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Diplomarbeit

An Empirical Analysis of Mergers and Acquisitions – Based Trading Strategies

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Abbreviations

AAR	acquirer abnormal return
AR	acquirer return (absolute)
CAAR	cumulative acquirer abnormal return
CTAR	cumulative target abnormal return
DA	discriminant analysis
EPS	earnings per share
p. a.	per annum
P/E	price per earnings per share
SDC	Securities and Data Corporation
SEC	Securities and Exchange Commission
TAR	target abnormal return
TR	target return (absolute)

Abstract

I investigate the return generated by trading stocks of companies that were subject of an announced acquisition between the years 1997 and 2000.

My focus is on three elements: First, I examine whether the probability that the announced mergers are completed successfully depends on any of a set of about 30 variables. The analysis is based on a sample of 799 mergers and tender offer cases from the years 1990 to 2000.
Factors that are identified as significant are: Toehold, Enterprise value per Sales, logarithm of Sales, and whether the deal is Accretive to earnings per share or not.
For non-friendly deals the takeover premium is identified as an additional factor. In deals where the transaction is paid in cash only, a smaller deal value, lower assets, and lower target equities also increased the odds for the deal to be completed.

In the second analysis I identify factors which have influence on the trading return generated for an investor who buys stocks of companies that are announced to be taken over.
Trading profit can be increased when investments are focused on target companies where the transaction value of the deal is relatively high.

The factors identified to be relevant for deal success do not coincide with those identified for trading profit. This indicates that the increased likelihood for success of certain kinds of deals must already be priced by the market (e.g. lower speculation spread).

The third analysis simulates trading returns that can be generated by investing into stocks which are involved in an acquisition. The simulation tests the identified factors for relevance to profit generation and reiterates that high-value deals yield a higher return than low-value deals.

Finally, I illustrate that buying target companies yields an annual profit of about 15%. Acquiring companies, which intend to pay their acquisition via stock exchange, suffer from considerable price pressure and should be sold short. When they pay their acquisition in cash-only, no price pressure could be observed.

1. Introduction

1.1. Prologue

For a long time already mergers and acquisitions have been considered to be an important issue in the economy, and during the last few years their significance has been greater than ever before. Although the motivation of many mergers can be questioned, and the result of the procedure is often mixed, (Cording, Christmann and L.J. Bourgeois, 2002), there was no way to stop the merger mania at the turn of the millennium.

There are two distinctive ways how an acquisition of a company can take place: In a merger two companies come together as one. The buyer assumes all assets and liabilities of the target company. In an acquisition of stocks, or a so called tender offer, the acquirer seeks control by buying stocks directly from the shareholders and side-steps the current management. (Sridharan and Reinganum, 1995)
Payment for the acquisitions can be done via stock swap, issue of debt, direct cash payment or any combination of it. Once the bidder owns a majority of the target company's stocks, he can oust the current management team and claim control of the prey. To encourage the present stockholders of the target company to sell their stock, the acquirer often offers a premium. Depending on the subjective price of the target firm, the premium can range from less than zero to more than one hundred percent.
While the manners in which acquisitions are done may be diverse, some essentials always stay the same: after a successful total acquisition, the target company will become part of the acquirer and the stocks of the former company will no longer be traded on the market. The company's stocks are *delisted* and the investors who still hold the stock will be compensated with the promised premium (e.g. they receive cash or an adequate amount of the acquirer's stocks).
The entire procedure of an acquisition can last from several weeks up to several years. Sometimes the target company undertakes everything possible to avert a takeover through poison pills, asset and liability restructurings, and litigation, which procrastinates the transaction almost indefinitely. In about 20% of all cases the bid is withdrawn and the acquisition is cancelled entirely.

Needless to say, the stock prices of both companies are greatly influenced by the transaction.
Economic theory predicts the following scenario: when the transaction is expected to be completed with absolute certainty within an known period of time and the terms and conditions of the offer remain constant, the post-announcement stock price reaction of the target company should resemble the one of a risk-free bond (Officier, 2002). This is because we would know the exact time and amount of the 'repayment', like it is the case for bonds.
As ever so often, reality looks slightly more complicated: First of all we'll never know for sure, whether the deal will be completed successfully in advance. Thus this 'risk-free bond' is actually associated with plenty of risk which should trigger investors to request a higher yield for the

investment. In other words, the share price of the target company at the time of the announcement should be lower than its would-be-price if it were a risk-free bond. Jindra and Walkling, 2001 call this phenomenon part of the *speculation spread*. The spread itself they define as the difference between actual bid price and the present market price.
Another element which makes reality deviate from our simple theoretical model is the fact that an offer price can be revised. Sometimes investors are caught by surprise when suddenly the bid premium increases because an additional bidder offers a higher price for the target company. On the other hand, the acquirer may also adjust his bid price downwards. We can easily see that the stockholders of the target company are filled with great uncertainty about what will finally happen to their shares.
A more open-ended yet equally tentative situation face the shareholders of the acquiring company. While their stocks will not be delisted from the market, the market often reacts either positive or negative to a posted offer. Depending on the expectations of the success of the deal, future expectations of synergies, and other factors created by the transaction, the share price reaction will exhibit peculiar patterns.

1.2. Objective of this paper

First I analyze what financial and non-financial factors, which are known at the date of the original announcement of a deal, can statistically predict its outcome. To know the final outcome in advance is of great interest for stockholders because, not surprisingly, it has significant influence on the share price development, especially for the target company (see Figure 12 and Figure 26).
In the second part I try to find out which variables have influence on the generated return, assuming when we invest in all companies which are announced to be taken over. Some of the deals will be withdrawn and other will be completed. Intuitively we may think that factors which help us increase our odds to pick deals that will be successful (subject of the first analysis) should also help us to increase our profit (second analysis). I'll discuss this hypothesis at the end of chapter 5.2.1.

My examination is being conducted from the point of view of a trader who wishes to exploit financial and non-financial data about the companies and the deal itself, in order to achieve abnormal returns in trading the stocks subject to a tender offer or merger.
The focus lies on the knowledge which is publicly available at the original date of announcement of the deal – assuming a trader would be willing to buy or short-sell the stocks involved in a transaction only after an official announcement has been made.

The ultimate objective is to find out whether there are any publicly known financial ratios or deal properties that can help us improve our trading profit.

1.3. Structure and approach

The empirical part of the paper can be divided in three sections. Chapter 3 starts with the description of the sample and some preliminary findings which are described with the aid of figures and charts which are mostly listed in Appendix I. Most of those analyses are conducted with Excel-Pivot tables. The histograms were created with either SPSS or EVIEWS.

Analysis 1

The second part comprises statistical analyses of 30 variables (listed in chapter 4.1). I try to find out whether any of them can be used to predict the final outcome of the deal. As successful deals yield a much higher profit to target-stock investors, it would be of great advantage if we could increase the odds to pick the right deals, namely the ones which will not be withdrawn. The analysis is conducted with a logit regression (EVIEWS) as described in Chapter 4.2 and the tables are listed in Appendix II.

Analysis 2

In a next step I test the variables on relevance to profit with a linear least square regression (SPSS). I try to find out which of the 30 variables could help us to improve the return on investment, when making the investment conditional upon certain factors. The dependent variable is the compounded return when investing from day 1 after announcement and holding it until the deal is completed. For withdrawn deals I assume that we hold the stock until day 90.[1] Tables are listed in Appendix III.

Analysis 3

In chapter 5 I simulate with the aid of my Matlab program (listed in Appendix V) what profit can be generated when we invest in companies which are either acquiring another firm (in that case the shares are sold short) or are subject of an acquisition themselves (long positions are taken). Some simulations are conditional upon certain factors which were identified to be relevant on either deal outcome of trading profit. The charts with the results are listed in Appendix IV.

It is important to notice that to calculate the returns I use two different approaches: In the descriptive analysis (chapter 3.3) I average the compounded returns of all deals. Every deal has the same weight, regardless how many deals are active in the specific period (see Figure 31). If the deal is big or small does not change the given weight either – all deals are equally weighted, assuming we invest the same amount of money in each deal.

In the second method, where I simulate an investment with the Matlab program, the return generated each day is averaged over all deals which are active on the specific day. Therefore on periods where only few deals were active they are inherently given a heavier weight in the calculation of the index. In periods where many deals were active the individual deal will be

[1] More details will follow on this assumption.

less weighted because it is averaged with all other active deals on that day. I also assume that an equal amount of money is invested in each deal, independent from its market size or share price.

The stock prices are being divided in two pre-announcement periods (days -7 to -1 and -1 to 0 relative to the day of announcement) and six post announcement periods (days 0 to 1, 1 to 7, 7 to 30, 30 to 60, 60 to 90 and 90 to 180). We also have information about the final takeover price (which may for instance be paid between days 60 and 90 after announcement). Between those given prices the Matlab program interpolates linearly.

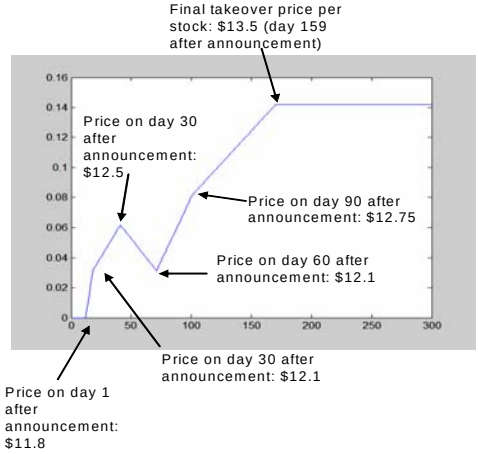

Figure 1 – available stock data

1.4. Dissociation from other research

Although this is not the first paper which examines implications of a takeover announcement on target and acquiring companies, this is, to my knowledge, the first piece of research which tries to explain the price movements with a great variety of data about the company and specifications of the deal. It is also the first paper which tests whether the market includes the likelihood of deal success in the stock price of the target company.

I utilize a sample with more financial ratios and company information than most previous studies trying to predict outcomes of tender offers and mergers. In addition most authors have uniquely focuses on cash tender offers (Jindra and Walkling, 2001, Samuelson and Rosenthal, 1986), mainly because at the time those papers were written, cash offers have been the predominant form for takeovers. As I will describe in more detail in chapter 3, stock swap offers have significantly gained popularity and are therefore included in this analysis.
This paper also analyzes a relatively new sample in contrast to many researches that look at data which dates back more than 20 years.

We can divide the literature which is relevant to the issue discussed in this paper into two subcategories:

1.4.1. Deal success rate

The first genre tries to find out which deals can be expected to be successful and which ones will be cancelled. For our purposes it is sensible to consider a merger as success, when the transaction itself is completed and the target stock is delisted from the market. Whether the deal

will actually meet its expectations and create synergies or cut costs etc. is an entirely different issue and is not relevant for this research.
Baker and Savasoglu, 2002 identify that whether a deal is *friendly* (target managerial attitude) or not as the best single predictor of merger success. My analysis can confirm that this factor is indeed of great significance. Walkling, 1985 finds increased ownership before the acquisition starts (subject in the analysis of this paper under the variable *toehold*) and higher *bid-premiums* as relevant factors for success. While I totally agree with the toehold factor my analysis shows that the bid premium is only important for non-friendly deals. For friendly takeovers the factor is of no significance in my data. Further he confirms that variables that impede the tendering of shares, like e.g. opposition by the *target management*, decrease the probability of success.

Baker and Savasoglu, 2002 also find *that log of target equity* has statistically significant influence on deal success with a positive coefficient. My analysis opposes this thesis (see Table 17) and finds the variable in question to be insignificant for the full sample, and for friendly deals even highly insignificant. However, I can confirm that the variable is significant for cash-only deals, but with a *negative* coefficient.

Cornelli and Li, 2002 find that *trading volume* and success rate are positively correlated. Trading volume was not tested in my analysis because no such data was available.

Koch and Sjöström, 2003 say that the most important factors for predicting tender offers in Sweden is board reaction, type of payment and size of the largest owner. In my analysis cash offers only increase the likelihood for success in non-friendly bids (Table 21). The variable is not significant for all other sub-samples tested. Koch only tested 8 different variables and did not differentiate between various sub-samples as I did.

The Tables on the pages 58 to 64 clearly enhance the research done on this subject and reveal some additional factors to be statistically significant, depending on the sub-sample criteria being applied (e.g. cash offers only, friendly offers only, etc.).

1.4.2. Stock price movements of target companies

The second genre of literature of interest for this work describes stock price movements of companies directly or indirectly involved in a merger or tender offer.

For instance Baker and Savasoglu, 2002 find abnormal returns of 0.6% – 0.9% per month over the period from 1981 through 1996 in calculating an equal-weighted and value weighted return for taking 1901 risk arbitrage position over the period. As a benchmark to calculate portfolio returns they use the CAPM model. Unlike this paper they do not simulate trading itself but approach it with a model. They say: "an event return r has three components: the probability of success π, the return conditional on success r_s, and the return conditional on withdrawal r_w."
Total return is thus $r= \pi r_s+(1-\pi) r_w$.
Unlike in their study, target log market equity is only significant for cash offers in my study. Cash offers constitute only a small fraction of all transactions.

Jindra and Walkling, 2001 test profitability of risk arbitrage and measure the initial spreads of: 362 cash tender offers for the period of 1981 to 1985 (cash offers only). They find that when buying the target and shorting the acquirer for one week following the announcement, a profit of 156% p.a. can be generated. I strongly disagree with this rather wishful thinking (see chapter 3.3.1 and Table 4 for details).
They show with multivariate regressions that the spread is positively related to bid size, target size and pre-offer run up. The spread is also positively related to the duration of the offer. The principal difference between their work and mine is that their main focus lies on the differentiation of initial spreads (less than 2% per case on average) and revision returns[2] (about 8% per case on average). Trading return is calculated based on a model which separates profit in those two categories. In my work I do not tell apart those two types of returns. As I am uniquely interested in the profit which can be made on average, I simply look at the total result. But when putting everything together they find an average return of about 10% per investment while my calculations show about 7.7%.

Karolyi and Shannon, 1998 examined the profitability of a merger arbitrage strategy in Canada and compared the result to the TSE 300 stock exchange. They find an excess return of 33.9 and claim that the return has nothing to do with the likelihood of success, target size, beta, p/s, p/b, payment method, pre-announcement run-up or industry sector. They also say: "Not only do risk arbitrage investors earn higher returns than for a conservative buy-and-hold strategy, but also the magnitude of their excess returns are insensitive to a number of deal-specific attributes, such as the number of days to close, payment method, size of the deal price to book ratio, industry sector and the pre-announcement share price run-up."
My research tests more variables for influence on deal success (see chapter 4.1 for a full list of independent variables) and enhances those findings with other variables which are significant or insignificant. Whether those variables indeed have no influence on trading return is discussed in chapter 4.4.
In my paper I examine buying target stocks and shorting acquirer independently and do not take risk arbitrage positions in its classical sense. Instead I simulate trading the target and acquiring stocks separately.

Huang and Walkling, 1987 found that *cash offers* involve substantially higher abnormal returns than stock offers. He also claims influence of whether the deal is resisted or not by the target management but finds no influence on the return by differentiating between tender offers and mergers.
My logit regressions deny the fact that when payment is done in cash the likelihood for success increases (except for non-friendly deals the method of payment appears to have great influence, see Table 15 and Table 21). I can also show that his claim of cash offers yielding higher return to target-stock investors must be incorrect (Figure 27). Linear regressions on trading profit also

[2] Under 'revision return' we understand a favorable increase in the offer price which should have a positive effect on the target stock's price.

contradict his findings (Table 27 shows the factor 'cash' with a negative coefficient but as statistically non-significant).

Samuelson and Rosenthal, 1986 examine pre-announcement movements of prices in target stocks as predictors for deal success. Using a sample of cash offers only, they find that "the higher the relative stock price, the greater the chance of tender success". Although I briefly describe pre announcement price movements in Figure 13 and Figure 17 I do not further analyze this subject. On a descriptive basis my illustrations just mentioned appear to support his thesis.

1.4.3. Stock price movements of acquiring companies

In examining the stock price movements Mitchell, Pulvino and Stafford, 2004 focus exclusively on acquiring companies and find considerable support for existence of price pressure around mergers mainly caused by merger arbitrage short selling, a common strategy used in event driven hedge funds.
My work confirms the price pressure and enhances their findings in analyzing the price development for a much longer period than they do (until 180 days after deal announcement) where the price pressure continues and even increases (see Figure 17). In addition I simulate a strategy where I short-sell companies which intend to take over another firm (Figure 30).

Fuller, 2003 finds that bidders making cash offers have larger abnormal returns than those making stock offers. He also examines the effect of collar offers and finds they are associated with significantly positive return for target companies but negatively for the bidder. He focuses on 5 days before and after the announcement and differentiates between various forms of payment (fixed stock, cash, floating stock, fixed collar and floating collar). Figure 30 confirms that cash offers do not experience the downward pressure. I enhance Fueller's findings in showing that the downward pressure continues after day 5. I examine the price movements until 180 days after the announcement.

1.4.4. Further research

Walkling and Edmister, 1985 analyze determinants of tender offer premiums and attribute higher premiums to increased competition among bidders and also find a positive correlation between target resistance and the premium. Their findings explain why a higher premium can in many cases lower the odds for a successful deal (e.g. competing bids).
Table 8 confirms that the target managerial attitude indeed has influence on the takeover premium, but only for non-friendly offers. I also make some additional findings which are described in chapter 3.4.

Another paper analyzing stock price movements focuses on share repurchases in Sweden: Lakonishok and Vermaelen, 1990 claim that in buying shares which are in the process of a repurchase tender offer produces abnormal returns of 9% in less than one week. While the methods applied to evaluate the return in this paper and in my work may be similar, I exclusively focus cases where one firm acquirers 100% of another firm.

In Cornelli and Li, 2002 risk arbitrageurs make profit because they have an informational advantage because they know the size of their own position. If they have a great stake in a company they may be able to influence the outcome of the deal which brings them in a position where they can better evaluate the risks of the transaction and thus improve their risk-return profile. They also analyze the influence of trading volume on the rate of success of the merger and find a positive correlation.

Dodd and Ruback, 1977 provide empirical estimates of stock market reaction to tender offers and differentiate between successful and unsuccessful. They investigate the consequences for stockholders of target and acquiring firms. Unlike this paper they do not investigate whether different types of deals, or any additional information known at the date of announcement, may have repercussions on the share prices, and their description of stock reaction goes back to 60 months before announcement. To calculate excess return they make use of the CAPM model. The research lies back many years, which may explain why his findings about abnormal return differ significantly from mine: he suggests that stockholders of target companies gain abnormal return of 2.8% in the month after the announcement (compare with Table 6).
His main focus lies more on the price jump at the day of announcement itself.

Hsieh and Walkling, 2003 examined the role which arbitrageurs play in mergers and acquisitions and to which degree takeover premium and bid success are related to arbitrage holdings. Arbitrage holdings are positively related with revision returns (the return generated when a takeover premium is increased during the offer period). The research is not directly related to what I examine.

2. Theory of Merger Arbitrage

2.1. Strategies

The merger arbitrage strategy is commonly used by hedge funds and belongs to the category of so called event-driven strategies. The idea is to exploit the unusual reaction of stocks because of the occurrence of a certain event – in our case a merger or acquisition.

The simplest scenario can be observed in cash mergers: the arbitrageur buys stocks of the target firm and holds them until the deal is completed. He will then receive a pre-defined amount of cash (or stocks of the acquirer) because his stocks will be is delisted from the market. In case the bid is withdrawn and the transaction cancelled, the investor will neutralize his position at the earliest possibility.
In mergers where payment is not done via cash but rather with stock swap, the scenario is more complicated as investments may not only involve the target firm but also in the acquirer: We differentiate between fixed-exchange ratio and floating exchange ratio offers. In the former the acquirer agrees to deliver a fixed number of his own shares for each target share. The appropriate position to hedge out market risk would be to short sell the amount of shares offered for each target share.
In floating exchange ratio mergers the value of the target company is specified and the exchange ratio is calculated accordingly. The exact pricing is often specified after the 'pricing period' during which, from the point of view of the arbitrageur, the deal is treated like a cash offer. After the pricing period floating-exchange ratio deals are identical to fixed-ratio deals and the trader may short the bidder's shares to hedge market risk. (Mitchell, Pulvino and Stafford, 2004, Yang and Branch, 2001)
Another kind of merger, in which payment methods can be categorized, are collar offers: Fuller, 2003 describes them as mergers where all-stocks are used as method of payment and a range is specified within which the bidder's price can fluctuate. For instance a fixed collar offer fixes the exchange ratio and includes a price range within which the price must remain in order to complete the merger. If the threshold is crossed bidder and/or target company can cancel the deal. In contrast to the floating offer a fixed offer would specify a fixed dollar amount for each target share. As the method of payment is stock the exchange ratio floats until just before the deal is completed.

2.2. Risks

Unlike for conventional equity the market dependence of a merger arbitrage strategy is relatively low because the profit generated is mainly based on discrepancies of expectations whether the announced event (the merger) will be completed successfully. Yet, in times of financial crisis conventional hedging mechanisms may fail or may not be strong enough to deliver effective protection. (Ineichen, 2003)

But the main risk lies in the uncertainty whether the deal will be completed or not. Over the years the reasons why mergers fail have been changing: in the 1980s the main reason for failures were financing problems. As cash was the preponderant form of payment, deals were often vulnerable to liquidity problems and had to be cancelled because the acquiring company was unable to meet the financial requirements. (Douglas, Barnett and Lewis, 1996)

Today the situation has changed bit: the fact that stock swaps (payment is done with stocks and not with cash) have gained popularity (more details will follow in chapter 3) has made the strategy more dependent from general market movements. Stock financed acquisition terms now often include so called 'collars', which means the company being acquired has the right to call off the merger if the acquiring firm's stock price falls below a certain limit. General financial health of the acquiring company is certainly still an important factor in whether a deal can be completed or not, but it is now less dependant on the available cash reserves itself but rather on market movements which influence its stock price.

The main reasons why deals are withdrawn are as follows: (also see Pickering, 1983)

- The stock market is not reacting within the expected parameters and the acquirer cannot afford the target company anymore. For collar offers the required terms may not be met anymore.
- In case payment is promised in cash the acquirer may face unforeseen problems and will be forced to retract the deal because of payment problems.
- Antitrust problems may cause the SEC (securities and exchange commission) to block the deal. This mainly affects large companies where a consolidation of the market significantly reduces competition in the sector and may thus have an adverse effect on regulatory policy. (Coleman, Meyer and Scheffman, 1997 discuss the issue in detail)
- The offer is retracted for other reason. Managers are often accused of engaging in mergers and acquisition for sheer personal reasons and the deals are put down as being testosterone driven combats.

