations of this study are discussed in the subchapter 9.3.

9.1 Answer to the research question

The objective in this master's thesis was to answer the research question: *Are there existing large excess returns by using the merger arbitrage investment strategy in European markets in the time series since 2002 and does it make merger arbitrage to an exceptional investment strategy.* SKASR results for the merger arbitrage portfolios revealed that all the constructed total merger arbitrage portfolios outperformed benchmark market return portfolio. However, none of the mixed deal portfolios and short position stock deal portfolios didn't result statistically significant results versus benchmark portfolio.

The study revealed that in the big picture there is some deviation in returns between the deal types and cash deals generated higher returns than stock deals and in three out of four comparable portfolios cash deals generated a higher mean return than mixed deal portfolios. Using short selling strategy mixed deals also performed better than stock deal portfolios in this sample. Moreover, cash deals posted also, smaller standard deviation than stock and mixed deal portfolios. Findings that cash deals generated higher returns than stock swap deals are supporting earlier findings by Branch & Yang (2006a) and Wang & Wedge (2012).

Comparing portfolios including all deal types equal-weighted portfolios posted higher mean returns with lover volatilities than value-weighted portfolios. For cash deal portfolios there was only 0,12% difference between the two strategies. During the total sample period for stock and mixed deals using short selling strategy, equal-weighted portfolios performed better than value-weighted portfolios. Contrary to short-selling strategy, for stock and mixed deals with long only strategy, value-

weighted portfolios beat equal-weighted portfolios by average return. However, almost all equal weighted portfolios had a lower standard deviation than their comparable value-weighted portfolios. Therefore, all equal-weighted portfolios scored higher Sharpe ratio than their comparable value-weighted strategy. After all, it can be said that in total sample equal-weighted portfolios performed better than their value-weighted alternatives and there are differences with the risk-adjusted returns but not that clear pattern for mean return.

In this analysis, it was visible to see the decrease in the number of running deals from the pre-financial-crisis period between 2002 to 2008 compared 2008 to 2014. In return there was a huge decline in a period 2008 onwards in stock deals using short selling strategy and for mixed deals using long and short strategy. Surprisingly, long strategy stock deal portfolios performed better in later analyzing period 2008 onwards than in the prior period. For cash deals there was no remarkable pattern in portfolio return to be explained by two different time-series and the returns seem very market neutral. To answer the question three out of four total portfolios posted lower mean return in later than earlier time-period mainly driven by mixed and stock deals. Therefore, it can be said that the negative declining merger arbitrage trend continued in the latter series like Ji & Jetley (2009) and Hall et al. (2013) reported before.

Clearly, all but three mixed deal portfolios posted a lower monthly standard deviation than STOXX Europe 600 market index and all the constructed portfolios had a lower standard deviation than the total market index. Compared to Branch & Yang (2006a) results ranging from 2,9% standard deviation for stock deals to 4,2% for cash deals this analysis posted slightly higher 3,13% to 3,51% standard deviation for stock deal portfolios, but lower 2,13% to 2,66% standard deviation for cash deal portfolios. These results seem to be driven mainly by the nature of the sample and in overall it can be said that these results are in line with the low volatilities with the earlier studies in North America. Like Baker & Savasoglu (2002) argued total portfolios consisting cash and stock deals posted lower standard deviation than either deal type portfolio alone. Findings that equally weighted portfolios posted a lower standard deviation than value weighted portfolios in big picture and cash deal portfolios had lower standard deviation than stock deals are similar findings to Baker & Savasoglu (2002). As the volatility in overall was slightly less than in this sample for total

portfolios than in Baker & Savasoglu (2002) and Branch & Yang (2006a) the volatility in overall isn't any higher than in the earlier studies done in the North America.

Earlier, during market downturns Mitchell & Pulvino (2001) reported for a dramatic increase in the relationship between the market and merger arbitrage returns and in this analysis regression analysis was performed. In regression analysis, there was no clear correlation between the merger arbitrage return and market return in any conditions. The relationship to market return was found when maximum monthly losses were capped to maximum 10% and the analysis was done in negative market return months. Unless the maximum losses are capped there is no statistically significant relationship between the market return and merger arbitrage portfolio return. Consequently, the presumption that risk arbitrageurs could be facing more risk during the depreciating than the positive and flat market conditions can't be confirmed in this study.

9.2 Recommendations

In this study merger arbitrage proved to be a profitable investment strategy in all market conditions before any transaction costs or any other limitation. Based on these findings merger arbitrage in Europe is more attractive investment strategy in neutral and depreciating markets than in strong market conditions as Block (2006) earlier recommended in his study in U.S. markets. It is recommended to diversify the investments to high number of running deals with an equally weighted balance, as equally weighted portfolios scored lower volatilities and higher sharp ratios than value weighted portfolios. In this analysis long position strategies posted higher return than short position strategies, therefore it's not recommended to close the arbitrage position after an initial investment. Long position strategy means higher exposure to risk, but between 2002 to 2014 it was more profitable investment strategy than with short selling. Merger arbitrage is not recommended for too small investors as otherwise transaction costs and diversification can be too steep limitations to keep investments profitable.

9.3 Future research directions and observed limitations of the research

In this study transaction costs and capital constraints were excluded. Real life arbitrageurs are facing both limitations in their everyday investments. One of the good future research findings could be to estimate merger arbitrage returns in Europe with estimated reduction costs. Though, it could be more complicated to measure than in the U.S. studies as it's likely that transaction costs could vary between the countries. One other limitation is that there was no commission or any other transaction costs calculated between the currency exchange rates between the countries. Returns between the currencies were calculated with a market rate, though it is unlikely that merger arbitrageurs have access to exact same rates.