As we can see the term ‚arbitrage' can be misleading in the context. By no means should it suggest that there's no risk involved in the transaction. With risk arbitrage we mean that in case of stock swap offers we hedge our compensation or premium against market reactions which might diminish (or increase) our payment in selling short the acquirer's stocks.

2.3. Profit calculation

As discussed in Dorfleitner, 1999 there are two ways to calculate the return between t and t+1. For the purposes to calculate cumulative abnormal return the compounded return presents the distinctive advantage that different time periods of return can be added up in order to calculate the return of a cumulative period. Unless stated otherwise I use for all calculations in this paper compounded returns:

$$R := LN\left(\frac{S_t}{S_{t+x}}\right) = LN(S_t) - LN(S_{t+x})$$

S is the stock price at day t.

In previous research the *'excess return'* has often been calculated with the help of the CAPM model. The data available for this sample does not provide any details about the stock's βs which makes me assume that on average we have β of 1. Under those assumptions the return of each stock is compared with the index movement of the relevant period. The difference in return depicts the excess return.

$$R_{excess} := LN\left(\frac{S_t}{S_{t+x}}\right) - LN\left(\frac{I_t}{I_{t+x}}\right)$$

where S embodies the stock price and I a market Index such as the S&P 500 or the NASDAQ.

In theory the return of a merger arbitrage depends on three factors (Yang and Branch, 2001)

- the speculation spread
- offer price revisions
- the return for the risk arbitrageur if the deal is cancelled
- the probability of the merger will be successful

Acquisitions which are completed successfully (with the consequence that the target company is delisted) unequivocally lead to higher returns for target stockholders (see for example Figure 14 or Figure 25). Also Karolyi and Shannon, 1998 find that "The key success factor for the arbitrageur is the ability to determine whether or not the merger or tender offer will be successful". That's why it makes sense to first determine whether any publicly known specifications about the target company and deal at the time of the announcement (as time of announcement I always use the date of the first announcement in case of rival bids) can be used to make a statistically significant prediction about the outcome.

The return generated by the target company after the announcement of a deal can be split into two factors (assuming the deal will be completed):

1. The first one is the so called *speculation spread* (Jindra and Walkling, 2001) which is being defined as the price difference between the price per share offered by the acquirer for the target company and the stock price of the target after the announcement of the deal. While many papers only use the share price of the target right after the announcement to calculate the speculation spread, Officier, 2002 recognized the necessity to use more than just one speculation spread measurement, because sometimes the exact terms and conditions of a merger are declared later than the announcement itself. For the analyses conducted in this

paper those peculiarities are of no major relevance since I exclusively focus on the total return generated for stockholders after the announcement of a deal.

2. The second element which influences return for stockholders of the target company are the so called *offer price revisions*. Rival bids or other reasons may ultimately alter the final takeover price and thus influence the stockholder's profit who already owns the share at the time the offer price is revised. In the sample from Securities and Data Corporation (SDC) the only data available is the final takeover price and target stock prices of five different times after the announcement. Those preconditions do not allow for differentiation between revisions returns and speculation spreads, which is why I focus entirely on the generated return, regardless which of the two factors mentioned is predominantly causing it.

For cash deals, in theory, an arbitrageur only invests money in the target company: When successful, theoretical profit is as follows:

$$R_{it} = LN\left(\frac{P_{it} + D_{it}}{P_{it-1}} + 1\right) - LN(r_{ft} + 1)$$

where D embodies a possible dividend and r_{ft} is the risk free rate of return.

For Stock swap or collar offers arbitrageurs take a long position in the target stocks and hedge their position by shorting δ shares of the acquiring company (Hsieh and Walkling, 2003). δ embodies the exchange rate of the offer. In other words, stock swap offers include additional proceeds from the short position.

$$R_{it} = LN\left(\frac{P_{it}^{T} + D_{it-1}^{T}}{P_{it-1}^{T}} + 1\right) - \delta\frac{P_{it-1}^{A}}{P_{it-1}^{T}} LN\left(\frac{P_{it}^{A} + D_{it}^{A}}{P_{it-1}} + 1\right) - LN(r_{ft} + 1)$$

In my analysis I do not take any arbitrage positions because, unfortunately, I do not have enough information to accurately determine the amount of short positions which would have to be taken to hedge against market movements. Many stock swaps also include partial cash payments which would distort such calculations. In addition the short position would have to be adjusted constantly, depending on the stock movements of the acquiring company.

For this reason I analyze the movements and calculate profits of target and acquiring stocks separately.

3. Data discussion and descriptive analysis

3.1. Sample selection

I'm starting with a sample of 1085 merger cases from January 1990 until December 2000, provided by Securities Data Corporation's (SDC) Mergers and Acquisitions Database. Each merger case contains about 30 variables of financial data and ratios about the target company, and various specifications about the deal itself. 414 cases (the cases from 1997 until 2000) also contain information about closing prices of nine different days of target and acquiring companies.

In order to include the transaction in the calculations it had to meet the following criteria:
A public US company had to make an announcement of the intention to acquire 100% of the shares of another public US company. The value of the transaction had to be either higher than $1.5b (big-deals sample) or between $50m and $75m (small-deals sample).

Some of the transactions had to be ignored because they exhibited the following problems:

- Missing data about takeover price per share
- Bid still pending
- Multiple bids: As my main focus is the share price reaction of the target company, I treat cases where there were multiple bidders as follows: If there were two or more bidders and the target company was acquired by neither of them, only the offer with the highest premium (always the latest one) was considered, but with the date of announcement of the first proposed deal. If one of the subsequent offers was successful, I only considered the successful one (which was always the latest one and also the one with the highest premium) but with the date of announcement of the first offer. In several of these cases the final acquirer was a white knight.
  I have decided to use this method because it is the best way to replicate what profit can be generated by trading the target stocks.

The omission of those cases just mentioned happened on a random basis and hence does not bias my analysis.

3.2. Successful, unsuccessful, stock swap and cash takeovers

In Figure 4 we can observe the almost 80% of the announced deals were completed successfully over the period of 1990 to 2000 and in Figure 5 for the periods 1997 to 2000 (sub sample used for profit calculation and trading simulation).
The overall majority of the deals were friendly offers and payment was conducted via stock swap. When a deal was classified as not friendly only 2% were successful when paying with stocks, while 10% concluded the deal successfully when payment was done in cash. 3% of the deals were 'not friendly' and withdrawn when payment was suggested via stock swap and the same amount was withdrawn when ceteris paribus payment should have been done with cash.

When the offers were friendly most of the bidders chose to pay with stocks. It seems most bidders prefer to pay in stocks and can to do so when the target managerial attitude is positive, but when the target is less interested in being bought, more acquirers chose to finance the deal with pure cash. This certainly makes sense because stock payment always entails greater risk than pure cash payment for the target company's investors, especially for institutional investors, who may own a big stake in the company, and thus cannot easily sell all of their stocks as fast as they would possibly want to, without taking additional risks. On the other hand cash payments have in many countries disadvantages from the point of view of taxes, which is probably one of the main causes why it has gained popularity, as it is depicted in Figure 7.
While in 1990 about 60% of all completed offers were financed via stock swap, the amount has increased to almost 90% by the year 1997 and remains constant for next three years available in the sample.
Also notice that in the years 1990 to 1996 more than 15% of all deals were completed, not friendly, and paid in cash, but from the years 1997 to 2000 we can only find two cases that match these criteria.

According to the sample, merger activity has increased (Figure 6) over the years, peaking at 120 cases in 1998 and 1999.

3.3. Descriptive analysis of trading profit

3.3.1. Investing in target companies

In this section I make use of the available stock data for each acquiring and target company. As mentioned earlier, closing prices of 9 different days relative to the date of announcement are provided by SDC for acquirer companies and 7 different closing prices are available for target companies, where additionally two pre-announcement prices can be calculated using the premium stated relative to those days, and the final acquisition price.

Let us start with Table 3 (p. 41) which depicts absolute trading profits for a target stock investor. The table differentiates between completed, withdrawn, cash payment, stock payment and various degrees of target managerial attitude.
The absolute return is calculated as follows: I assume that the trader takes a long position in the stock one day after there has been an announcement that the company in question will be acquired for a certain price. In case the acquirer indeed held his promise and managed to acquire the company, SDC provides details about the exact date when the target company's stock was delisted and the stockholders were paid the promised acquisition price. Calculation of trading profit for that case does not constitute any difficulties and can also be annualized without the necessity to take any additional assumptions.
In case the deal was not successful SDC does not provide any details about when the public learned of the failure. That's why I have to make an assumption: Throughout this paper I assume that we sell stocks from failed deals either on day 90 or 180 after the original date of announcement (usually both results are calculated and put into comparison). However, in most cases both assumptions yield similar results.

For successful deals I measured an average profit of 11.3%. As the average deal duration was about 165 we can calculate an annualized profit of about **25% p.a.**. Cash deals were on average completed within 112 deals while stock swap deals took 172 until they were completed. Not surprisingly hostile deals yielded the highest annual return (if they were indeed completed) with 32.7% per case. The reason for this must lie in the increased risk for failure.
The annualized return of 25.3% for stock swaps deals was slightly higher than for cash deals where we only made 22.8% per year.

When looking at withdrawn deals (about 20% of all deals are not successful) we have an average return **between -16.5% and -18.6%** per unsuccessful investment, depending on which of the two assumptions stated above we apply. An annualization of this number is not sensible because of our lack of information about when exactly those deals were withdrawn.

When we put the puzzle together and calculate the total profit, assuming we invested an equal amount of money in all target companies which were announced to be subject of an acquisition, we can expect an average profit of 7.7% per investment. Despite our lack of knowledge about the duration of withdrawn deals we can estimate an *annual profit between 13% and 17%* on average for all cases.

In Table 4 I investigate whether the absolute return from investing in target companies differs over the years. We can observe a relatively constant duration of successful deals except for the year 2000, where deals were on average completed 143 days after announcement (in contrast to 171 days in 1997). The average annualized profit for successful deals is 16% in 1997 but more than twice as high (34% p.a.) in 1998. When looking at the drawdown from withdrawn deals we can observe a (not annualized) return of about -5% in 1997 and -30% in 1998. Apparently there are years where volatility is increased.
The overall return is not affected that much. Plain profits show a minimum of 5.8% in 1997 and a maximum of 9.4% in 1999 per investment.

One of the pivotal ideas of hedge funds is to apply investment strategies which are relatively independent from general market movements. That's why it makes sense to measure the returns of our investment strategies in absolute numbers and not just in relative terms to market indices. Nonetheless, I also compare our investments with the S&P 500 in order to see whether it is possible to beat the market when investing in target or acquirer companies.
Table 5 shows different returns generated relative to the S&P 500 (target abnormal return) when investing in target companies.
The calculations are conducted as follows: first the compounded return of the given period between two given stock prices is calculated. A Matlab program will search the corresponding values of the S&P 500 and subtract the (compounded) change of the market index from the original compounded return.

The last column of Table 5 (titled with 1 to X*) shows the following: is the merger successful the trading profit from investing one day after deal announcement and holding until completion is calculated. For withdrawn deals I assume again that we either sell the stock on day 90 (second last column) or on day 180 (last column).
Over the period of 1997 to 2000 we outperform the S&P 500 by about 3% on average when investing in all cases. When comparing the different years the numbers deviate strongly, which suggests that the investment strategy is indeed quite independent form the market. For instance we underperform the market in 1997 which was a relatively strong year (more than 20% market return).

Jindra and Walkling, 2001 claim that when buying the target stock right after announcement and holding it for one week an excess return of about 1.5% (more than 100% p.a.) can be generated. To good to be true? We can see in Table 4 and Table 5 that neither the absolute return nor the abnormal return is positive for our entire sample. The return varies between -1.4% and .7%. For all other periods I investigated our investments fall short of beating the market. This indicates that the actual profit can only be made in the final day(s) right before the stock is delisted. This 'final day price jump' is not included in the periods-calculation of Table 4 and Table 5, but only when the final day is marked with X* (see other columns).
Not surprisingly the target stock always makes a big jump from day (-1) to 0 in order to reflect the takeover-news. But as we are mainly interested in maximizing our profit on a post-announcement basis, the issue is of no importance to this analysis.

Figure 12 (p. 46) shows how an average target stock price is developing from day (-7) to day 180 relative to the announcement. The cumulative return illustrates how withdrawn deals will eventually move back to their original price right before the announcement. Successful deals increase their price gradually until they are delisted (the final price jump right before the stock is delisted is not included in this graph). We can also perceive a slightly negative tendency in the stock price from day 90 to 180. Probably some investors start to become nervous when the deal is still pending after that much time.
Figure 13 to Figure 20 (p. 48-51) illustrate average stock price movements relative to the S&P 500 and the NASDAQ composite. During the time of 1997 to 2000 the NASDAQ was of great importance. The make sure the results of this study would not be biased because the use of only one benchmark, the NASDAQ was included in this study. The drawdown in the latest period (day 90 to 180) was higher when comparing the absolute return to the NASDAQ than when setting it into comparison to the S&P 500. This is probably because a relatively high number of deals in our sample were in their final phase in the years when the NASDAQ was building up its bubble.
Figure 15 shows the respective differences between each period displayed in Figure 14. The attentive reader may notice that the results sometimes do not match exactly. The reason for this is that for a few cases there was no stock data available for day 0 which causes a slight distortion between the two illustrations, which are, however, of no importance for the overall results.

Finally I compare the target abnormal returns from the different periods (annualized) in Figure 23 (p.53) for each year. We can see that the returns vary greatly over time and period and that the finding of Jindra and Walkling, 2001 must be too optimistic. In my opinion we cannot discern any patterns which should allow us to generate an excess return in constantly investing during one of the periods investigated. The stock price behavior is much more complex.

3.3.2. Investing in acquiring companies

Similar to the table illustrating returns on target companies,

Table 6 depicts returns for the given periods for acquiring companies involved in a merger or takeover transaction. When probing the absolute returns of the acquiring companies, we can easily spot on

Table 6 that all post-announcement periods yield a negative return on average. While the company stock price does not appear to deviate in a discernible manner from days (-30) to (-7) before deal announcement, we can observe it to increasingly underperform the market after the announcement. I refrain from making any quantitative conclusions which period has the best returns and where an investment should be or not be done, because the variances are to big to draw any statistically significant conclusion. Nonetheless there is one thing we can unambiguously discern: companies which acquire another firm clearly underperform the market index for the periods analyzed in this paper. In fact they do not just underperform the index but also have a significant negative absolute return as we can see in

Table 6. Figure 30 illustrate that cash-only offers make an exception to this.

According to Table 7, from day 0 to day 180 after deal announcement the S&P 500 was underperformed by 20% (or 40% annually) on average. This of course strongly suggests that any company which announces a takeover should be sold short as soon as possible. I will simulate such a strategy in chapter 5.

Figure 17 to Figure 20 depict how stocks of acquiring companies can be expected to react. When a deal is not successful the average shareprice reaction is even more negative than if the deal ends successfully. The stock of the acquirer underperforms the market in the first 180 days after the announcement by about 20%.
For target companies it may be more appropriate to illustrate the absolute return because as I was able to show with Figure 23, the return is relatively independent from the market. For acquiring companies the situation looks a bit different because according to Figure 24 (p. 53) the returns are more stable over the years (relative to the S&P 500) than for target firms. It also seems that profit is more equally distributed over the periods.

3.4. Takeover Premium

Walkling, 1985 mentions that if bidders face an upward sloping supply curve in their quest for shares of the target, they would need to pay a premium over market price in order to insure a successful offer. Different estimates of value and differing prices cause an upward sloping supply curve. An increased bid premium should result in a greater amount of shares being

tendered by the acquirer and thus increase the probability of takeover success. Yet, Hoffmeister and Dyl, 1981 did not find any connection between bid premium and takeover success. Surprisingly I find even a negative correlation between bid premium and deal success in cases where target managerial attitude was classified as 'not applicable'. The explanation may be found in Walkling and Edmister, 1985 who associate a higher bid premium with possible complications or obstacles. When analyzing takeover premiums it is important we differentiate between the various target managerial attitudes.

Table 8 (p. 47) differentiates between friendly, hostile, neutral, unsolicited and not applicable and shows the premiums measured on different days before the announcement relative to the final takeover price. In is sensible to focus on the premium measure one day before the announcement because it is least distorted by pre-announcement share price movements.

Friendly deals show an average takeover premium of 34.8% and completed to withdrawn deals do not significantly differ from each other.
Daigler and Wahrburg, 2000 focused exclusively on hostile takeovers and stressed the importance the premium in their analysis. Not surprisingly the bid premium has a higher importance in hostile then in friendly takeovers, a fact which can be confirmed by my analysis: for hostile deals the average premium of completed deals was 70% while withdrawn deals exhibit a premium of 48.6% which is still relatively high compared to the average of friendly deals.
The sample size of neutral and unsolicited deals is too low to draw any conclusions. For takeovers which were classified as 'not applicable' the premium for successful cases was even lower than for withdrawn ones.

When comparing cash payment deals with stock swaps deals (Table 9) we can observe a slightly higher premium for stock swap deals (36% to 30%) probably because cash deals mean less risk to target company investors, as there is no need to hedge against price changes of the acquirer's stock. It should also be noticed that completed deals have in both cases a lower premium than completed ones. As mentioned above the target managerial attitude seems to have great influence on the premium. That's why I test in Table 10 the difference in premium between cash and stock swap offers again, but this time with friendly offers only. This time the numbers for completed, withdrawn, cash, and stock swaps, no matter how we compare the premiums, are very close to each other. This is a clear indication that for friendly deals the premium has a low significance on the outcome of the deal.

4. Statistical Analysis of Independent Variables

4.1. Tested independent variables

In the analyses the following determinants were tested: [names for variables as used in SPSS and EVIEWS in parenthesis]

(1) **Target managerial attitude** [friendly] (friendly / not friendly) – SDC differentiates between friendly, hostile, unsolicited and not applicable takeovers. To simplify the analysis my dummy-variable 'friendly' is set to 1 when SDC identified the deal as friendly and is otherwise set to 0. This simplification is sensible because for some of the categories the number of available cases in the sample would be too small to draw any conclusions.

(2) **Toehold** [toehold] (acquirer already owns part of target before announcement) – A merger case qualifies as toehold when the acquiring company already held at least 10% of the target company at the time of the announcement of the deal. As the bargaining position of the bidder increases directly with the percentage of shares held of the target company, theory predicts that bidding success should have a strong correlation with the toehold factor. Walkling, 1985 claims that frequently bidders already own a considerable amount of the target share. In the unabridged version of my sample (1990-2000) though only about of 5% of bidders qualified as toehold with a maximum of 11% in 1991 and a minimum of 2% in 1996.

(3) **Value of transaction** [value], log (value of transaction) [value_log] – I investigate whether the transaction value itself has influence on outcome of deals and share price reaction. The value is determined by SDC.

(4) **big / small sample** [big]– The original sample is composed of two different sub-samples. The 'big' sample, which represents about half of the entire sample, comprises all cases which have a transaction value of more than $1.5b (big=1). The small sample consists of the cases where transaction value was between $50m and $75m (big=0).

(5) **Payment method** [cash] – This binary variable indicates whether payment was done via cash only (set to 1) or otherwise when stock swaps or liabilities were involved the variable is set to 0.

(6) **Bid premium** [prem_t_1, prem_t_7, prem_t_30] – The variables indicate the percentage premium, measures one day, one week and four weeks prior to the announcement. The data is provided by SDC and no calculations were necessary.

(7) **Target net sales**, [sls] log (Target net sales) [SLS_LOG] – The data is also provided by SDC.

(8) **Profit margin** [prof_mrg] – is calculated as follows: target net income per target net sales.

(9) **Target operating income** [op_inc] – provided by SDC platinum and indicating the operating income of the target company as available at the time of the announcement.

(10) **Target pretax income** [prx_inc] – provided by SDC platinum and indicating the pretax income of the target company as available at the time of the announcement

(11) **Target net income** [net_inc] – provided by SDC platinum and indicating the pretax income of the target company at the time of the announcement.

(12) **Target cashflow** [cf] – provided by SDC platinum and indicating the cashflow of the target company at the time of the announcement

(13) **Target earning per share / Acquirer earning per share**– provided by SDC platinum and indicating the EPS of the target and acquirer companies as available at the time of the announcement. The variables are used to calculate whether the deal is accretive or dilutive (see variables (28) and (29))

(14) **Target book value per share** – provided by SDC platinum as measured at the date of the announcement.

(15) **Target gearing** (debt / equity) – provided by SDC platinum measuring debt per equity of the target company on the day of announcement.

(16) **Book value per takeover price** [bv_tkp] – I calculate it by the two components (book value and takeover price) provided by SDC.

(17) ***Target enterprise value*** [epv] [3] – Provided by SDC and is calculated by multiplying the number of target actual shares outstanding from the most recent source available by the offer price and then by adding the cost to acquire convertible securities, plus short-term debt, straight debt, and preferred equity minus cash and marketable securities, stated in millions.

The fact that the actual shares outstanding are multiplied with the (final) takeover price makes it unsuitable to use as a predictor of deal outcome or investment profit, because the final takeover price may be revised over time.

[3] Variables in italics are not completely known at the time of the announcement, because they depend on the takeover price, which may be revised until the deal is completed.

(18) ***Target enterprise value per net sales*** [epv_sls] – The enterprise value is divided by target net sales. Like the original enterprise value is depending on the final takeover price the variable is unsuitable for predictions.

(19) ***Target enterprise value per cashflow*** [epv_cf] – same as variable (18) but per target company's cashflow

(20) ***Target enterprise value per operating income*** [epv_opinc] – same as variable (18) but per target operating income

(21) **Target net income per assets** [sls_as] – values provided by SDC

(22) **Target cashflow per assets** [cf_as] – values provided by SDC

(23) **Target cashflow per equity** [cf_eq] – values provided by SDC

(24) **Target total assets**, log (total assets) [as], [as_log] – Karolyi and Shannon, 1998 find no connection but Jindra and Walkling, 2001 find a negative connection to deal success.

(25) **Target Sales per assets** [sls_as] – provided by SDC

(26) **Target total equity** [eq] – provided by SDC

(27) ***Offer price per target earnings*** [offer_p_e] - similar to variable (18) this is a variable which we do not know at the date of announcement any is thus unsuitable for any predictions. Nevertheless some readers may be interested in how far the offer P/E ratio stays in connection with deal success.

(28) **Accretive / dilutive (EPS)** [accretive_eps] **–** Mergers and acquisitions are classified as accretive when the acquisition increases the acquiring company's earnings per share. There are 307 cases where the EPS of both companies are known. From this data I decide whether the deal qualifies as accretive. There are two different approached used to decide whether a deal can be identified as accretive or dilutive: either the P/E ratios of the two companies are compared or instead the EPS is used directly, without putting it into relation to the shareprice. An investment bank said that they are using the EPS directly.

(29) **Accretive / dilutive (P/E)** [accretive_p_e] **–** Some books suggest the EPS should be put in connection with the share price of the corresponding company. An accretive (P/E) merger occurs when the P/E ratio of the acquirer is greater than that of the target firm.

4.2. Determinants of Deal Success Rate (logit regression)

4.2.1. Theory and previous research

Walkling, 1985 identifies three factors which influence the outcome of the deal in a statistically significant manner: He argues that the probability of tender offer success should be directly related to the *bid premium* because bidders face an upward sloping supply curve which is mainly caused by heterogeneous expectations. The fact that through an increased amount of shares tendered the probability of success can be increased is intuitively traceable.
The second factor identifies is *managerial resistance*. In a hostile bid the target company has many ways to resist the offer but the chance of resistance can be significantly increased when defense measures are established before a bid is placed. Common pre-offer defenses are fair price amendment, restricted voting rights, waiting periods, poison pills and poison puts. Post-offer defenses are litigation, asset restructuring and liability restructuring.
The third factor constitutes the percentage already owned of the target by the acquirer by the time when the bid is placed (names as "*toehold"*). Walkling also finds that competing bids appear to have a negative influence on success because in most multiple bid situations the demand for shares among all bidders exceeds the total shares outstanding.

Hoffmeister and Dyl, 1981 discounted some of the factors other studies deem relevant. For instance they deny any connection between *bid premium* and offer success, especially in unfriendly offers. The most relevant factors identified in the study are *target managerial attitude* and *firm size*. It needs to be mentioned that this analysis was done with a relatively small sample (84 cases from the years 1976 to 1977) and was concentrating on cash offer only which may limit its explanatory power.

4.2.2. Empirical Study: Logit model

Hoffmeister and Dyl, 1981 employ a traditional linear regression model with a binary dependent variable, but this can cause heteroskedasticity.
To measure the influence of those factors on the success of the takeover, I pondered between using a discriminant function analysis, with the two groups being defined as completed or withdrawn transactions, and a logit regression. Those methods are more suitable to classify cases into values of a categorical dependent variable. Laitinen and Kankaanpää, 1999 argue that the results between those two methods are not statistically significantly different from each other, but since the DA method has lost popularity I have decided that a logit regression would be most suitable for the application needed in this study.

The objective of this analysis is to decide whether the factors tested in the model (variables described in chapter 4.1) can be used to differentiate between completed and withdrawn mergers & acquisitions. A best case scenario would be if we could predict at the date of announcement with all the financial and non-financial data which are publicly available whether the deal will be successful or not. Of course there are plenty of random factors which make it impossible for us to become infallible oracles. Nonetheless we can identify factors

which may exert a positive or negative outcome and increase our odds to pick the right deals to invest in.
The model being developed in this paper employs not only financial variables but also includes subjective factors such as target managerial attitude, toehold, and acquisition technique.

4.2.3. Determinants

The logit models test all the independent variables listed on Table 17 for relevance on transaction success. The sample size is 799 and comprises the years 1990 to 2000 as described in chapter 3.1. The following factors were identified as to have a statistically significant influence:

(1) **Toehold^{+} – (full sample)**

In accordance with Walkling, 1985 I find that when a company owns more than 10% of the target company before it announces the acquisition, the likelihood for deal success increases. On the first sight the findings in my sample may seem confusing: Table 12 shows a p-value 1.00 which would actually suggest that the variable is not significant. But in fact all 43 cases which qualified as toehold in the sample were completed successfully (in this case a logit regression makes no sense and cannot be applied).

		TOEHOLD		
Count		0	1	Total
	0	132	0	132
STATUS	1	624	43	667
	Total	756	43	799

Table 1 – all toeholds are successful deals

There may be various reasons for the positive influence of the toehold. First the acquirer is likely to have been in contact with the target management and may be more familiar with possible problems that may evolve during the acquisition and may also have access to other information which may prove to be relevant during the transaction. Second, an increased ownership in the target company will allow the acquirer to influence the target company's management, where he can assert the will of the acquirer firm. And third, an increased ownership will reduce the numbers of shares which still need to be acquired. Bulow, Huang and Klemperer, 1999 explain with a game-theoretical approach that when a firm bids more aggressively, its competitors face an increased winners curse and must bid more aggressively. This allows the toeholder to be even more aggressive.

(2) **Target managerial attitude (Friendly^{+}) – (full sample)**

Whether a deal is friendly or not is also identified to be one of the most influencing factors which can be used to predict the probability of the outcome of the takeover.

Table 11 shows a z-value of more than 6 which means that the variable is significant on the 1% level and can thus be regarded as one of the most influencing factors.

(3) ***Enterprise value per sales*** $^{+}$ ***– (full sample, friendly cases only)***

A higher enterprise value per sales was identified to have a statistically significant positive influence on deal success. Table 13 shows significance on a 2% level with a positive coefficient.

Unlike most other variables listed, the enterprise value is not necessarily known at the time of the announcement because its calculation is based on the final takeover price (see chapter 4.1 item (17) for exact definition). Its predictive power is thus limited, or depends at least on the assumption that the first takeover price will remain constant until the deal is completed.

Item (5) says that an increased takeover premium reduces the chances of a successful merger. The only way we can avoid contradiction is when we interpret this finding as follows: the increased likelihood for success is not caused by the takeover price itself but the other factors comprised in the enterprise value: short-term debt, straight debt and cash. Hence, one of the following factors must be responsible for this behavior:

1. A higher cash stock of the target company reduces its enterprise value and hence would have negative impact on deal success.
   The thesis cannot be verified with the data at our disposal. One could argue that a higher cash stock gives more options to the target company to defend itself in case of a hostile takeover attempt (e.g. share buyback). But Enterprise value per sales is only significant in the full sample and the 'friendly sample' but not in the 'not friendly' sample selection which makes it improbable that this explanation is valid.

2. More debt increases the enterprise value and would have positive affects the success rate positively.
   The behavior may be explained as follows: Increased debt gives the target company less choice and less means to defend itself and may increase its activities to actively seek a buyer.

3. More equity value (i.e. a higher takeover price) would increase the enterprise value and thus increase the likelihood that the deal will be successful.
   This explanation cannot be relevant because the variable 'equity' was tested in this analysis and did not yield any significance (see Table 17).

4. Lower sales increases the value of 'enterprise value per sales' and increases the chances the deal will be successful.

When testing sales on relevance to deal success we can identify that log(sales) does indeed have a negative effect on deal success and can thus concluded that the lower sales are at the root of the matter. (see next item and Table 14)

(4) **Log (sales)$^{-}$ – (full sample, friendly cases)**

As just mentioned, Table 14 shows that increased log (sales) has a negative effect on takeover success, or in other words, low sales are favorable for a successful takeover.

One possible explanation for this coherence may be that companies which are in temporary problems and report sluggish sales are apparently promising targets for successful takeovers. This may explain why the size of the company is of no importance but sales, which reflect a rather temporary status, are more important.

Companies which are in good shape and exhibit higher sales are less prone to be taken over successfully.

(5) **Takeover Premium^{+} – (hostile only),** measures one day before announcement

Table 16 shows that the variable in question is significant on a 10% level and has a negative impact on takeover success. This finding is neither in accordance with Walkling, 1985 nor does it support what we may call common sense. As mentioned earlier, it is important that the takeover premium is always put into context to the target managerial attitude, as it was displayed on

Table 8 (p.47).

The relevance of the takeover premium is discussed in more detail in chapter 3.4.

(6) **Accretive EPS^{+} – (friendly only)**

For friendly bids I additionally identified that when a company with a lower EPS acquires one with a higher EPS, the chances for success increase (Table 18). Mergers which are accretive to earning per share are generally regarded as advantageous from the point of view of the acquirer.

(7) **Cash vs. Stock swap (Cash^{+}) – (non-friendly cases only)**

For hostile bids it is of advantage when payment is done via cash rather than stock swaps. Table 21 shows that the variable is significant on a 1% level and can thus be regarded to be a factor of crucial influence to pave the road to a successful non-friendly deal.

As mentioned earlier, payment via cash constitutes less risk for the target stockholder and may thus ease the tendering of target stocks.

(8) **Log (Deal Value)$^-$, Log (Assets)$^-$, Log (Equity)$^-$ – (cash deals only)**
In deals where the acquirer intends to pay in cash-only, factors which are related to the transaction value appear to have a significant influence on the success rate. The higher those values, the lower the chances the deal will go through.

4.3. Determinants of Trading Profit (linear regression)

I reasoned earlier that if we can increase our chances to pick deals which will be completed successfully, we should be able to increase our profit. The logit regressions from chapter 4.2 have given us some evidence that there are indeed some factors which may help us determine in advance whether the deal will be successful or not.

I additionally run a linear regression with the dependent variable 'target return from day 1 to X*/90' and the independent variables listed in section 4.1 and compare the findings with the logit regression.

The table in Appendix III (p. 65) tells us that the only variable which has influence on trading profit is the *logarithm of the transaction value*. A higher transaction value appears to have a positive influence on the return generated when investing in target companies on day one after announcement and holding it until it is delisted (or day 90 if it is withdrawn[4]).

4.4. Synthesis and Section Summary

In chapter 4.2 we tested variables which can help us to increase the odds to pick only the deals that will be completed successfully. The variables identified to be statistically significant are:

- Toehold (+) (for all cases)
- Target managerial attitude (Friendly +) (full sample)
- Enterprise Value per Sales (+) (full sample, friendly only)
- Log (Sales) (-) (full sample, friendly only)
- Takeover premium (+) (hostile deals only)
- Payment method (Cash +) (non-friendly only)
- Accretive to EPS (+) (friendly only)
- Log (deal value) (-) (cash offers only)

When testing the influence of those variables on trading profit we get an entirely different picture:
The only significant variables are:

- Big
- Log (Deal Value)

[4] The results do not deviate when holding withdrawn deals until day 180 after announcement.

Both of those variables measure the same factor, namely the transaction value. The dummy variable 'BIG' is splitting the sample in deals showing a transaction value between $50m and $75m and those with a higher transaction value than $1.5b.

We can draw the following conclusion:
The results from the linear regressions do not match with our findings from the logit regression. This means we can refute the thesis proposed in the introduction that when we increase our odds to pick only deals that will be completed successfully, we can increase our trading profit. Apparently the market will price an increased likelihood of deal success with a lower speculation spread.

We can also conclude that deals with a high (logarithm of) Transaction-Value yield a higher trading return than deals with a low value in the variable, assuming we invest in target companies one day after the original date of announcement of the deal and hold the stock until the deal is completed (or 90 days for withdrawn deals).

Now that we have pinpointed some factors that may influence the shareprice development of our stocks, we may simulate the scenarios and test the robustness of the results.

5. Trading Simulations

5.1. Index calculations

Calculating the profit from each merger case is simple, but creating an index that reflects the cumulative return from investing in merger cases is a bit trickier, especially because in our sample we only have stock data of seven different points after the merger announcement (plus final takeover price).
I simulate that we invest, with an unlimited budged, $100 in every company which is announced to be taken over.

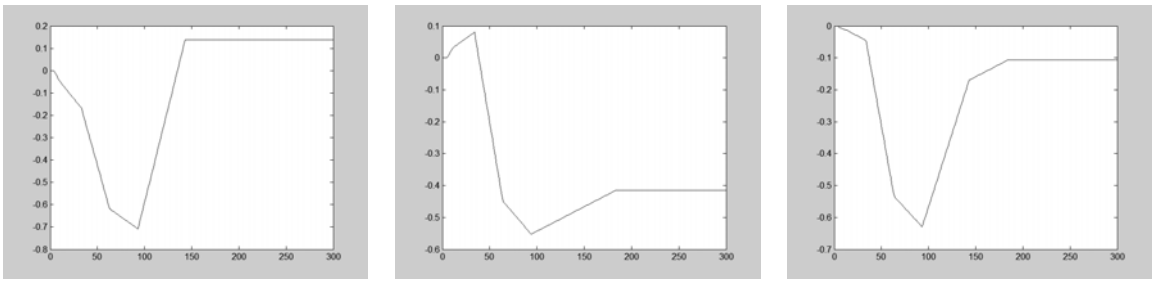

Figure 2 – Matlab output of trading simulation

The first two charts assume there's only one single merger case over the period stated (two typical cases: the one on the left: successful on about day 140; the one in the middle: withdrawn) and the chart on the right puts them together in averaging the returns for each day. For the Trading Simulation (Figure 25 to Figure 31) the same method is applied but with the entire sample, and is put into comparison to the S&P 500.

In this part I focus entirely on post announcement behavior of the share prices, so there are only seven prices or six periods of data available. I know the share prices at the day of the announcement, 1, 7, 30, 60, 90 and 180 days after the announcement of the deal. The returns between the day of announcement and the day right afterwards are suspiciously high (see Table 4) and are therefore excluded from all investments. In many cases the first occasion to trade the target stock will only be on day one after the announcement, which is the reason why the assumption that an investor can only buy the target stock on that day is realistic.

My Matlab program linearly interpolates the share prices between the given days and calculates an index, assuming an equal amount of money is being invested in all target companies one day after the merger is announced.
The index is calculated in the following way: Starting at 0 I add the compounded percentage change of each interpolated share prices to the index on each day after having the 'change value' divided by the 'amount of active merger cases' on the specific day.

$$Index_i = \sum_{d=1}^{1800} \left(\frac{\sum_{i=active}^{430} R_{id}}{n_d} \right)$$

n is the number of active deals (Figure 31) on day *d*. *R* embodies the compounded market excess return of each merger case *i* at a specific day *d*. The total amount of different deals is 430 and we calculate the index for 1800 days.

Stocks are sold when the deal is either completed (day X*) or after 90 or 180 days when the deal is withdrawn. Unfortunately SDC only indicates dates of announcements and dates of completions but says nothing about the duration of withdrawn deals. Therefore I'm forced to make the assumption of 90 or 180 days, as it was described earlier.
The lack of data for withdrawn deals may be seen as a major weakness in this analysis, but we can say that the result is probably even more conservatory that necessary. Cornelli and Li, 2002 assume that the share price in case of failure goes back to the price right before the announcement of the merger. Figure 12 shows that in reality the price will actually fall much more over time and move below the original price before the announcement. In addition the comparison of Figure 27 with Figure 28 shows only minor differences.

5.2. Generated return

The research in trying to predict movements of stock prices is almost endless. Many have claimed they had found a rule which would enable them to beat the market. In an efficient market it should be impossible to make excess profit by trading on the basis of publicly available information.
According to Ineichen, 2003 the average absolute return of thhe HFRI merger arbitrage index is about 13% p.a. (~12% p.a. compounded return). Yet, the index may have limited expressive power as hedge fund managers are notoriousy bad in being transparent concerning their fund-management fees. The years which I investigate are between the two vertical lines.

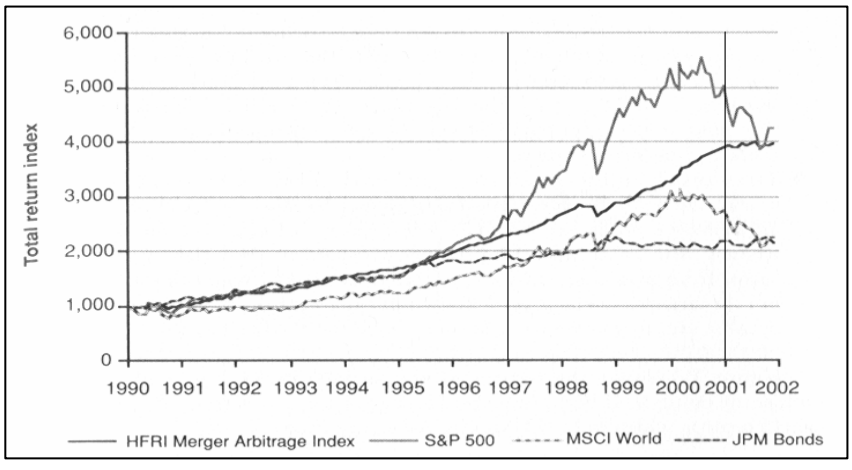

Figure 3 - Merger Arbitrage Index (Source: Ineichen, 2003)

5.2.1. Investing in target companies

When evaluating the annual trading profit from the pivot tables, we can see in the table below that when investing in target companies we can expect to gain an absolute return of about 15% p.a, respectively 7.7% per investment. Jindra and Walkling, 2001 show that the speculation spread makes about 2% and the revision return causes roughly 7% of the total profit generated, when investing in target stocks of successful deals. The results presented in this paper are slightly higher (notice that I am using compounded returns which have an inherent downward bias). Compounded returns for successful takeovers are on average 11% and are on average completed within 165 days.

The return when holding withdrawn deals for 180 days instead of 90 days is slightly higher which contradicts not just Figure 12 but also the averages of the withdrawn deals in the table. The reason for this is that for some withdrawn deals the stock quotes of day 180 are missing while they are available for day 90 and vice versa.

An annualization with our lack of data is critical in this context and should not be given too much emphasis. Yet we can conclude that on average we can expect a profit of **7½%** when investing in target stocks on day one and holding them until completion or withdrawal. Whether we sell withdrawn stocks on day 90 or 180 after announcement does not significantly influence the return.

Status	d1 to day X*/180	d1-X*/90	d1-X*/180ann	d1-X*/90ann
Completed	11.3%	11.3%	25%	25%
Withdrawn	-18.6%	-16.5%		
Total	**7.7%**	**7.6%**	**~13%**	**~17%**

Table 2 – Return generated from investing in target companies

We can now compare those results with the simulation (Figure 25 to Figure 28): Making the same assumption (buying target stocks one day after announcement and holding them until completion or 90 respectively 180 days for withdrawn deals) I demonstrate how profit evolves over time compared to the S&P 500 and the NASDAQ composite. Over the five-year period we generate a profit between 65% and 75% (hence about **12% to 15% annually**). In the simulation we no longer need to annualize the profits because the process is simulated over five years and the graph depicts the development of profit over the given period.

Figure 25 and Figure 26 compare profits of completed and withdrawn deals. Completed deals yield on average an annual return of about 20% which is in accordance with Table 2. Withdrawn deals cause a loss of about 40% annually. The relatively low number of losses causes the graph to be much more volatile than the plot for completed deals, and quantitative interpretation should thus not be given too much emphasis (for a graph with the number of 'active merger cases' see Figure 31).

Figure 27 and Figure 28 differentiate between various trading strategies.

In chapter 4.2 we have identified several factors that should increase the probability to pick successful deals. We can now test their influence on trading profit with the simulation.

For example I simulate that we only invest in friendly deals (Table 11 suggests friendly deals are more likely to be completed successfully than non-friendly deals). Figure 27 shows only a tiny increase in profit which might as well be coincidence (the coincidence is confirmed in Table 27, that variable is not statistically significant for profit). Other factors, such as Enterprise Value per Sales, Log (Sales) or accretive to EPS were also tested. In some cases we can indeed observe a better return, but the linear regression on Appendix III warn us that the higher profit is not statistically significant.
When we look at the graphs of the different strategies we can see that indeed we cannot draw any clear conclusions. Although most predictions about deal success may lead to a happy-end in our investment story, it may also turn in an abject disappointment. For instance we can see in Figure 28 than when we invest only in 'accretive_eps' (red) we end up with an higher return than when we invest in all merger cases. But when we focus only on the years 1997 to 1998 our efforts to increase our profit fail (compare to the black line).
A similar situation is visible in Figure 27. The gray line indicates profit when trading only log(sales)<2.5 and enterprise value per sales>15 (the thresholds are arithmetic means of the respective variables, and depending on whether high values or low values are favorable for deal success the operator has been chosen accordingly). Although the investor seems to be lucky at the end of the scrutinized investment period, exuberance may turn into an equally intense disappointment when the investor only invests for the years 1997 and 1998.

The linear regressions on profit confirm our doubts. The only variable which was identified to be relevant for profit is the logarithm of deal transaction (marked in green). In the logit regression this variable is only significant for cash-deals only, which constitute a very small fraction of the entire sample. In addition, the coefficient is positive for the linear regression on profit but negative on the logit regression on deal success.

We can conclude that when the market identifies an increased likelihood for deal success – and there are indeed some factors which increase the odds as we were able to see in chapter 4.2.3 – the knowledge does not help us to increase our trading profit. The increased likelihood must lead to a lower speculation spread. The market compensates the lower risk with a lower return.

5.2.2. Investing in acquiring companies

The various analysis and calculations about trading profit of companies that announce an acquisition of another firm, shows unequivocally – no matter whether relative to a market index or in absolute figures – they should be sold short. Figure 29 and Figure 30 simulate such as strategy.
Companies which have to withdraw their offer in acquiring another firm appear to experience an even sharper fall in share price. If it were possible to filter out such deals and only sell short stocks of companies of this genre, according to Figure 29, we could then generate an annual compounded return of about 50%. If we simply sell short all companies which announce an acquisition we can expect the investment to yield a compounded **absolute annual profit of about 10%** which is about in range of the S&P 500 itself, yet relatively independent from overall market movements.

In Figure 30 different trading strategies are applied. We can clearly see that cash deals are reacting differently from non-cash deals (also see Figure 21 and Figure 22). The cause for this behavior is without doubt the absence of arbitrageurs in cash deals. As mentioned in chapter 2, merger arbitrageurs sell short acquiring stocks when the target company's stockholders are paid with stocks. However, in cash deals arbitrageurs will find no reason to hedge their position against market movements, and the deal should not stimulate any additional short positions. Whether the deal is friendly or not has only a minor impact on the overall return.

6. Conclusion

When investing the same amount of money in all target companies which are announced to be taken over, and holding the stock until it is delisted if the deal is successful, or for 90 or 180 days if it is withdrawn, an average profit of about 15% p.a. can be made.