Multiple countries were included in this research and differences in return between the countries were not analyzed. It could be interesting to analyze the differences in merger arbitrage returns between the countries or either in geographical areas for example returns in Northern Europe vs. Southern Europe. Additionally, it could be possible to study if merger arbitrage deals in some specific countries or geographical areas are more correlated to market returns than others.

In this study the was no focus to deal attitude or any that kind of factors possibly affecting to deal outcome and return. In future research, it could be interesting to analyze if there is any difference in return between friendly and hostile deal type portfolios in Europe. As upwards revisions to bids are affecting to deal returns in a positive way for merger arbitrageur, it could be the next step to build a model to forecast if the deal is likely to be sweetened from original terms or not.

There have not been any merger arbitrage return studies to the authors, knowledge to include this wide variety of European countries in a single study. The stage is now open to future studies if they can replicate same findings or not. The negative declining merger arbitrage trend continued in the latter time-series as like Ji & Jetley (2009) and Hall et al. (2013) reported before. The future is still unknown and there is a research gap to examine if the trend will continue to decline.

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Appendices

Appendix 1. Portfolio SKASR analysis, where value-weighted portfolios are compared to equal-weighted portfolios.

	Value-Weighted	vs.	Equal-Weighted		
Portfolio	SKASR		SKASR	Significance	number of months with no deals running
Arbitrage Porfolios, Short Selling Acquirer Stock in Stock Swap and Mixed Deals					
Cash deals	0,60		8,35	0,00 **	6
Stock deals	0,12		0,12	0,98	13
Mixed deals	0,08		0,29	0,00 **	46
All deals included	0,61		1,14	0,00 **	0
Arbitrage Portfolios, Long Position Only					
Stock deals	0,33		0,32	0,79	13
Mixed deals	0,11		0,28	0,00 **	46
All deals included	0,73		1,20	0,00 **	0

**= Statistically significant at 99% confidence level

* = Statistically significant at 95% confidence level

Appendix 2. Portfolio SKASR analysis, where short strategy portfolios are compared to long strategy portfolios.

	Short Strategy	vs.	Long Strategy		
Portfolio	SKASR		SKASR	Significance	number of months with no deals running
Value Weighted Portfolios					
Stock deals	0,12		0,33	0,00 **	13
Mixed deals	0,08		0,11	0,22	46
Equal weighted Portfolios					
Stock deals	0,12		0,32	0,00 **	13
Mixed deals	0,29		0,28	0,12	46

**= Statistically significant at 99% confidence level

* = Statistically significant at 95% confidence level

Appendix 3. Sensitivity analysis showing the relationship between the merger arbitrage return and market return in different market conditions when losses over 10% are excluded

Threshold $R_m - R_f$	<0%			<-1%			<-2%			<-3%			<-4%		
	R^2	α	β	R^2	α	β	R^2	α	β	R^2	α	β	R^2	α	β
Number of months		55			42			37			24			12	
Value Weighted Portfolios															
Cash	-0,02	0,022	0,07	-0,02	0,025	0,13	-0,02	0,026	0,15	-0,05	0,018	0,03	-0,03	0,038	0,29
Stock Short	0,10	0,019**	0,58	0,11	0,029*	0,78	0,10	0,030	0,81	0,10	0,044	1,04	0,07	0,069	1,36
Mix Short	0,09	0,031*	0,79*	0,12	0,043*	1,07*	0,15	0,057	1,32*	0,16	0,063	1,43	0,13	0,095	1,88
Total Short	0,09	0,019*	0,24*	0,09	0,022*	0,30*	0,08	0,022**	0,31**	0,13	0,031	0,45*	0,14	0,045	0,65
Stock Long	-0,01	0,015**	0,16*	-0,02	0,012**	0,12*	-0,03	0,004**	-0,03	0,00	0,033**	0,44*	0,14	0,045	0,65
Mix Long	0,10	0,032	0,84	0,13	0,044	1,12	0,16	0,055	1,33	0,18	0,066	1,50	-0,04	0,044	0,58
Total Long	0,05	0,023**	0,25*	0,05	0,026**	0,33**	0,00	0,020*	0,20**	0,10	0,035**	0,46*	0,11	0,088	1,81
Equal Weighted Portfolios															
Cash	-0,02	0,017	-0,04	-0,02	0,023	0,10	-0,02	0,024	0,11	-0,04	0,018	0,03	0,05	0,044	0,58
Stock Short	0,13	0,021**	0,67	0,12	0,029**	0,82	0,10	0,028*	0,82	0,11	0,043	1,07	0,06	0,062	1,31
Mix Short	0,04	0,026**	0,46**	0,05	0,028*	0,51*	0,08	0,038*	0,69*	0,12	0,035*	0,64	0,13	0,051	0,88
Total Short	0,03	0,017**	0,13	0,02	0,018*	0,15	0,00	0,016**	0,12	0,00	0,018*	0,16	-0,04	0,023	0,23
Stock Long	0,01	0,014**	0,24	-0,02	0,009**	0,13	-0,03	0,002**	0,01	-0,01	0,022*	0,34	-0,03	0,039	0,57
Mix Long	0,07	0,028	0,56	0,07	0,029	0,59	0,09	0,037	0,73	0,15	0,040	0,78	0,10	0,048	0,90
Total Long	-0,01	0,018**	0,07*	-0,02	0,016**	0,03*	-0,03	0,013*	-0,01*	-0,04	0,016*	0,04*	-0,04	0,030	0,22

**= Statistically significant at 99% confidence level

* = Statistically significant at 95% confidence level