Stocks of target companies of successful takeovers yield an annual profit of about 25%, but for withdrawn cases we incur a loss of about 30% p.a on average.

For friendly bids I identified the following factors and ratios as having an influence on deal success:

- If the acquirer already holds more than 10% (**toehold**) of the target company before the deal is announced, the influence on the outcome is positive.
- The **target managerial attitude**, (whether the deal is friendly or not) has significant influence on deal success.
- Lower **Log (sales)** increase the probability that the deal will be successful
- If the deal is **Accretive to EPS,** it is more likely to be successful than when it is dilutive.

For non-friendly bids the **takeover premium**, measured one day before deal-announcement, was additionally identified to have a significant influence on the outcome. For hostile bids (which constitute a subcategory of 'non-friendly') a high premium has a favorable effect on deal outcome.

For cash-only deals I identified the following factors as having influence on deal success:

- **Toehold** has a positive influence (same as above)
- A higher **Log (deal value)** has a negative influence on success. The cases which originated form the 'high-value transaction' sample were less successful than the ones from the 'low-value transaction' sample.

For non-friendly deals it is an advantage when payment is done in **cash** rather than in stocks.

In evaluating which factors have influence the trading return generated for an investor who buys stocks of a companies that are announced to be taken over, I find that when trading only companies where the (logarithm of the) transaction value is relatively big, we can increase our profit.

One might be tempted to think that it is of great interest to predict, at the time when the deal is announced, whether the takeover will be completed or not because the returns vary significantly depending on the outcome. But the factors which were identified to be relevant for deal success

do not coincide with those identified for trading profit. This means that the increased likelihood for success of certain kinds of deals must already be priced by the market through a smaller speculation spread.

The trading simulation confirms the results obtained by the statistical analysis. Overall profit gained by investing in all target companies is about 15% per year. When concentrating investments on a certain genre of transactions only, the results show that we cannot draw any definite conclusions from an increased likelihood of deal success to increased profit. For instance deals which are identified as accretive to EPS may yield a higher return when looking at the whole period, but there are several periods where we would be better off if we would not apply this criterion.

The only factor which was identified to be statistically significant for profit in the linear regression – the logarithm of deal value – shows an increased return over almost all periods. When only investing in deals which exhibit a deal value of higher than $1.5b, we get a return of about 19% p.a. instead of 15% p.a.

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Appendix I Descriptive Analysis

Figure 4 – Deals 1990 – 2000

The figure shows the outcome of all 799 cases between the years 1990 and 2000 which matched the criteria to be included in the sample. The chart shows whether the deals were completed or withdrawn, friendly or hostile and indicates the method of payment.

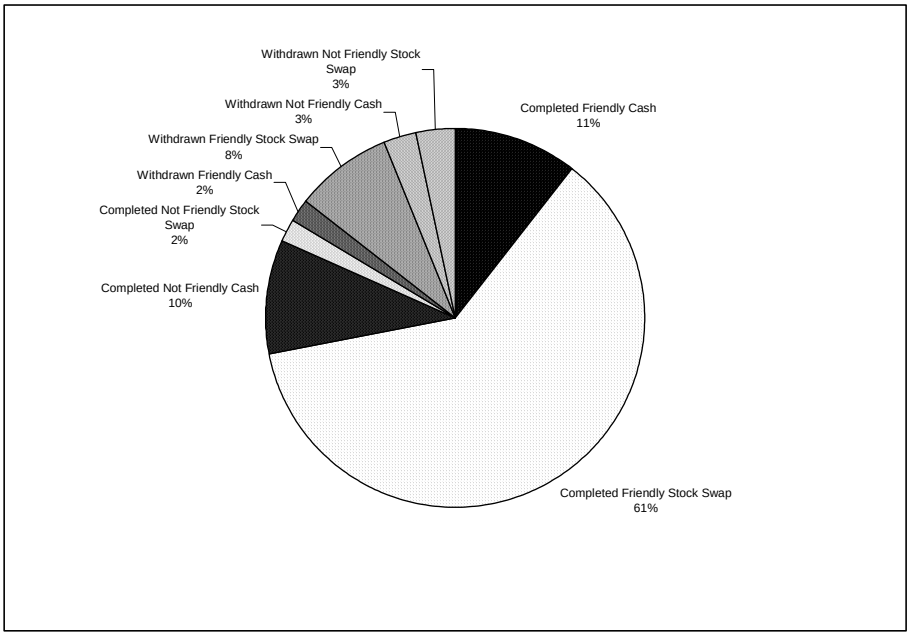


Figure 5 – Deals 1997 – 2000

In chapter 5 only deals from 1997 to 2000 were included. The chart again shows whether the deals were successful or withdrawn, friendly or non-friendly and indicates the method of payment.

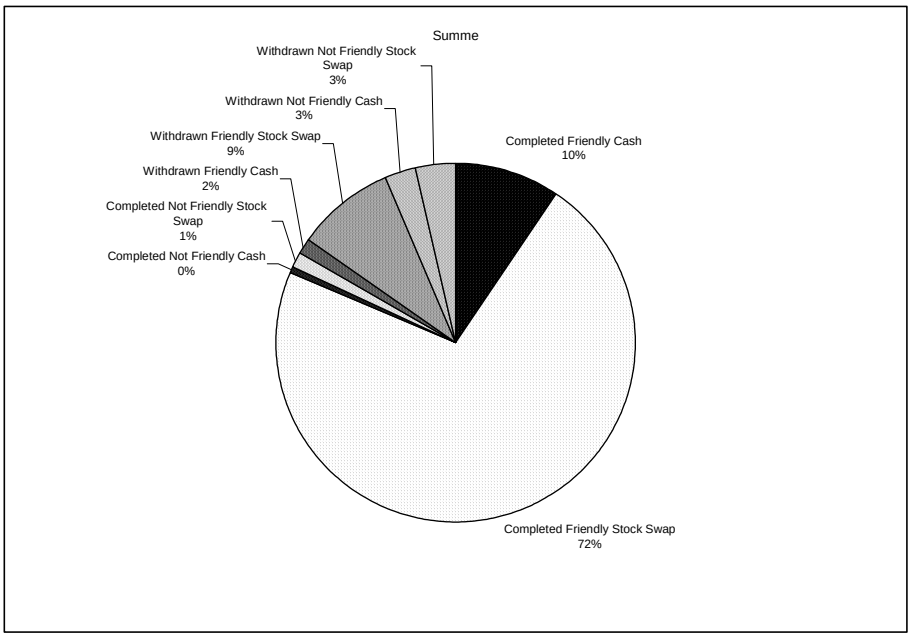
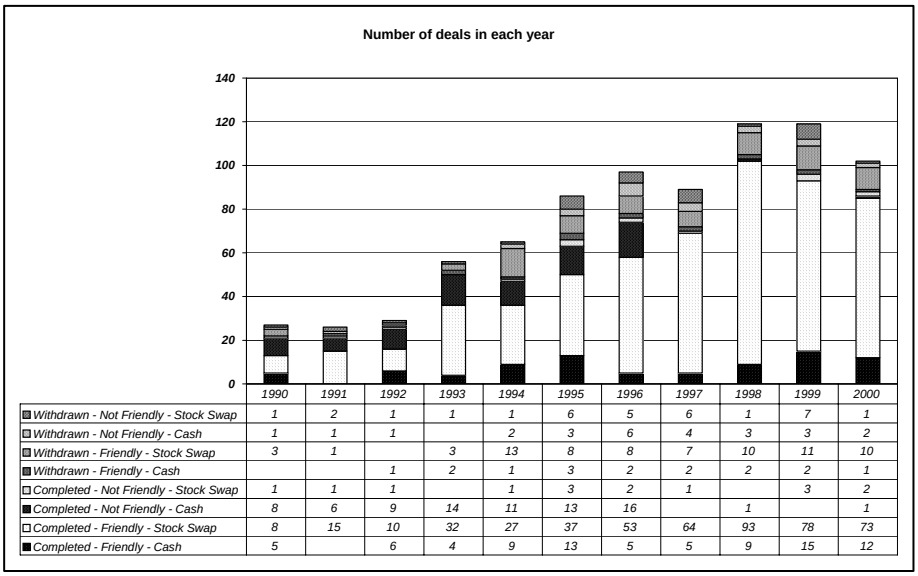


Figure 6 – Yearly deals

The sample contains deals which either have a transaction size over $1.5b or between $50m and $75m. The chart shows how those deals are distributed over the years and differentiates between successful/withdrawn, payment methods (cash/stock swap) and classifies the deals into friendly and non-friendly. The period between 1997 and 2000 appears to be exceptionally active. Those are the years of the sample which are used in the trading simulation in chapter 5.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Withdrawn - Not Friendly - Stock Swap	1	2	1	1	1	6	5	6	1	7	1
Withdrawn - Not Friendly - Cash	1	1	1		2	3	6	4	3	3	2
Withdrawn - Friendly - Stock Swap	3	1		3	13	8	8	7	10	11	10
Withdrawn - Friendly - Cash			1	2	1	3	2	2	2	2	1
Completed - Not Friendly - Stock Swap	1	1	1		1	3	2	1		3	2
Completed - Not Friendly - Cash	8	6	9	14	11	13	16		1		1
Completed - Friendly - Stock Swap	8	15	10	32	27	37	53	64	93	78	73
Completed - Friendly - Cash	5		6	4	9	13	5	5	9	15	12

Figure 7 – Yearly percentage outcome of deals

Similar to the chart above, this graphic shows the outcomes and peculiarities in percent for each year.

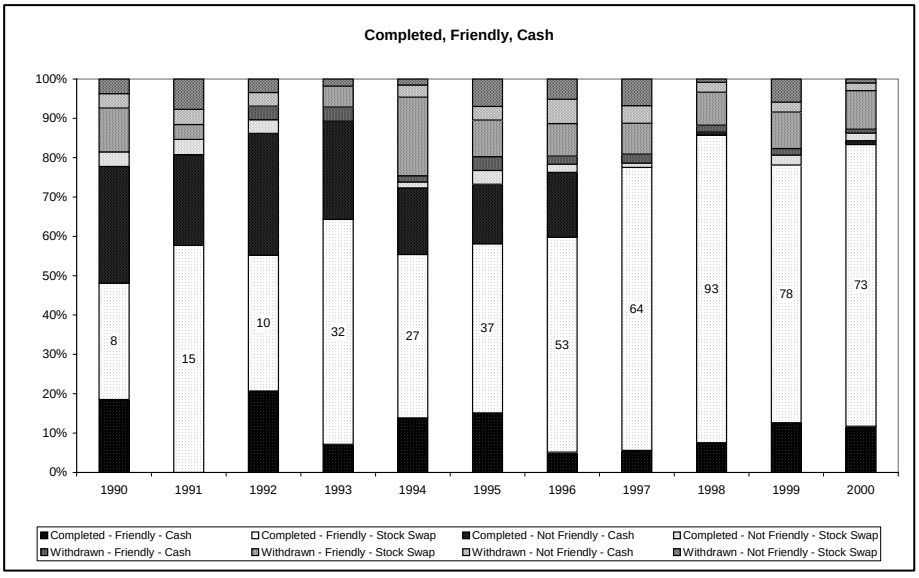


Figure 8 – days from announcement to success (completed deals only)

The distribution depicts the amount of days it took from the initial date of announcement of the merger or acquisition until it was considered to be completed. Unfortunately SDC only records the duration of the deal for successful cases which forces me to assume an average duration of 90 and 180 days (both cases are tested) for deals which were withdrawn. On average it takes *165 days* to complete a successful deal.

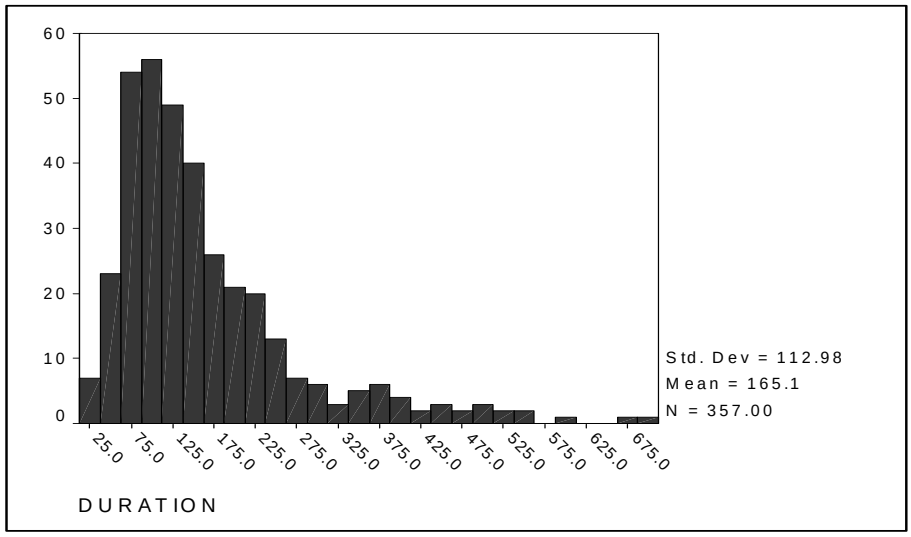


Figure 9 – Trading profit when taking long position in acquirer days 1-180

When buying the stock of the acquiring company on day 1 after deal announcement and holding it until day 180 we make a loss of 12% (24% p.a.). The results from Figure 29 and Figure 30 are more moderate.

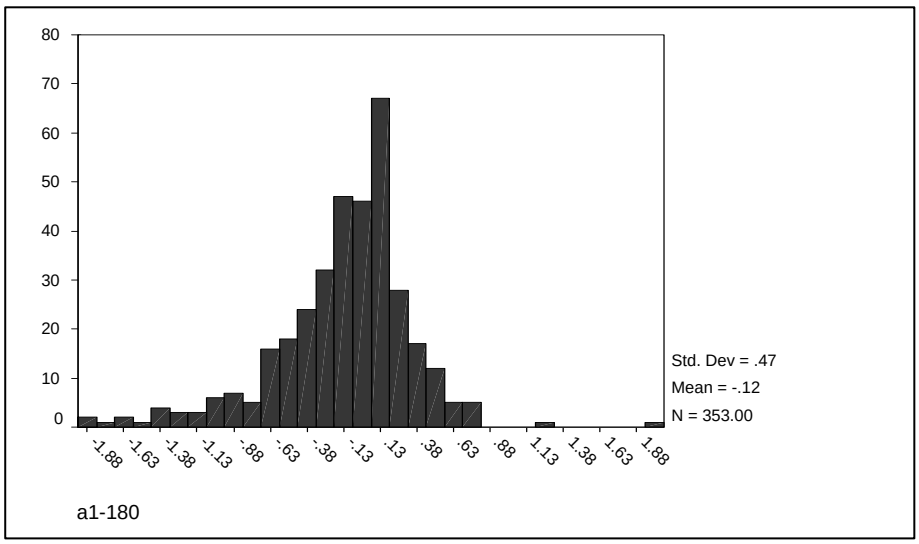


Figure 10 – Return when buying target at day 1 to X* or 1-90, annualized

We buy all target companies one day after deal announcement and hold it until the deal is completed. For withdrawn deals we assume that we sell the stock on day 90. Average annualized absolute profit in that case is 17%.

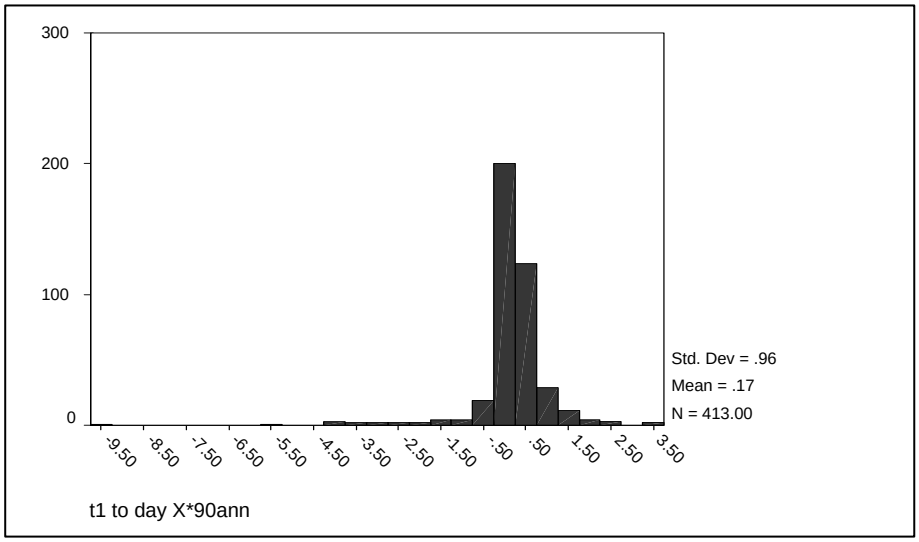


Figure 11 – Return when buying target at day 1 to X* or 1-180, annualized

We buy all target companies one day after deal announcement and hold it until the deal is completed. For withdrawn deals we take a more conservative assumption than in Figure 10 and assume that we sell the stock only on day 180. Average annualized absolute profit in that case is 12%.

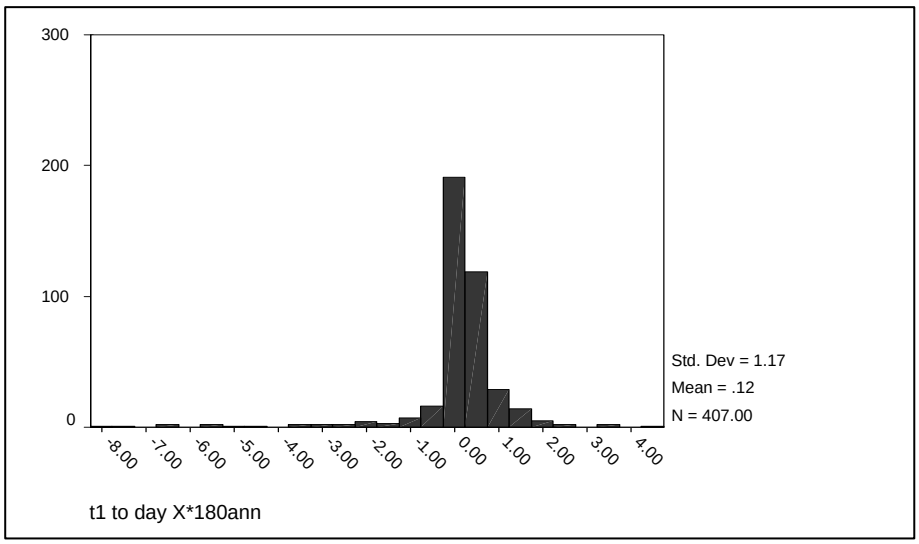


Table 3 – Target Returns (TR)

The table shows the different absolute return that can be generated when buying target stocks on day 1 after announcement and holding it until the company is delisted from the stockmarket (day X*). In case the deal is withdrawn I work with two different assumptions: Either we sell the stock on day 90 (assuming we'll correctly anticipate the danger of the failure by that time) or we sell it only on day 180.

The results are similar for both assumptions. On average we can expect an absolute return of about 7.7% percent per investment. While successful deals bring us about 11.3% we lose about 17% in withdrawn deals.

In the last two columns the profits were annualized in order to make them comparable with the results gained form chapter 5. As the exact duration of the deal is known for completed deals we can say that an annualized profit of 25% for this genre is quite accurate. For withdrawn deals the numbers are a bit more ambiguous.

Nevertheless we can say, the average total annualized profit of our investments must lie between 13% and 17% under the assumption that we sell withdrawn deals somewhere between the days 90 and 180 after the deal was announced. The calculations match the results form the trading simulation.

Status	d: cash / stock	Attitude	# deals	Deal duration	d1 to X*/90	d1 to X*/180	d1 to X*/90 p.a.	d1 to X*/180, p.a.
Completed			**357**	**165**	**11.3%**		***25.0%***	
	Cash		43	112	7.0%		*22.8%*	
		Friendly	41	112	7.1%		*23.1%*	
		Not Appl.	1	187	6.8%		*13.2%*	
		Unsolic.	1	40	2.3%		*21.0%*	
	Stock Swap		314	172	11.9%		*25.3%*	
		Friendly	308	171	11.7%		*25.0%*	
		Hostile	6	242	21.7%		*32.7%*	
Withdrawn			**56**	90 or 180	**-16.5%**	**-18.6%**	***-66.9%***	***-31.7%***
	Cash		16	90 or 180	-9.0%	-14.1%		
		Friendly	7	90 or 180	-7.2%	-21.8%		
		Hostile	2	90 or 180	-30.8%	-11.9%		
		Not applic.	7	90 or 180	-4.6%	-8.3%		
	Stock Swap		40	90 or 180	-19.5%	-20.2%		
		Friendly	30	90 or 180	-27.1%	-28.4%		
		Hostile	4	90 or 180	-0.7%	1.1%		
		Unsolic.	6	90 or 180	6.5%	8.3%		
Total			**413**		**7.6%**	**7.7%**	***~13%***	***~17%***

Table 4 – Target Returns (TR), yearly

The table is similar to Table 3. The difference is that this table shows the returns for each year. I also depict the returns generated in the different periods of investment (columns 9-16) without the final price jump to the final takeover price. Column 6 and 7 are the same as in the last table but the returns are shown for each year. Unlike in Table 3 the numbers here are not annualized because the aim of this table is to find out whether there are high discrepancies between the returns of each year.

First of all we can see that the duration of the successful deals was relatively constant except for the year 2000 where deals were completed on day 143 on average. The average profits for our investments are 7.7%. For successful deals we have an average annualized profit or 16% p.a. in 1997 but more than twice as high (34% p.a.) in 1998. When we look at the drawdowns from withdrawn deals, we can observe in the year 1997 the average return (not annualized) was about -5% per deal and in 1998 about -30%. There appear to be years where the whole stockmarket is significantly more volatile.

Year	Status	cash / stock	# deals	duration	d1 to X*/90	d1 to X*/180	*d1 to X* p.a.*	d(-7)-(-1)	d(-1)-0	d0-1	d1-7	d7-30	d30-60	d60-90	d90-180
1997			**84**	**171**	**5.4%**	**5.8%**		**3.0%**	**7.2%**	**2.3%**	**0.7%**	**1.7%**	**0.3%**	**-1.8%**	**3.5%**
	Completed		70	171	7.7%	7.7%	***16%***	3.6%	6.1%	2.2%	0.5%	1.5%	1.6%	-1.1%	4.1%
		Cash	5	153	8.3%	8.3%		7.2%	13.4%	0.0%	-0.7%	1.0%	1.2%	12.4%	1.5%
		Stock Swap	65	172	7.6%	7.6%		3.2%	5.3%	2.4%	0.6%	1.5%	1.6%	-1.6%	4.4%
	Withdrawn		14		-5.8%	-4.5%		1.0%	11.0%	2.6%	1.6%	3.0%	-5.6%	-4.9%	2.8%
		Cash	5		1.3%	-1.6%		7.5%	5.7%	4.6%	6.8%	9.9%	-15.0%	-0.4%	0.0%
		Stock Swap	9		-9.8%	-5.8%		-0.5%	12.2%	1.4%	-1.3%	-0.8%	-0.3%	-7.4%	4.0%
1998			**118**	**176**	**7.5%**	**8.8%**		**4.6%**	**8.3%**	**1.5%**	**-0.2%**	**-0.3%**	**-0.5%**	**-1.2%**	**-2.9%**
	Completed		103	176	13.7%	13.7%	***34%***	4.3%	8.2%	1.4%	-0.1%	1.1%	0.5%	1.6%	-1.5%
		Cash	10	128	11.6%	11.6%		4.2%	6.5%	4.6%	1.5%	0.2%	0.1%	7.9%	11.3%
		Stock Swap	93	181	13.9%	13.9%		4.4%	8.4%	1.1%	-0.3%	1.1%	0.5%	1.1%	-2.5%
	Withdrawn		15		-34.7%	-27.2%		5.8%	8.6%	2.1%	-1.0%	-9.6%	-7.2%	-16.9%	-6.8%
		Cash	4		-16.6%	-7.9%		0.5%	12.8%	0.8%	2.5%	-0.7%	-24.8%	6.3%	8.8%
		Stock Swap	11		-41.3%	-34.9%		7.8%	7.1%	2.6%	-2.2%	-12.9%	-0.9%	-25.3%	-13.1%
1999			**111**	**170**	**11.5%**	**9.4%**		**3.5%**	**9.5%**	**3.9%**	**0.3%**	**0.8%**	**3.6%**	**2.2%**	**-1.3%**
	Completed		96	170	13.0%	13.0%	***28%***	3.8%	9.8%	3.7%	0.1%	1.3%	3.9%	2.4%	5.2%
		Cash	15	111	5.9%	5.9%		4.1%	15.6%	7.6%	0.5%	1.2%	2.7%	-0.8%	2.9%
		Stock Swap	81	181	14.2%	14.2%		3.8%	8.8%	3.0%	0.1%	1.3%	4.1%	2.8%	5.4%
	Withdrawn		15		2.5%	-15.2%		1.4%	7.1%	5.6%	1.1%	-1.8%	2.0%	1.1%	-15.2%
		Cash	4		-21.0%	-44.6%		-0.6%	15.1%	-1.1%	0.3%	-1.3%	-4.4%	-15.7%	-23.5%
		Stock Swap	11		11.0%	-3.5%		2.0%	5.0%	8.0%	1.3%	-2.0%	4.4%	7.2%	-11.9%
2000			**100**	**143**	**5.1%**	**6.0%**		**3.0%**	**13.4%**	**4.1%**	**-1.4%**	**-0.9%**	**-3.9%**	**0.0%**	**7.3%**
	Completed		88	143	9.8%	9.8%	***25%***	2.8%	14.2%	3.1%	-0.6%	0.5%	-2.9%	0.4%	7.2%
		Cash	13	86	4.3%	4.3%		0.2%	17.1%	5.7%	0.3%	0.2%	3.1%	0.9%	
		Stock Swap	75	152	10.8%	10.8%		3.3%	13.7%	2.6%	-0.8%	0.5%	-3.7%	0.3%	7.2%
	Withdrawn		12		-29.7%	-30.9%		4.0%	7.4%	11.8%	-7.2%	-10.8%	-9.8%	-1.9%	7.6%
		Cash	3		-0.2%	33.3%		15.0%	19.0%	0.4%	-3.4%	-0.4%	-0.1%	3.8%	10.0%
		Stock Swap	9		-39.6%	-39.0%		1.6%	4.8%	15.6%	-8.4%	-14.3%	-13.1%	-3.8%	7.3%
Total			**413**	**165**	**7.6%**	**7.7%**		**3.5%**	**10.0%**	**3.0%**	**-0.2%**	**0.3%**	**0.0%**	**-0.2%**	**0.8%**

Table 5 – Target Abnormal Return (TAR) relative to S&P 500

The table differentiates between the years 1997 and 2000, completed/withdrawn and friendly/hostile. It shows the return which was generated when investing in the target company's stock at the days indicated relative to the original day of announcement. The returns are not annualized.
We can observe that with investing in all target companies on day 1 after announcement and holding them until they were delisted or 90/180 when they were withdrawn that we outperformed the S&P 500 in the years 1999 and 2000 but underperformed in 1997 and 1998. As the numbers are not annualized they only indicate by how much we outperformed the S&P500 during our investments. In order to make exact quantitative conclusions about annualized returns we lack data about the duration of withdrawn deals.

Year	Status	friendly / not friendly	# deals	d(-7)to1 (to S&P)	d(1-)to0 (to S&P)	d0 to1 (to S&P).	d1 to 7 (toS&P)	d7 to 30 (to S&P)	d30 to 60 (to S&P)	d60 to 90 (to S&P)	d90 to 180 (to S&P)	d1 to X*/90 (to S&P)	d1 to day X*/180 (to S&P)
1997			**84**	2.2%	7.1%	2.2%	0.5%	-0.1%	-0.6%	-4.9%	-5.0%	**-4.1%**	**-6.4%**
	Completed		70	2.7%	6.0%	2.1%	0.4%	0.0%	0.5%	-4.4%	-4.1%	-4.0%	-4.0%
		Friendly	69	2.7%	6.0%	2.1%	0.5%	-0.1%	0.3%	-4.5%	-3.9%	-4.2%	-4.2%
		Not Friendly	1			-1.3%	-4.6%	1.8%	16.7%	0.0%	-8.6%	9.3%	9.3%
	Withdrawn		14	0.6%	10.9%	2.6%	1.3%	-0.5%	-5.6%	-7.3%	-6.1%	-4.8%	-19.3%
		Friendly	7	0.3%	10.7%	4.9%	2.5%	-0.2%	-4.1%	-13.6%	-1.6%	-1.5%	-19.8%
		Not Friendly	7	1.1%	11.2%	0.3%	0.0%	-0.8%	-7.2%	-1.0%	-10.1%	-8.0%	-18.9%
1998			**118**	4.3%	8.2%	1.7%	-0.8%	-2.3%	-1.7%	-2.4%	-8.5%	**1.0%**	**-0.6%**
	Completed		103	4.0%	8.1%	1.6%	-0.7%	-1.1%	-0.5%	-0.1%	-6.2%	4.3%	4.3%
		Friendly	102	4.0%	8.2%	1.4%	-0.7%	-1.0%	-0.6%	0.0%	-6.4%	4.4%	4.4%
		Not Friendly	1	5.8%	-0.2%	28.0%	0.3%	-7.2%	3.2%	-4.9%	1.3%	-2.1%	-2.1%
	Withdrawn		15	5.5%	8.9%	1.7%	-1.5%	-10.5%	-9.0%	-15.5%	-15.1%	-21.6%	-36.6%
		Friendly	12	7.1%	7.1%	2.4%	-2.0%	-14.6%	-7.0%	-13.5%	-23.1%	-24.2%	-41.1%
		Not Friendly	3	-1.0%	16.1%	-0.8%	0.4%	6.1%	-17.0%	-23.8%	14.2%	-11.3%	-20.3%
1999			**111**	3.3%	9.5%	4.0%	-0.1%	-0.6%	2.1%	2.1%	-4.2%	**7.0%**	**4.7%**
	Completed		96	3.6%	9.9%	3.8%	-0.3%	-0.1%	2.5%	2.0%	2.6%	8.7%	8.7%
		Friendly	93	3.8%	10.0%	3.9%	-0.3%	-0.1%	2.5%	1.7%	2.2%	8.6%	8.6%
		Not Friendly	3	-1.1%	6.5%	1.3%	-0.1%	-1.0%	1.9%	10.1%	7.6%	10.4%	10.4%
	Withdrawn		15	1.4%	7.3%	5.0%	1.0%	-3.6%	-0.4%	2.2%	-18.6%	-3.5%	-22.4%
		Friendly	9	0.6%	8.7%	3.7%	1.6%	-1.9%	-1.8%	-1.9%	-26.9%	-2.0%	-35.6%
		Not Friendly	6	2.7%	4.6%	6.8%	0.1%	-6.2%	1.6%	8.4%	-7.5%	-5.7%	-4.8%
2000			**100**	3.4%	13.4%	3.9%	-1.2%	-0.5%	-3.5%	1.2%	10.9%	**9.2%**	**10.7%**
	Completed		88	3.3%	14.1%	2.9%	-0.3%	0.9%	-2.7%	1.6%	10.3%	14.1%	14.1%
		Friendly	85	3.1%	14.4%	2.7%	-0.5%	0.8%	-2.9%	1.6%	10.2%	13.8%	13.8%
		Not Friendly	3	7.7%	6.9%	8.7%	4.4%	3.9%	6.4%	0.8%	11.4%	23.5%	23.5%
	Withdrawn		12	3.9%	7.6%	11.6%	-7.5%	-10.8%	-8.2%	-0.5%	12.3%	-27.0%	-23.2%
		Friendly	9	3.2%	10.1%	9.8%	-8.1%	-12.3%	-15.2%	-2.2%	11.0%	-36.0%	-32.9%
		Not Friendly	3	7.2%	-3.5%	16.9%	-5.8%	-6.1%	12.5%	4.8%	22.5%	0.1%	54.7%
Total			**413**	3.4%	10.0%	2.9%	-0.4%	-1.0%	-0.8%	-1.1%	-2.9%	**3.6%**	**2.3%**

Table 6 – Acquirer Return (AR), (not annualized)

The table shows absolute returns of acquiring companies for various time periods relative to the day of announcement. On average the acquirer stock loses 13.3% in the first 180 days after the deal is announced.

Status	Payment method	Year	(-7) to 0	(1-) to 0	0 to 1	0 to 7	0 to 30	0 to 60	0 to 90	0 to 180
Completed			**2.6%**	**3.0%**	**-0.9%**	**-1.4%**	**-2.4%**	**-4.5%**	**-6.1%**	**-10.7%**
	Cash		-1.3%	0.4%	1.0%	1.8%	2.3%	4.6%	5.6%	-2.9%
		1997	-1.7%	1.4%	0.5%	0.1%	4.2%	3.8%	20.4%	24.3%
		1998	-4.9%	-0.6%	3.7%	5.0%	6.2%	7.0%	2.9%	-5.6%
		1999	3.3%	-0.7%	-0.2%	-0.2%	-1.7%	4.3%	9.0%	-11.8%
		2000	-1.8%	1.6%	0.0%	1.7%	2.3%	3.1%	-1.7%	-3.1%
	Stock Swap		3.1%	3.4%	-1.2%	-1.8%	-3.0%	-5.8%	-7.6%	-11.8%
		1997	2.0%	0.6%	-0.3%	-1.1%	-1.5%	-4.8%	-2.4%	3.1%
		1998	6.5%	5.0%	-1.2%	-1.2%	-1.4%	-3.2%	-4.8%	-9.4%
		1999	0.2%	2.8%	-1.3%	-1.9%	-4.0%	-4.5%	-4.5%	-5.2%
		2000	3.0%	4.2%	-1.6%	-3.0%	-5.4%	-10.9%	-18.1%	-31.1%
Withdrawn			**4.8%**	**3.7%**	**-2.5%**	**-3.8%**	**-5.2%**	**-9.4%**	**-15.7%**	**-28.6%**
	Cash		0.1%	0.1%	-2.3%	-2.9%	-1.6%	-15.7%	-14.4%	-15.6%
		1997	-0.1%	-0.1%	0.6%	4.3%	9.3%	-1.4%	0.9%	3.2%
		1998	-8.5%	0.7%	-10.3%	-16.8%	-14.2%	-39.3%	-36.7%	-32.6%
		1999	7.7%	-1.9%	-1.8%	-1.4%	-5.7%	-27.9%	-31.0%	-48.0%
		2000	-1.7%	1.9%	0.1%	-3.0%	-1.8%	0.5%	4.3%	27.8%
	Stock Swap		6.4%	5.0%	-2.6%	-4.2%	-6.6%	-7.1%	-16.1%	-33.4%
		1997	-6.7%	0.2%	-3.7%	-4.9%	-7.6%	-6.9%	-7.8%	-16.4%
		1998	7.7%	2.3%	0.1%	0.0%	0.8%	5.9%	-7.0%	-40.0%
		1999	-2.6%	0.6%	-1.6%	-1.8%	0.3%	3.1%	-2.6%	-18.0%
		2000	25.7%	17.0%	-6.0%	-11.4%	-22.9%	-35.8%	-52.0%	-62.7%
Total			**2.9%**	**3.1%**	**-1.2%**	**-1.7%**	**-2.8%**	**-5.2%**	**-7.4%**	**-13.3%**

Table 7 – Acquirer abnormal return (AAR) relative to S&P 500, annualized

The table differentiates between the years 1997 and 2000, completed/withdrawn and friendly/hostile. It shows the return which was generated when investing in the target company's stock at the days indicated relative to the original day of announcement. All returns are compounded and annualized.

Year	Status	friendly / not friendly	# deals	d(-1)to0 p.a.	d0-1 p.a.	d1-7 p.a.	d7-30 p.a.	d30-60 p.a.	d60-90 p.a.	d90-180 p.a.	d0-180 p.a.
1997			**84**	***-256.6%***	***-256.8%***	***-42.6%***	***-30.0%***	***-51.2%***	***-12.4%***	***-21.7%***	***-23.6%***
	Completed		70	*-273.4%*	*-144.9%*	*-54.9%*	*-24.2%*	*-53.4%*	*-9.2%*	*-15.0%*	*-18.3%*
		Friendly	69	*-236.9%*	*-163.5%*	*-51.3%*	*-25.0%*	*-50.5%*	*-11.6%*	*-12.4%*	*-16.9%*
		Not Friendly	1	*-2351.5%*	*1045.0%*	*-290.4%*	*24.9%*	*-233.7%*	*146.4%*	*-168.3%*	*-99.4%*
	Withdrawn		14	*-118.1%*	*-776.1%*	*14.8%*	*-55.8%*	*-41.6%*	*-27.4%*	*-51.4%*	*-46.2%*
		Friendly	7	*-171.3%*	*-880.9%*	*15.4%*	*-34.9%*	*48.0%*	*-73.8%*	*-40.2%*	*-27.5%*
		Not Friendly	7	*200.9%*	*-671.2%*	*14.3%*	*-76.6%*	*-131.2%*	*19.1%*	*-61.0%*	*-62.2%*
1998			**118**	***-1574.0%***	***-269.4%***	***-35.4%***	***-28.4%***	***-30.5%***	***-55.7%***	***-56.3%***	***-47.5%***
	Completed		103	*-1677.9%*	*-178.0%*	*-24.9%*	*-33.1%*	*-28.8%*	*-49.9%*	*-42.8%*	*-38.8%*
		Friendly	102	*-1697.4%*	*-283.1%*	*-25.3%*	*-32.3%*	*-29.5%*	*-49.8%*	*-43.4%*	*-39.7%*
		Not Friendly	1	*-65.1%*	*10227.7%*	*16.1%*	*-114.3%*	*38.6%*	*-60.0%*	*5.1%*	*41.7%*
	Withdrawn		15	*-700.7%*	*-922.9%*	*-110.0%*	*4.9%*	*-42.1%*	*-95.0%*	*-136.7%*	*-99.4%*
		Friendly	12	*-565.8%*	*-566.2%*	*-57.8%*	*-3.6%*	*-137.0%*	*-107.3%*	*-123.6%*	*-108.0%*
		Not Friendly	3	*-1240.2%*	*-2230.9%*	*-301.5%*	*36.1%*	*305.9%*	*-50.3%*	*-184.9%*	*-67.7%*
1999			**111**	***-735.9%***	***-414.3%***	***-51.8%***	***-48.0%***	***-26.2%***	***-1.5%***	***-31.4%***	***-31.2%***
	Completed		96	*-864.4%*	*-348.0%*	*-59.8%*	*-52.3%*	*-17.3%*	*6.7%*	*-22.6%*	*-24.4%*
		Friendly	93	*-916.3%*	*-329.0%*	*-52.0%*	*-53.4%*	*-14.6%*	*4.7%*	*-24.6%*	*-25.0%*
		Not Friendly	3	*365.3%*	*-890.9%*	*-284.3%*	*-21.6%*	*-91.9%*	*60.5%*	*27.8%*	*-8.5%*
	Withdrawn		15	*56.4%*	*-807.6%*	*-4.0%*	*-23.0%*	*-77.3%*	*-47.9%*	*-77.4%*	*-67.1%*
		Friendly	9	*-738.1%*	*-520.7%*	*46.2%*	*-62.6%*	*-143.6%*	*21.4%*	*-98.7%*	*-79.1%*
		Not Friendly	6	*850.9%*	*-1237.9%*	*-79.3%*	*36.5%*	*22.1%*	*-151.7%*	*-45.5%*	*-49.2%*
2000			**100**	***-1703.7%***	***-721.8%***	***-74.8%***	***-36.4%***	***-56.4%***	***-76.6%***	***-32.5%***	***-49.4%***
	Completed		88	*-1388.8%*	*-585.9%*	*-41.0%*	*-23.1%*	*-51.6%*	*-70.7%*	*-34.1%*	*-46.2%*
		Friendly	85	*-1388.6%*	*-601.6%*	*9.0%*	*-25.2%*	*-58.1%*	*-75.9%*	*-35.6%*	*-47.7%*
		Not Friendly	3	*-1396.3%*	*73.4%*	*-2139.6%*	*65.0%*	*221.0%*	*149.8%*	*24.9%*	*11.6%*
	Withdrawn		12	*-4349.0%*	*-1695.8%*	*-317.1%*	*-131.4%*	*-91.0%*	*-118.8%*	*-19.4%*	*-75.9%*
		Friendly	9	*-6689.6%*	*-2005.2%*	*-373.7%*	*-138.0%*	*-7.8%*	*-132.0%*	*-71.0%*	*-90.5%*
		Not Friendly	3	*1112.5%*	*-767.6%*	*-147.6%*	*-111.5%*	*-340.6%*	*-79.3%*	*187.0%*	*-17.5%*
Total			**413**	***-1144.7%***	***-417.3%***	***-50.9%***	***-35.8%***	***-40.1%***	***-38.1%***	***-36.6%***	***-39.0%***

Figure 12 – Cumulative Target Return (TR)

The figure shows how a stock price of a target company reacts when a takeover is announced (without the final price jump right before the delisting for successful mergers). We can see that target stock prices of withdrawn mergers will on average move back to its pre-announcement price. Successful cases will slightly outperform the market.

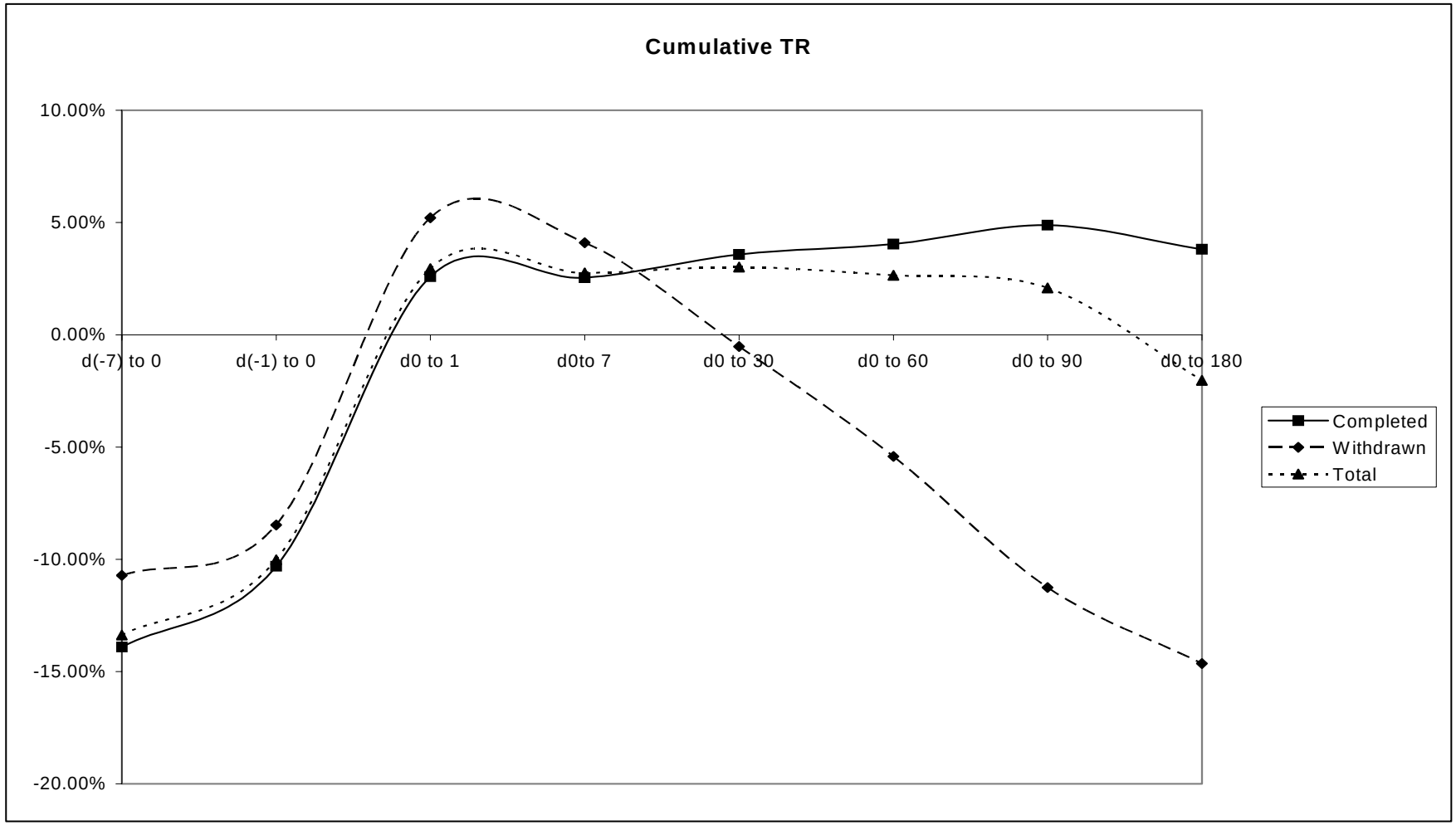


Table 8 –Takeover premiums (friendly vs. hostile)

The table shows bid premiums for friendly and non friendly takeovers. Notice that for friendly takeovers the bid premium stays almost the same for successful and withdrawn deals. Hostile deals show a significantly higher premium for successful deals compared to withdrawn ones.

Attitude	Status	# deals	Premium d(-1)	Premium d(-7)	Premium d(-30)
Friendly		**655**	**34.8%**	**39.3%**	**44.2%**
	Completed	573	34.6%	38.9%	44.4%
	Withdrawn	82	36.2%	41.8%	42.6%
Hostile		**38**	**56.1%**	**57.3%**	**57.6%**
	Completed	14	70.0%	67.4%	67.6%
	Withdrawn	24	48.6%	51.9%	52.1%
Neutral		**8**	**29.0%**	**27.6%**	**26.2%**
	Completed	7	17.3%	14.5%	12.7%
	Withdrawn	1	99.0%	106.3%	120.2%
Not Applicable[5]		**83**	**10.4%**	**6.3%**	**5.6%**
	Completed	72	9.1%	6.2%	6.1%
	Withdrawn	11	26.3%	6.6%	3.1%
Unsolicited		**15**	**45.4%**	**49.6%**	**48.0%**
	Completed	1	2.4%	15.0%	19.6%
	Withdrawn	14	48.5%	52.1%	50.0%
Total		**799**	**34.6%**	**37.1%**	**40.7%**

Table 9 – Takeover premiums (cash vs. stock swap), all deals

The premiums for stock swap offers are slightly higher than for cash offers when measured one day prior to the announcement. If measured 30 days before announcement, the premium is significantly higher for stock swaps.

cash / stock	Status	# deals	Premium d(-1)	Premium d(-7)	Premium d(-30)
Cash		**201**	**30.1%**	**28.0%**	**30.8%**
	Completed	162	27.3%	26.1%	27.2%
	Withdrawn	39	41.1%	34.7%	43.9%
Stock Swap		**598**	**36.0%**	**40.3%**	**44.3%**
	Completed	505	35.1%	39.2%	44.9%
	Withdrawn	93	40.2%	45.4%	41.5%
Total		**799**	**34.6%**	**37.1%**	**40.7%**

Table 10 - Takeover premiums (cash vs. stock swap), friendly deals only

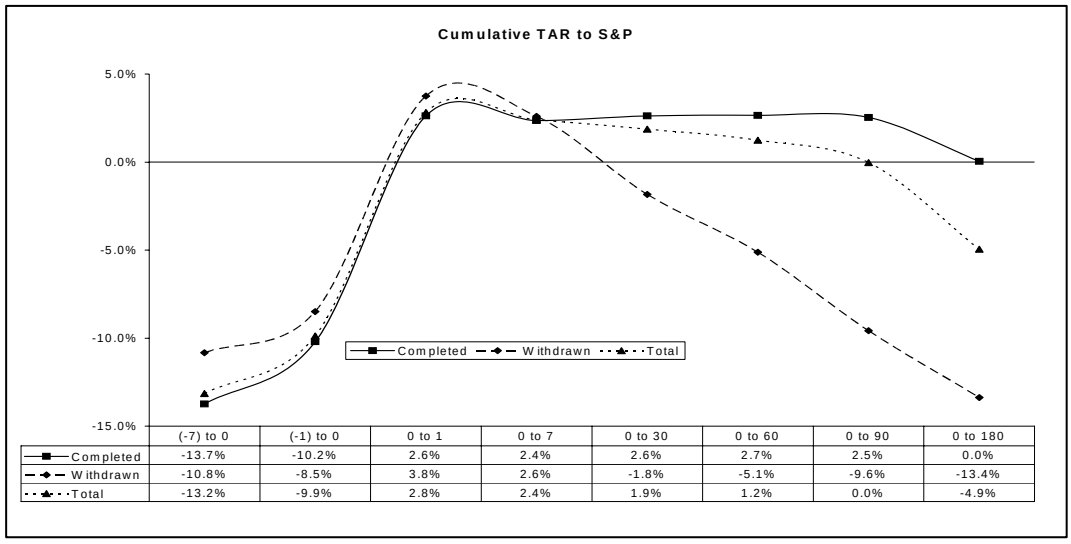
For friendly deals premium is of less significance and differs even less from cash to stock swap deals.

cash / stock swap	Status	# deals	Premium d(-1)	Premium d(-7)	Premium d(-30)
Cash		**99**	**37.0%**	**41.5%**	**48.1%**
	Completed	83	37.2%	41.5%	44.3%
	Withdrawn	16	35.9%	41.1%	66.8%
Stock Swap		**556**	**34.4%**	**38.9%**	**43.4%**
	Completed	490	34.1%	38.4%	44.4%
	Withdrawn	66	36.3%	41.9%	36.3%
Total		**655**	**34.8%**	**39.3%**	**44.2%**

[5] the attitude of the board is not applicable, i.e. open market repurchases, splitoffs and spinoffs etc.

Figure 13 – Cumulative Target abnormal return relative to S&P 500

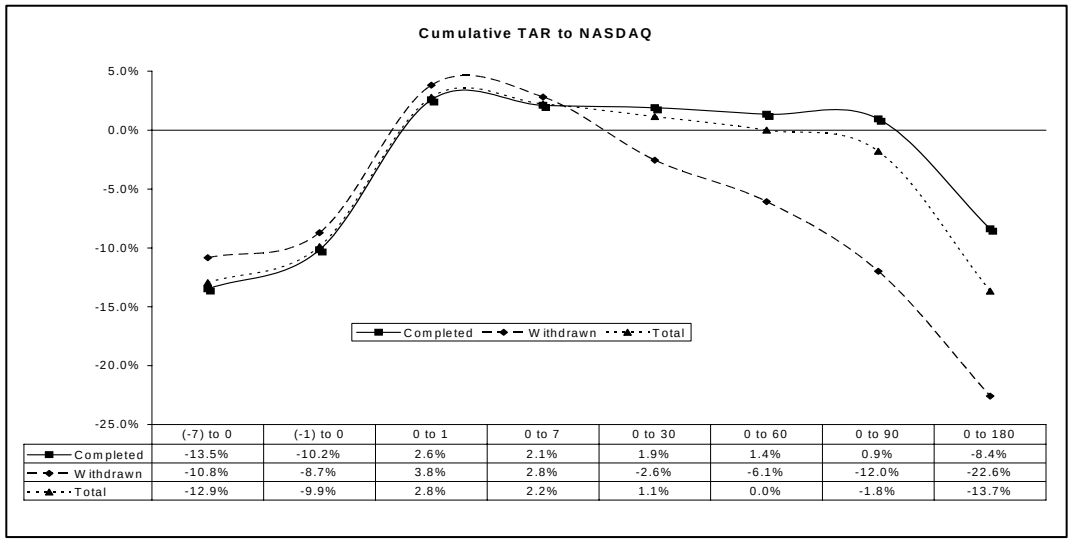
The chart indicates the share price movement of stocks being acquired relative to the S&P 500. The deal is always announced on day 0. Stock prices are available of the days -7, -1, 0, 1, 7, 30, 60, 90 and 180. The chart differentiates between successful and withdrawn cases. Not surprisingly withdrawn cases yield a significantly lower return than successful case. However, neither outperforms the Index after the deal was announced. It is very important to notice that the final *price jump* which is caused when target stock of a successful deal is delisted, is *not* included in this graphic, which causes the successful deals to have a downward bias.



	(-7) to 0	(-1) to 0	0 to 1	0 to 7	0 to 30	0 to 60	0 to 90	0 to 180
Completed	-13.7%	-10.2%	2.6%	2.4%	2.6%	2.7%	2.5%	0.0%
Withdrawn	-10.8%	-8.5%	3.8%	2.6%	-1.8%	-5.1%	-9.6%	-13.4%
Total	-13.2%	-9.9%	2.8%	2.4%	1.9%	1.2%	0.0%	-4.9%

Figure 14 – Cumulative Target abnormal return relative to NASDAQ

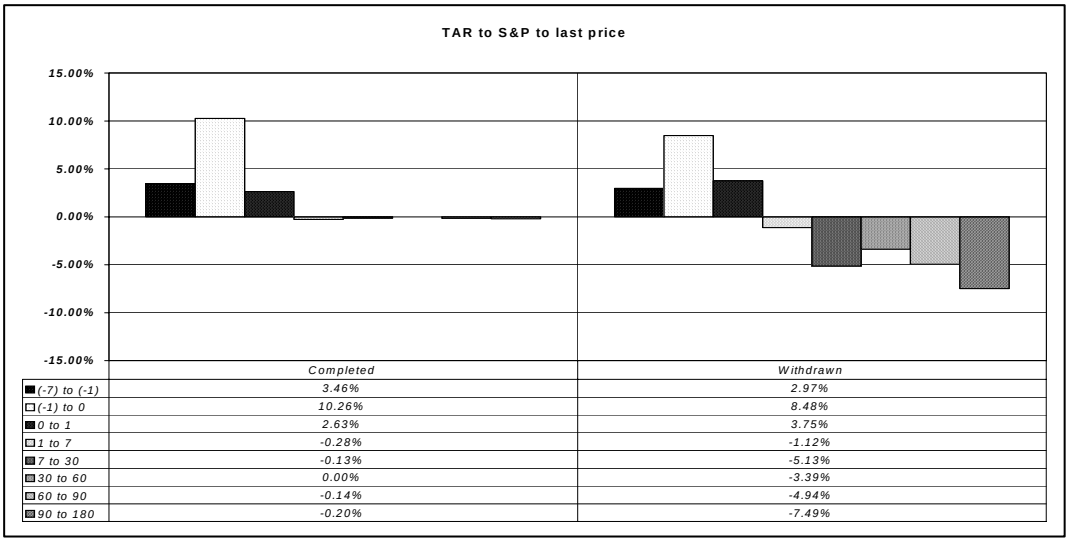
This is the same illustration as above but depicts the return relative to the NASDAQ. During the time of 1997 and 2000 the NASDAQ was of great importance. To make sure the results of this study are not biased because of the use of only one benchmark I test here also the price movements of the target companies against the NASDAQ composite. The discrepancies between this chart and the one above are of negligent quantity. The final *price jump* which is caused when target stock of a successful deal is delisted, is *not* included in this graphic.



	(-7) to 0	(-1) to 0	0 to 1	0 to 7	0 to 30	0 to 60	0 to 90	0 to 180
Completed	-13.5%	-10.2%	2.6%	2.1%	1.9%	1.4%	0.9%	-8.4%
Withdrawn	-10.8%	-8.7%	3.8%	2.8%	-2.6%	-6.1%	-12.0%	-22.6%
Total	-12.9%	-9.9%	2.8%	2.2%	1.1%	0.0%	-1.8%	-13.7%

Figure 15 – Target Abnormal Return (TAR) to S&P 500 relative to last price measurement

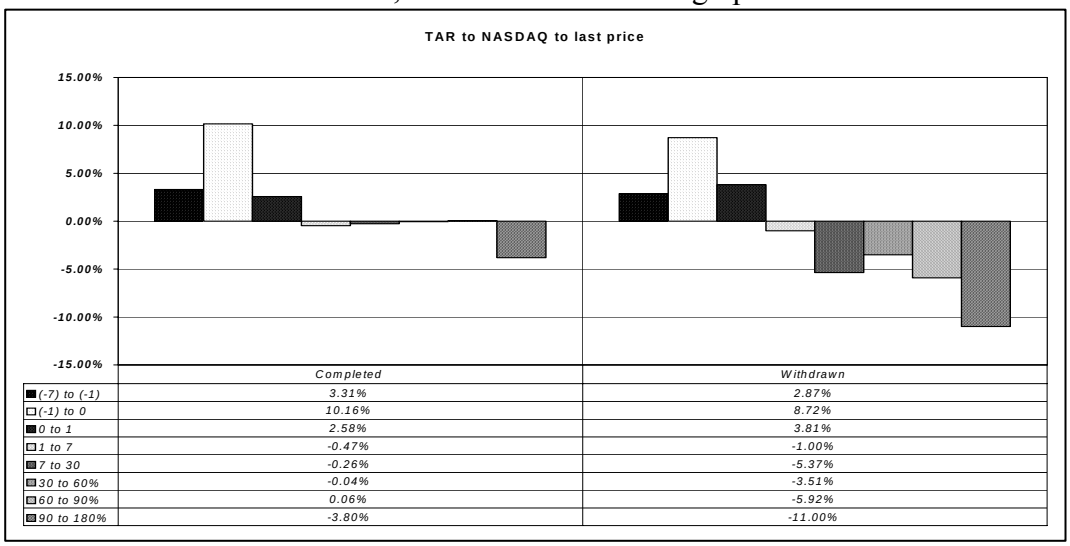
The chart shows the respective differences between each period displayed in Figure 14. The attentive reader may notice that the results sometimes do not match exactly. The reason for this is that for a few cases there was no stock data available for day 0 which causes a slight distortion between the two illustrations, which are, however, of no importance for the overall results. The final *price jump* which is caused when target stock of a successful deal is delisted, is *not* included in this graphic.



	Completed	Withdrawn
(-7) to (-1)	3.46%	2.97%
(-1) to 0	10.26%	8.48%
0 to 1	2.63%	3.75%
1 to 7	-0.28%	-1.12%
7 to 30	-0.13%	-5.13%
30 to 60	0.00%	-3.39%
60 to 90	-0.14%	-4.94%
90 to 180	-0.20%	-7.49%

Figure 16 – Target Abnormal Return (TAR) to NASDAQ relative to last price measurement

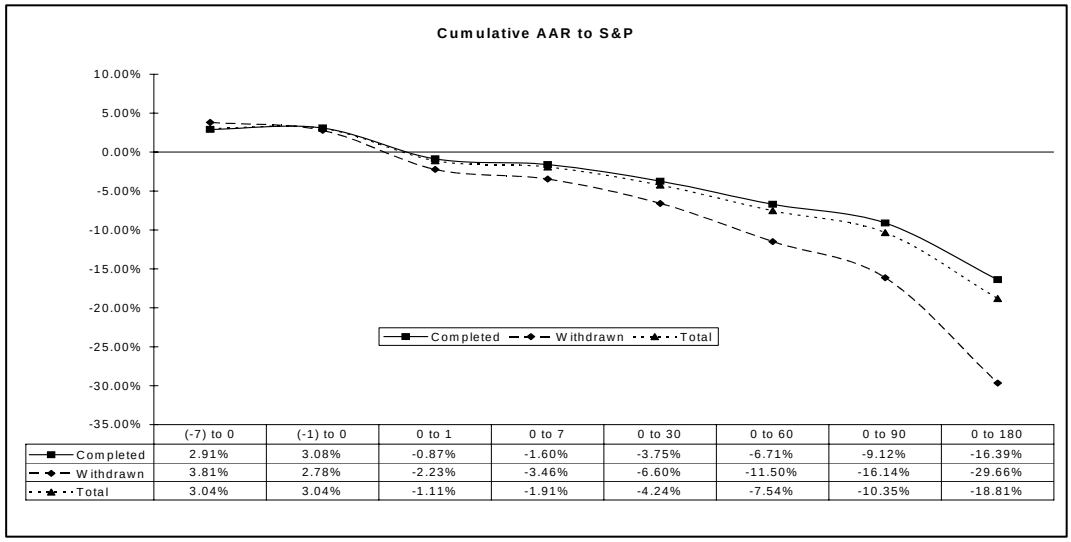
The chart shows the average difference in price for the target company to the last measurement of the stockprice (on the days stated). The final *price jump* which is caused when target stock of a successful deal is delisted, is *not* included in this graphic.



	Completed	Withdrawn
(-7) to (-1)	3.31%	2.87%
(-1) to 0	10.16%	8.72%
0 to 1	2.58%	3.81%
1 to 7	-0.47%	-1.00%
7 to 30	-0.26%	-5.37%
30 to 60%	-0.04%	-3.51%
60 to 90%	0.06%	-5.92%
90 to 180%	-3.80%	-11.00%

Figure 17 – Cumulative Acquirer abnormal return relative to S&P 500

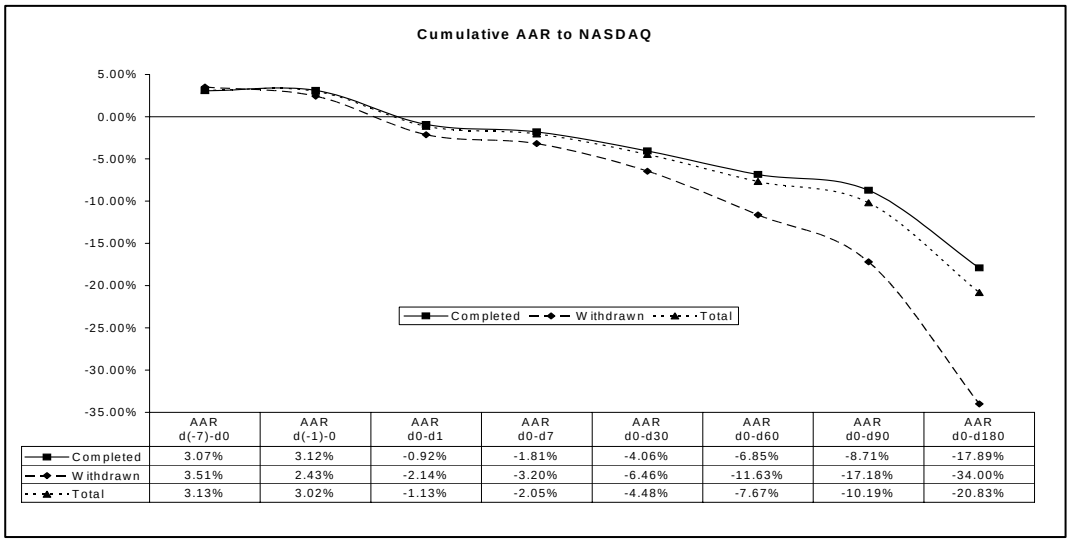
The graph indicates the share price movement of stocks of companies which are acquiring another firm relative to the S&P 500. The deal is always announced on day 0. Stock closing prices are available of days -7, -1, 0, 1, 7, 30, 60, 90 and 180. The chart differentiates between successful and withdrawn cases. Not surprisingly withdrawn cases yield a significantly lower return than successful case which, however, also do not outperform the Index after the deal was announced.



	(-7) to 0	(-1) to 0	0 to 1	0 to 7	0 to 30	0 to 60	0 to 90	0 to 180
Completed	2.91%	3.08%	-0.87%	-1.60%	-3.75%	-6.71%	-9.12%	-16.39%
Withdrawn	3.81%	2.78%	-2.23%	-3.46%	-6.60%	-11.50%	-16.14%	-29.66%
Total	3.04%	3.04%	-1.11%	-1.91%	-4.24%	-7.54%	-10.35%	-18.81%

Figure 18 – Cumulative Acquirer abnormal return relative to NASDAQ

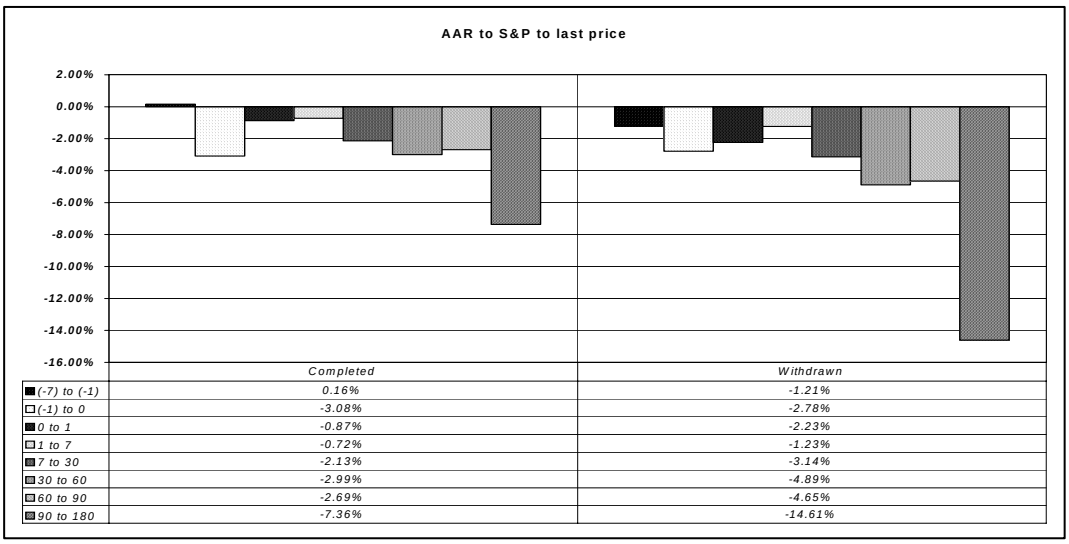
In the period of 1997 and 2000 the NASDAQ was of great importance. To make sure the results are not tainted by omitting that fact I test also the price movements of the target companies against this Index. However, the discrepancies between the S&P 500 and NASDAQ as a benchmark are negligent.



	AAR d(-7)-d0	AAR d(-1)-0	AAR d0-d1	AAR d0-d7	AAR d0-d30	AAR d0-d60	AAR d0-d90	AAR d0-d180
Completed	3.07%	3.12%	-0.92%	-1.81%	-4.06%	-6.85%	-8.71%	-17.89%
Withdrawn	3.51%	2.43%	-2.14%	-3.20%	-6.46%	-11.63%	-17.18%	-34.00%
Total	3.13%	3.02%	-1.13%	-2.05%	-4.48%	-7.67%	-10.19%	-20.83%

Figure 19 – Acquirer Abnormal Return (AAR) to S&P 500 relative to last price measurement

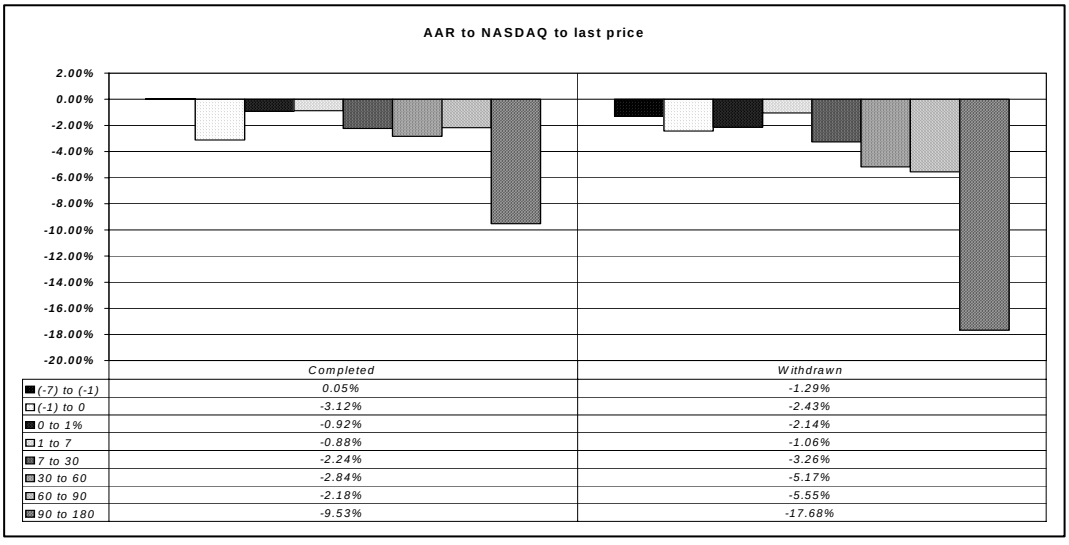
The chart shows the average difference in price for the acquiring company to the last measurement of the stock price (on the days stated).



	Completed	Withdrawn
(-7) to (-1)	0.16%	-1.21%
(-1) to 0	-3.08%	-2.78%
0 to 1	-0.87%	-2.23%
1 to 7	-0.72%	-1.23%
7 to 30	-2.13%	-3.14%
30 to 60	-2.99%	-4.89%
60 to 90	-2.69%	-4.65%
90 to 180	-7.36%	-14.61%

Figure 20 – Acquirer Abnormal Return (AAR) to NASDAQ relative to last price measurement

The chart shows the average difference in price for the acquiring company to the last measurement of the stock price (on the days stated).



	Completed	Withdrawn
(-7) to (-1)	0.05%	-1.29%
(-1) to 0	-3.12%	-2.43%
0 to 1%	-0.92%	-2.14%
1 to 7	-0.88%	-1.06%
7 to 30	-2.24%	-3.26%
30 to 60	-2.84%	-5.17%
60 to 90	-2.18%	-5.55%
90 to 180	-9.53%	-17.68%

Figure 21 – Acquirer return (absolute), cash deals only

When a company announces an acquisition and payment is done via stock swap, the stock price comes under pressure because arbitrageurs will try to hedge their position. In cash deals the situation is different. That's why I also depict the share price movement diagram for cash deals only.

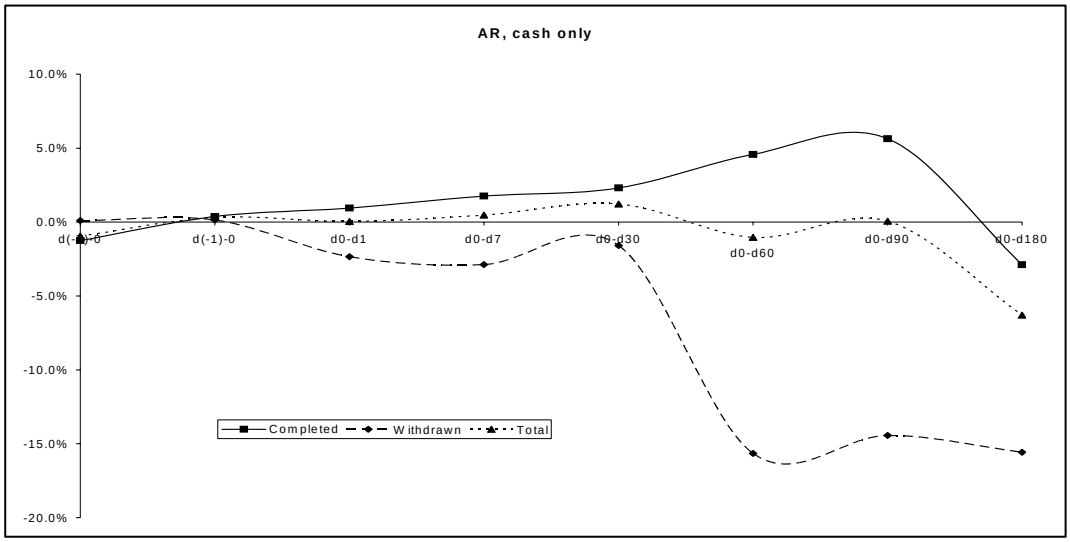


Figure 22 – Acquirer abnormal return, cash deals only

Similar to the graph above the figure illustrates the stock price movements for acquiring companies when they pay their acquisition in cash only. This time the stock movement is calculated relative to the S&P 500.

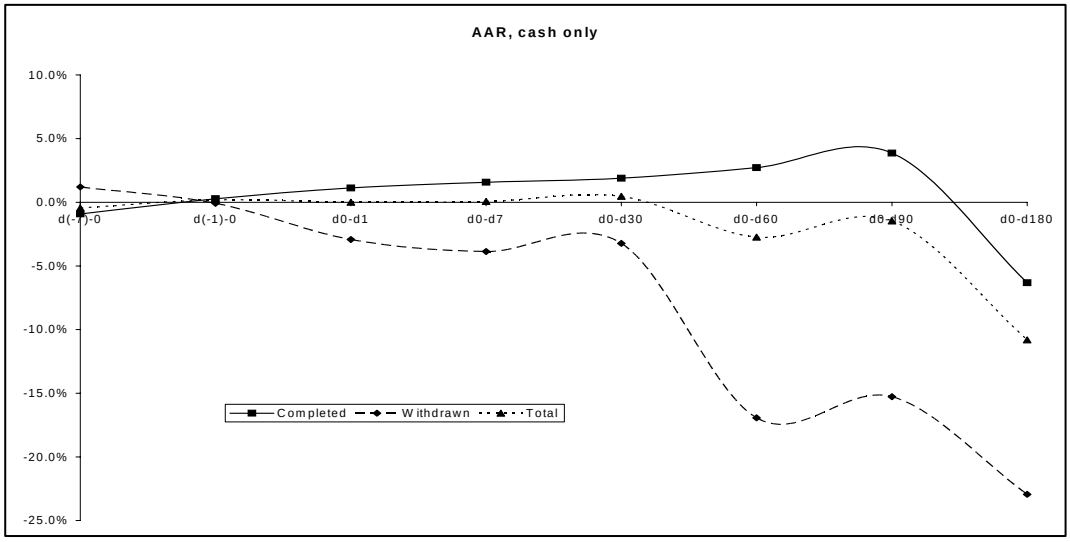
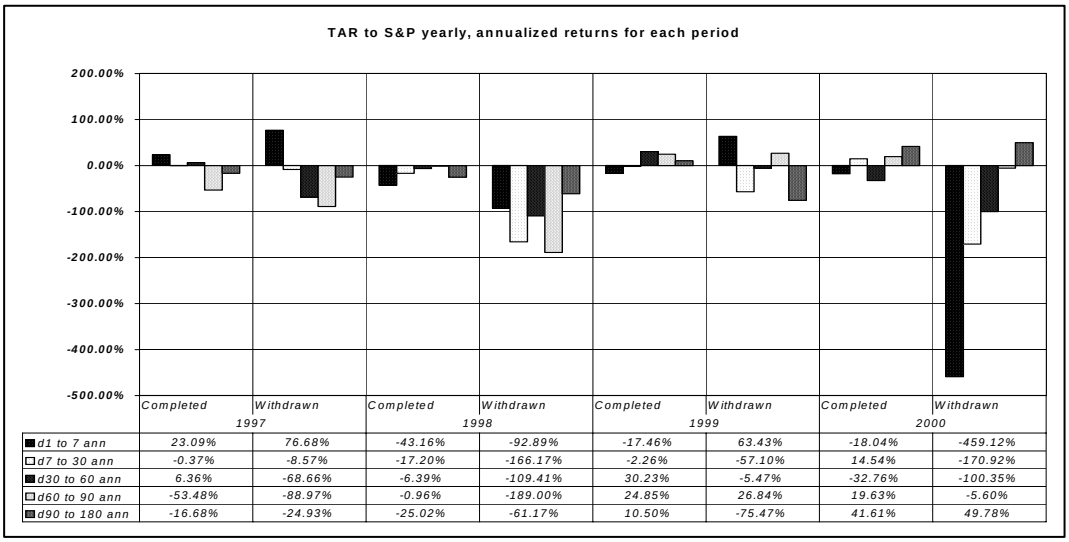


Figure 23 – Target Abnormal Returns, yearly, annualized for each period

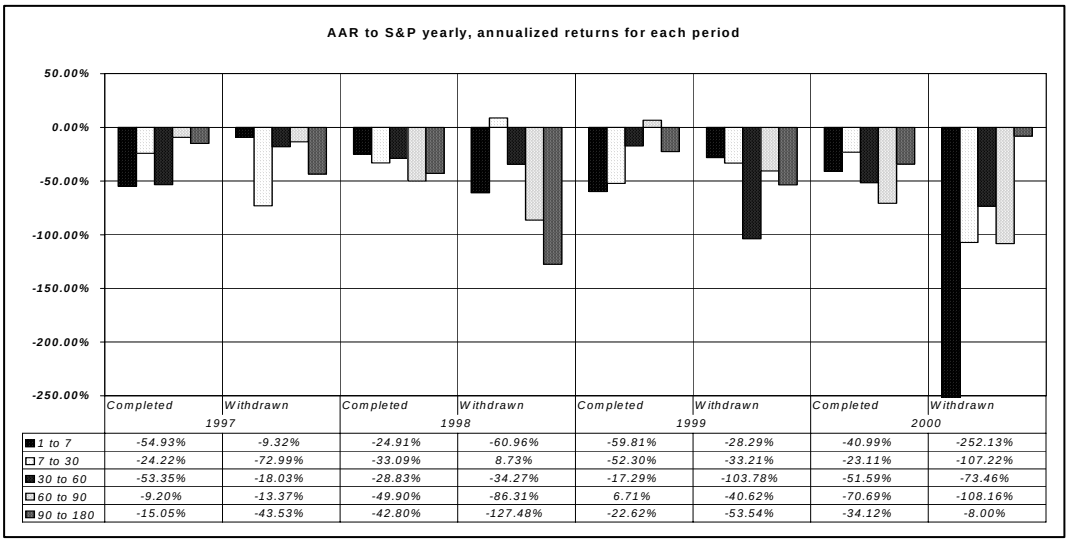
The chart shows annualized returns for each year when investing in target shares. I differentiate between completed and withdrawn deals and show the returns relative to the S&P 500 for each of the stated periods relative to the original date of deal announcement. It is important to notice that the **final price jump** which is caused when target stock of a successful deal is delisted is **NOT included** in this graphic which causes the successful deals to have a downward bias.



	Completed	Withdrawn	Completed	Withdrawn	Completed	Withdrawn	Completed	Withdrawn
	1997		1998		1999		2000	
d1 to 7 ann	23.09%	76.68%	-43.16%	-92.89%	-17.46%	63.43%	-18.04%	-459.12%
d7 to 30 ann	-0.37%	-8.57%	-17.20%	-166.17%	-2.26%	-57.10%	14.54%	-170.92%
d30 to 60 ann	6.36%	-68.66%	-6.39%	-109.41%	30.23%	-5.47%	-32.76%	-100.35%
d60 to 90 ann	-53.48%	-88.97%	-0.96%	-189.00%	24.85%	26.84%	19.63%	-5.60%
d90 to 180 ann	-16.68%	-24.93%	-25.02%	-61.17%	10.50%	-75.47%	41.61%	49.78%

Figure 24 – Acquirer Abnormal Return, yearly, annualized for each period

The chart shows annualized returns for each year when investing in shares of the acquiring companies. I differentiate between completed and withdrawn deals and show the returns relative to the S&P 500 for each of the stated periods relative to the original date of deal announcement. We can observe a relatively constant negative return over all periods similar to the findings from Figure 17.



	Completed	Withdrawn	Completed	Withdrawn	Completed	Withdrawn	Completed	Withdrawn
	1997		1998		1999		2000	
1 to 7	-54.93%	-9.32%	-24.91%	-60.96%	-59.81%	-28.29%	-40.99%	-252.13%
7 to 30	-24.22%	-72.99%	-33.09%	8.73%	-52.30%	-33.21%	-23.11%	-107.22%
30 to 60	-53.35%	-18.03%	-28.83%	-34.27%	-17.29%	-103.78%	-51.59%	-73.46%
60 to 90	-9.20%	-13.37%	-49.90%	-86.31%	6.71%	-40.62%	-70.69%	-108.16%
90 to 180	-15.05%	-43.53%	-42.80%	-127.48%	-22.62%	-53.54%	-34.12%	-8.00%

Appendix II Logit Regressions on Deal Success or Failure

Table 11 – Logit regression (full sample): Status to Friendly

To find out which factors which are know at the original date of deal announcement can be helpful to predict the final outcome of the deal (binary dependent variable STATUS) I run a logit regression on all financial and non-financial factors available about target companies and deal specifications (for a full list see Table 17). Friendly deals appear to have a significantly higher chance of deal success than hostile bids.

Dependent Variable: STATUS
Method: ML - Binary Logit
Sample: 1 799
Included observations: 799
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.631272	0.175038	3.606484	0.0003
FRIENDLY	1.312895	0.211136	6.218227	**0.0000**

Mean dependent var	0.834793	S.D. dependent var	0.371599
S.E. of regression	0.361881	Akaike info criterion	0.856095
Sum squared resid	104.3732	Schwarz criterion	0.867818
Log likelihood	-340.0098	Hannan-Quinn criter.	0.860598
Restr. log likelihood	-358.1146	Avg. log likelihood	-0.425544
LR statistic (1 df)	36.20948	McFadden R-squared	0.050556
Probability(LR stat)	1.77E-09		
Obs with Dep=0	132	Total obs	799
Obs with Dep=1	667		

Table 12 – Logit regression (full sample): Status to Toehold

All cases where the acquirer already owned at least 10% of the target companies at the day of the deal announcement were successful, that's why the logit regression is unable give us further information. Yet we can say, the variable is highly significant.

Dependent Variable: STATUS
Method: ML - Binary Logit
Sample: 1 799
Included observations: 799
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.553348	0.095804	16.21389	0.0000
TOEHOLD	31.76185	2615592.	1.21E-05	1.0000

Mean dependent var	0.834793	S.D. dependent var	0.371599
S.E. of regression	0.369734	Akaike info criterion	0.881381
Sum squared resid	108.9524	Schwarz criterion	0.893104
Log likelihood	-350.1116	Hannan-Quinn criter.	0.885884
Restr. log likelihood	-358.1146	Avg. log likelihood	-0.438187
LR statistic (1 df)	16.00597	McFadden R-squared	0.022348
Probability(LR stat)	6.31E-05		
Obs with Dep=0	132	Total obs	799
Obs with Dep=1	667		

Table 13 – Logit regression (full sample): Status to Enterprise Value[6] per Sales

Enterprise value per sales appears to have a great influence on the deal success rate. A higher value increases the chances for deal success.

Dependent Variable: STATUS
Method: ML - Binary Logit
Sample: 1 799
Included observations: 766
Excluded observations: 33
Convergence achieved after 6 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.353838	0.129604	10.44597	0.0000
EPV_SLS	**0.046420**	0.018251	2.543493	**0.0110**

Mean dependent var	0.835509	S.D. dependent var	0.370963
S.E. of regression	0.368279	Akaike info criterion	0.880770
Sum squared resid	103.6209	Schwarz criterion	0.892887
Log likelihood	-335.3347	Hannan-Quinn criter.	0.885434
Restr. log likelihood	-342.4344	Avg. log likelihood	-0.437774
LR statistic (1 df)	14.19934	McFadden R-squared	0.020733
Probability(LR stat)	0.000164		
Obs with Dep=0	126	Total obs	766
Obs with Dep=1	640		

[6] Notice that enterprise value is partly dependent on the takeover price which is not always known at the time of the announcement.

Table 14 – Logit regression (full sample): Status to Log (Sales)

A higher LOG (sales) of the target company appears to have negative influence on deal success. A possible explanation would be that companies with higher sales and thus more promising expectations are less willing to be acquired. Sales may be a better indicator than profit because it may be more important for the company's long-term future.

Dependent Variable: STATUS
Method: ML - Binary Logit
Sample(adjusted): 2 799
Included observations: 773
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.271648	0.298221	7.617339	0.0000
SLS_LOG	**-0.252214**	0.104239	-2.419571	**0.0155**

Mean dependent var	0.833118	S.D. dependent var	0.373112
S.E. of regression	0.371832	Akaike info criterion	0.899249
Sum squared resid	106.5979	Schwarz criterion	0.911281
Log likelihood	-345.5599	Hannan-Quinn criter.	0.903879
Restr. log likelihood	-348.5519	Avg. log likelihood	-0.447037
LR statistic (1 df)	5.983993	McFadden R-squared	0.008584
Probability(LR stat)	0.014436		
Obs with Dep=0	129	Total obs	773
Obs with Dep=1	644		

Table 15 – Logit regression (full sample): Status to Cash

Whether the offer is cash or stock exchange does not have significant influence on deal success.

Dependent Variable: STATUS
Method: ML - Binary Logit
Date: 03/14/04 Time: 23:39
Sample(adjusted): 1 798 IF FRIENDLY=1
Included observations: 655 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.004751	0.131120	15.28949	0.0000
CASH	-0.358499	0.302887	-1.183606	0.2366

Mean dependent var	0.874809	S.D. dependent var	0.331188
S.E. of regression	0.331084	Akaike info criterion	0.758360
Sum squared resid	71.57961	Schwarz criterion	0.772054
Log likelihood	-246.3630	Hannan-Quinn criter.	0.763670
Restr. log likelihood	-247.0276	Avg. log likelihood	-0.376127
LR statistic (1 df)	1.329186	McFadden R-squared	0.002690
Probability(LR stat)	0.248950		
Obs with Dep=0	82	Total obs	655
Obs with Dep=1	573		

Table 16 – Logit regression (full sample): Status to takeover premium

The premium as measured one day before deal announcement appears to have a significant influence on deal success – but in a negative way. A higher takeover premium may be a sign for increased obstacles which may hamper a successful conclusion of the deal.

Dependent Variable: STATUS
Method: ML - Binary Logit
Date: 03/15/04 Time: 03:40
Sample: 1 799
Included observations: 626
Excluded observations: 173
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.656344	0.137919	12.00951	0.0000
PREM_T_1	-0.003912	0.002338	-1.672945	**0.0943**

Mean dependent var	0.819489	S.D. dependent var	0.384920
S.E. of regression	0.384279	Akaike info criterion	0.946484
Sum squared resid	92.14615	Schwarz criterion	0.960667
Log likelihood	-294.2494	Hannan-Quinn criter.	0.951994
Restr. log likelihood	-295.5770	Avg. log likelihood	-0.470047
LR statistic (1 df)	2.655264	McFadden R-squared	0.004492
Probability(LR stat)	0.103208		

Obs with Dep=0	113	Total obs	626
Obs with Dep=1	513		

Table 17 – Summary of univariate logit regressions of Full Sample

The table sums up which factors have significant influence on deal success for all takeovers available in the sample. The lower the p-value the more the corresponding variable influences the dependent variable STATUS. For the full sample the variables toehold, friendly, enterprise value / sales, and log (sales) have been identified as being significant within the 10% significance level. All regressions were done independently from each other (univariate regressions).

VARIABLE DESCRIPTION	NAME	COEFFICIENT	P-VALUE
Toehold	**toehold**	**31.8**	**n/a**
Friendly versus hostile takeover	**friendly**	**1.31**	**0%**
Enterprise Value / Sales	***Epv_sls***	***.05***	***1%***
Log (sales)	**Sls_log**	**-.25**	**2%**
Premium 1 day before announcement [7]	Prem_t_1	-.004	9%
Accretive EPS	accretive_eps		13%
Enterprise value / cashflow	Epv_cf		17%
Premium 7 days before announcement	Prem_t_7		17%
Accretive P/E	Accretive_p_e		18%
big (>1.5b) or small (50-75m) deals	big		18%
Enterprise value / operating income	Epv_opinc		18%
Enterprise value / net income	Ev_ninc		19%
Method of payment	Cash		20%
Sales	sls		21%
Offer P/E ratio	Offer_p_e		22%
Equity	eq		28%
Log (Assets)	As_log		32%
Log (Equity)	Eq_log		33%
Log (Deal Value)	Value_log		39%
Book value per share	Bkv_shr		59%
Dept / Equity	gearing		61%
Enterprise value	Epv		63%
Cashflow / assets	cf_as		64%
Profit Margin	Prof_mrg		67%
Sales / assets	Sls_as		68%
Premium 30 days before announcement	Prem_t_30		70%
cashflow	cf		71%
Net income	Net_inc		71%
Assets	as		72%
Net income / assets	Ninc_as		80%
Pretax income	Prx_inc		88%
Cashflow / equity	Cf_eq		91%
Operating income	Op_inc		97%
Deal value	value		97%

[7] see chapter 3.4 for further explanations

Table 18 – Logit regression (friendly deals only): Status to Accretive to EPS

A company with a lower EPS buys a firm with a higher EPS is more likely to be successful than vice versa when the deal is friendly. Although our trading simulation in Figure 27 confirms this finding, I urge caution with the interpretation of this finding. The significance level of 10% for a sample of 292 cases is relatively lean.

Dependent Variable: STATUS
Method: ML - Binary Logit
Sample(adjusted): 1 798 IF **FRIENDLY=1**
Included observations: 292
Excluded observations: 362 after adjusting endpoints
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.021548	0.237955	8.495509	0.0000
ACCRETIVE_EPS	0.768741	0.456346	1.684557	**0.0921**

Mean dependent var	0.907534	S.D. dependent var	0.290180
S.E. of regression	0.289207	Akaike info criterion	0.619474
Sum squared resid	24.25586	Schwarz criterion	0.644657
Log likelihood	-88.44323	Hannan-Quinn criter.	0.629562
Restr. log likelihood	-89.99611	Avg. log likelihood	-0.302888
LR statistic (1 df)	3.105764	McFadden R-squared	0.017255
Probability(LR stat)	0.078016		
Obs with Dep=0	27	Total obs	292
Obs with Dep=1	265		

Table 19 – Logit regression (friendly deals only): Status to Enterprise Value per Sales

For friendly deals a higher enterprise value per sales has a positive influence in deal success. Notice that the enterprise value is dependent on the final takeover price which may not be known at the original date of announcement.

Dependent Variable: STATUS
Method: ML - Binary Logit
Sample(adjusted): 1 798 IF **FRIENDLY=1**
Included observations: 638
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.627088	0.165569	9.827273	0.0000
EPV_SLS	0.058878	0.024765	2.377458	**0.0174**

Mean dependent var	0.877743	S.D. dependent var	0.327839
S.E. of regression	0.325112	Akaike info criterion	0.730000
Sum squared resid	67.22378	Schwarz criterion	0.743976
Log likelihood	-230.8701	Hannan-Quinn criter.	0.735426
Restr. log likelihood	-236.9519	Avg. log likelihood	-0.361865
LR statistic (1 df)	12.16365	McFadden R-squared	0.025667
Probability(LR stat)	0.000487		
Obs with Dep=0	78	Total obs	638
Obs with Dep=1	560		

Table 20 – Logit regression (friendly deals only): Status to "Log (Sales)

Similar to Table 14 we can see that a higher LOG (sales) of the target company appears to have negative influence on deal success for friendly deals. A possible explanation would be that companies with higher sales and thus more promising expectations are less willing to be acquired or vice versa.

Dependent Variable: STATUS
Method: ML - Binary Logit
Date: 03/13/04 Time: 02:21
Sample(adjusted): 3 798 IF FRIENDLY=1
Included observations: 642
Excluded observations: 10 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.504720	0.352959	7.096345	0.0000
SLS_LOG	**-0.216919**	0.126051	-1.720888	**0.0853**

Mean dependent var	0.875389	S.D. dependent var	0.330534
S.E. of regression	0.330006	Akaike info criterion	0.753579
Sum squared resid	69.69850	Schwarz criterion	0.767487
Log likelihood	-239.8988	Hannan-Quinn criter.	0.758977
Restr. log likelihood	-241.3995	Avg. log likelihood	-0.373674
LR statistic (1 df)	3.001427	McFadden R-squared	0.006217
Probability(LR stat)	0.083191		
Obs with Dep=0	80	Total obs	642
Obs with Dep=1	562		

Table 21 – Logit regression (non-friendly deals only): Status to Cash

The table shows that for non-friendly deals it is an advantage when payment is done in cash.

Dependent Variable: STATUS
Method: ML - Binary Logit
Date: 03/26/04 Time: 15:55
Sample(adjusted): 2 799 IF **FRIENDLY=0**
Included observations: 144 after adjusting endpoints
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.587787	0.322030	-1.825252	0.0680
CASH	**1.821740**	0.399800	4.556633	**0.0000**

Mean dependent var	0.652778	S.D. dependent var	0.477749
S.E. of regression	0.439723	Akaike info criterion	1.164142
Sum squared resid	27.45658	Schwarz criterion	1.205390
Log likelihood	-81.81826	Hannan-Quinn criter.	1.180903
Restr. log likelihood	-92.98226	Avg. log likelihood	-0.568182
LR statistic (1 df)	22.32800	McFadden R-squared	0.120066
Probability(LR stat)	2.30E-06		
Obs with Dep=0	50	Total obs	144
Obs with Dep=1	94		

Table 22 – Summary for univariate logit regressions of Friendly deals only

The table sums up which factors have significant influence on deal success for friendly takeovers. The lower the significance percentage the more the corresponding variable influences the dependent variable STATUS. For the full sample the variables toehold, Log(sales), Enterprise value per sales and accretive EPS have been identified as being significant within the 10% significance level. All regressions were done independently from each other (univariate regressions).

VARIABLE DESCRIPTION	NAME	COEFFICIENT	P-VALUE
Toehold	**toehold**	**29.6**	**n/a**
Enterprise Value / Sales	***Epv_sls***	***.05***	***2%***
Log (sales)	**Sls_log**	**-.21**	**9%**
Accretive EPS	**accretive_eps**	**.8**	**9%**
Enterprise value / operating income	Epv_opinc		13%
Enterprise value / cashflow	Epv_cf		18%
Method of payment	cash		24%
Enterprise value / net income	Ev_ninc		26%
Book value per share	Bkv_shr		31%
Enterprise value	Epv		31%
Offer P/E ratio	Offer_p_e		37%
Net income	Net_inc		37%
Assets	as		37%
Pretax income	Prx_inc		47%
Operating income	Op_inc		47%
Net income / assets	Ninc_as		54%
Accretive P/E	Accretive_p_e		59%
Equity	eq		60%
Premium 7 days before announcement	Prem_t_7		62%
Log (deal value)	Value_log		62%
cashflow	cf		64%
Cashflow / assets	cf_as		66%
Profit Margin	Prof_mrg		69%
Dept / Equity	gearing		72%
Sales / assets	Sls_as		72%
Premium one day before announcement	*Prem_t_1*		*75%*
Sales	sls		77%
Premium 30 days before announcement	Prem_t_30		77%
Cashflow / equity	Cf_eq		78%
Log (Assets)	As_log		82%
Deal value	value		90%
Log (equity)	Eq_log		90%
big (>1.5b) or small (50-75m) deals	big		98%

Table 23 – Logit regression (cash deals only): Status to Log (Equity)

For cash-Takeovers a higher log (equity of target company) appears to have a negative influence on deal success.

Dependent Variable: STATUS
Method: ML - Binary Logit
Date: 03/19/04 Time: 16:20
Sample(adjusted): 2 799 IF CASH=1
Included observations: 181
Excluded observations: 19 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.453271	0.643257	3.813825	0.0001
EQ_LOG	-0.444284	0.242274	-1.833806	0.0667

Mean dependent var	0.795580	S.D. dependent var	0.404396
S.E. of regression	0.400128	Akaike info criterion	1.015866
Sum squared resid	28.65831	Schwarz criterion	1.051208
Log likelihood	-89.93583	Hannan-Quinn criter.	1.030194
Restr. log likelihood	-91.67088	Avg. log likelihood	-0.496883
LR statistic (1 df)	3.470112	McFadden R-squared	0.018927
Probability(LR stat)	0.062487		
Obs with Dep=0	37	Total obs	181
Obs with Dep=1	144		

Table 24 – Logit regression (cash deals only): Status to Log (Sales)

For Cash-only deals a lower Log (Sales) appears to have a positive influence on deal success.

Dependent Variable: STATUS
Method: ML - Binary Logit
Date: 03/23/04 Time: 14:50
Sample(adjusted): 2 799 IF **CASH=1**
Included observations: 189
Excluded observations: 11 after adjusting endpoints
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.470495	0.613646	4.025929	0.0001
SLS_LOG	**-0.414726**	0.215090	-1.928157	**0.0538**

Mean dependent var	0.798942	S.D. dependent var	0.401856
S.E. of regression	0.397509	Akaike info criterion	1.004455
Sum squared resid	29.54856	Schwarz criterion	1.038759
Log likelihood	-92.92099	Hannan-Quinn criter.	1.018352
Restr. log likelihood	-94.85266	Avg. log likelihood	-0.491645
LR statistic (1 df)	3.863337	McFadden R-squared	0.020365
Probability(LR stat)	0.049352		
Obs with Dep=0	38	Total obs	189
Obs with Dep=1	151		

Table 25 – Summary for univariate logit regressions of Cash deals only

For Cash deals we can discern additional significance for variables which describe the target company's size (such as Log (deal value), Log (Assets) and Log (Equity)). A lower company size seems to have a positive influence on deal success. The variables being significant but not in bold show a coefficient very close to zero and are thus of no relevance.

	NAME	COEFFICIENT	P-VALUE
Toehold	**toehold**	**n/a**	**n/a**
Assets	as	-.00002	01% -
Pretax income	Prx_inc	-.001	01% -
Operating income	Op_inc	-.001	01% -
Equity	eq	-.0003	01% -
Log (deal value)	**Value_log**	**-.96**	**01%**
cashflow	cf	-.0006	01% -
Sales	sls	-.0001	01% -
Deal value	value	-.0003	01% -
big (>1.5b) or small (50-75m) deals	**big**	**-1.57**	**01% -**
Enterprise value	*Epv*	*-.0006*	*02% -*
Net income	Net_inc	-.001	02% -
Premium 1 day before announcement	***Prem_t_1***	***-.01***	***05% -***
Log (sales)	**Sls_log**	**-.4**	**05%**
Enterprise value / cashflow	***Epv_cf***	***-.01***	***06% -***
Log (Assets)	**As_log**	**-.5**	**07% -**
Log (equity)	**Eq_log**	**-.4**	**07% -**
Premium 30d before announcement	*Prem_t_30*	*-.006*	*09% -*
Accretive EPS	accretive_eps		11%
Enterprise Value / Sales	Epv_sls		12%
Dept / Equity	gearing		16%
Premium 7 days before announcement	Prem_t_7		19%
Net income / assets	Ninc_as		23%
Target managerial attitude	friendly		25%
Cashflow / assets	cf_as		31%
Profit Margin	Prof_mrg		41%
Enterprise value / net income	Ev_ninc		46%
Sales / assets	Sls_as		60%
Cashflow / equity	Cf_eq		60%
Enterprise value / operating income	Epv_opinc		62%
Offer P/E ratio	Offer_p_e		65%
Book value per share	Bkv_shr		92%
Accretive P/E	Accretive_p_e		n/a

Table 26 – Summary for univariate logit regressions of Non Cash-Only deals

The result is similar to the analysis of the full sample. The additional variables which were identified are *Enterprise value / xxx*. As the coefficients of those variables are extremely low, they do not have any significant expressive power.

	NAME	COEFFICIENT	P-VALUE
Toehold	**toehold**	**35.7**	**n/a**
Enterprise Value / Sales	***Epv_sls***	***.1***	***01%***
Target managerial attitude	**friendly**	**2.6**	**01%**
Enterprise value / cashflow	*Epv_cf*	*.009*	*07% -*
Enterprise value / net income	*Ev_ninc*	*.004*	*09%*
Enterprise value / operating income	*Epv_opinc*	*.006*	*09%*
Log (sales)	**Sls_log**	**-.2**	**09%**
Enterprise value	Epv		20%
Accretive P/E	Accretive_p_e		25%
Assets	as		25% -
Premium 7 days before announcement	Prem_t_7		27%
Offer P/E ratio	Offer_p_e		28%
Accretive EPS	accretive_eps		31%
Premium 1 day before announcement	Prem_t_1		31% -
Net income	Net_inc		32% -
Operating income	Op_inc		36% -
Pretax income	Prx_inc		37% -
Book value per share	Bkv_shr		42%
Log (deal value)	Value_log		44%
Equity	eq		47% -
cashflow	cf		47% -
Premium 30d before announcement	Prem_t_30		55% -
Dept / Equity	gearing		56%
Profit Margin	Prof_mrg		58%
Net income / assets	Ninc_as		62%
Deal value	value		65% -
big (>1.5b) or small (50-75m) deals	big		78% -
Cashflow / assets	cf_as		80%
Log (Assets)	As_log		89% -
Sales / assets	Sls_as		91%
Sales	sls		92% -
Cashflow / equity	Cf_eq		94%
Log (equity)	Eq_log		94% -

Appendix III Linear Regression on Trading Profit

Table 27 – OLS regressions on target return: Dependent Variable: "return 1 to X*/90"

I testes which variables have influence on the return generated per investment. The two variables which were identified are BIG and LOG (VALUE). They are both related to the transaction value. Big is a dummy variable which is 1 if the transaction value is higher than $1.5b (high value sample) and is zero when the transaction value is between $50m andn $75m (low value sample). Notice that all variables were tested independently (univariate regressions). The linear regressions were done with all variables listed in chapter 4.1 but I only listed the ones which are of interest from previous analyses. All variables which are not listed were insignificant.

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.156E-02	.022		1.864	.063
BIG	**4.930E-02**	.027	.090	1.840	**.066**
(Constant)	3.001E-02	.048		.619	.536
FRIENDLY	4.888E-02	.050	.048	.974	.330
(Constant)	7.525E-02	.013		5.950	.000
TOEHOLD	1.239E-02	.066	.009	.187	.852
(Constant)	-1.155E-02	.043		-.270	.787
VALUE (LOG)	**2.823E-02**	.013	.105	2.133	**.034**
(Constant)	8.387E-02	.013		6.274	.000
CASH	-5.719E-02	.035	-.080	-1.617	.107
(Constant)	6.457E-02	.019		3.359	.001
PREM_t-1	1.552E-04	.000	.024	.435	.664
(Constant)	9.672E-02	.037		2.636	.009
SLS (LOG)	-8.418E-03	.013	-.032	-.642	.521
(Constant)	9.805E-02	.040		2.450	.015
AS (LOG)	-7.526E-03	.013	-.029	-.587	.557
(Constant)	7.488E-02	.012		6.005	.000
SLS/AS	5.451E-04	.001	.033	.663	.508
(Constant)	7.347E-02	.022		3.373	.001
accretive_eps	1.903E-02	.033	.035	.571	.569

Table 28 – Target abnormal return is correlated to Acquirer abnormal return

Target abnormal return appears to be positively correlated with acquirer abnormal return.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.058E-02	.017		4.106	.000
	AAR 0 180	.195	.032	.309	6.083	.000

a Dependent Variable: TAR 1 X*

Appendix IV Trading Simulations

Figure 25 – Buying target firms day 1 to end or day 1 to 90 for withdrawn

With my Matlab program (listed in Appendix V) I simulate buying all target stocks one day after announcement and selling it for its final takeover price on the day the stock is delisted. For all withdrawn deals we opt out on day 90 after announcement. To test the robustness of this assumption the Figure 26 shows the simulation with selling withdrawn deals on day 180 only.

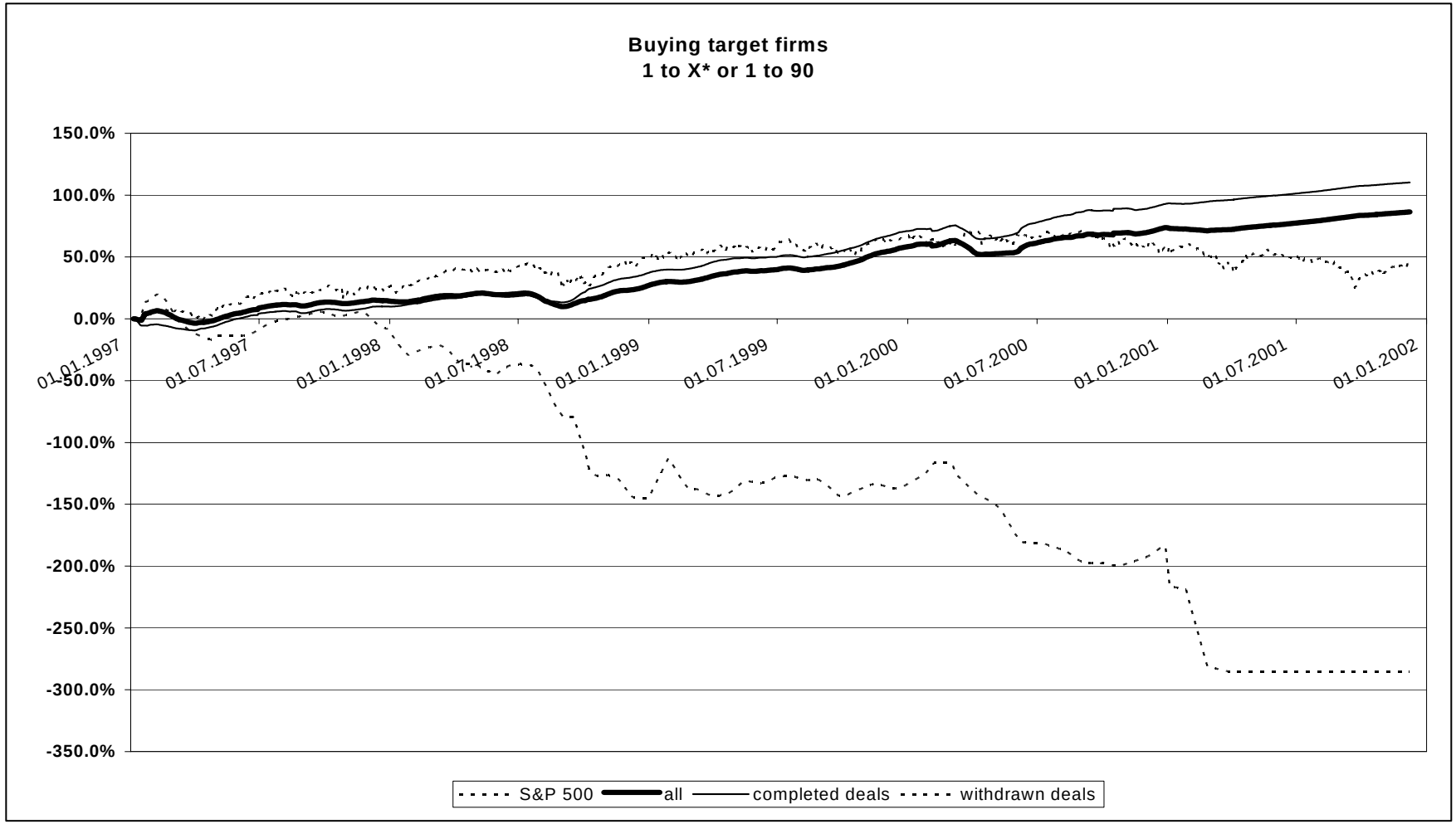


Figure 26 – Buying target firms day 1 to end or day 1 to 180 for withdrawn

Although the average drawdown from withdrawn deals is less extreme in this figure than in Figure 25, the total return is slightly lower because withdrawn deals get a higher weight in the overall investment. The total result does not significantly deviate depending on the two different assumptions. Both simulations yield a return of about 75% to 80% in five years and appear to run relatively independent from the S&P500.

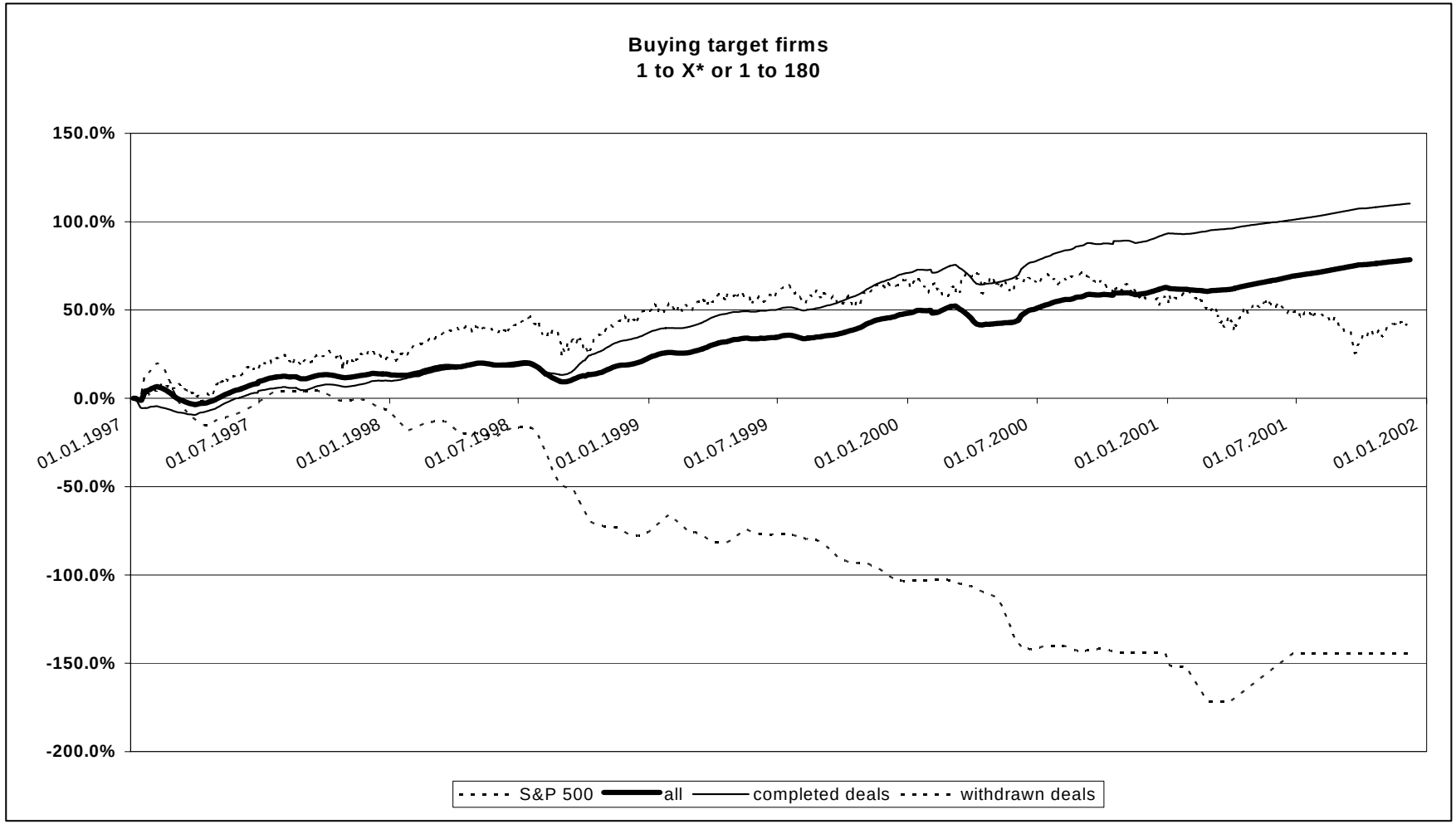


Figure 27 – Buying target firms day 1 to end or day 1 to 90: different investment strategies

The graph show the return generated when applying different criteria in buying stocks subject to an acquisition. I differentiate between cash only, friendly only, and target company stocks which have higher EPS than the acquirer. Withdrawn deals are sold on day 90 after announcement and completed deals are held until the stock is delisted.

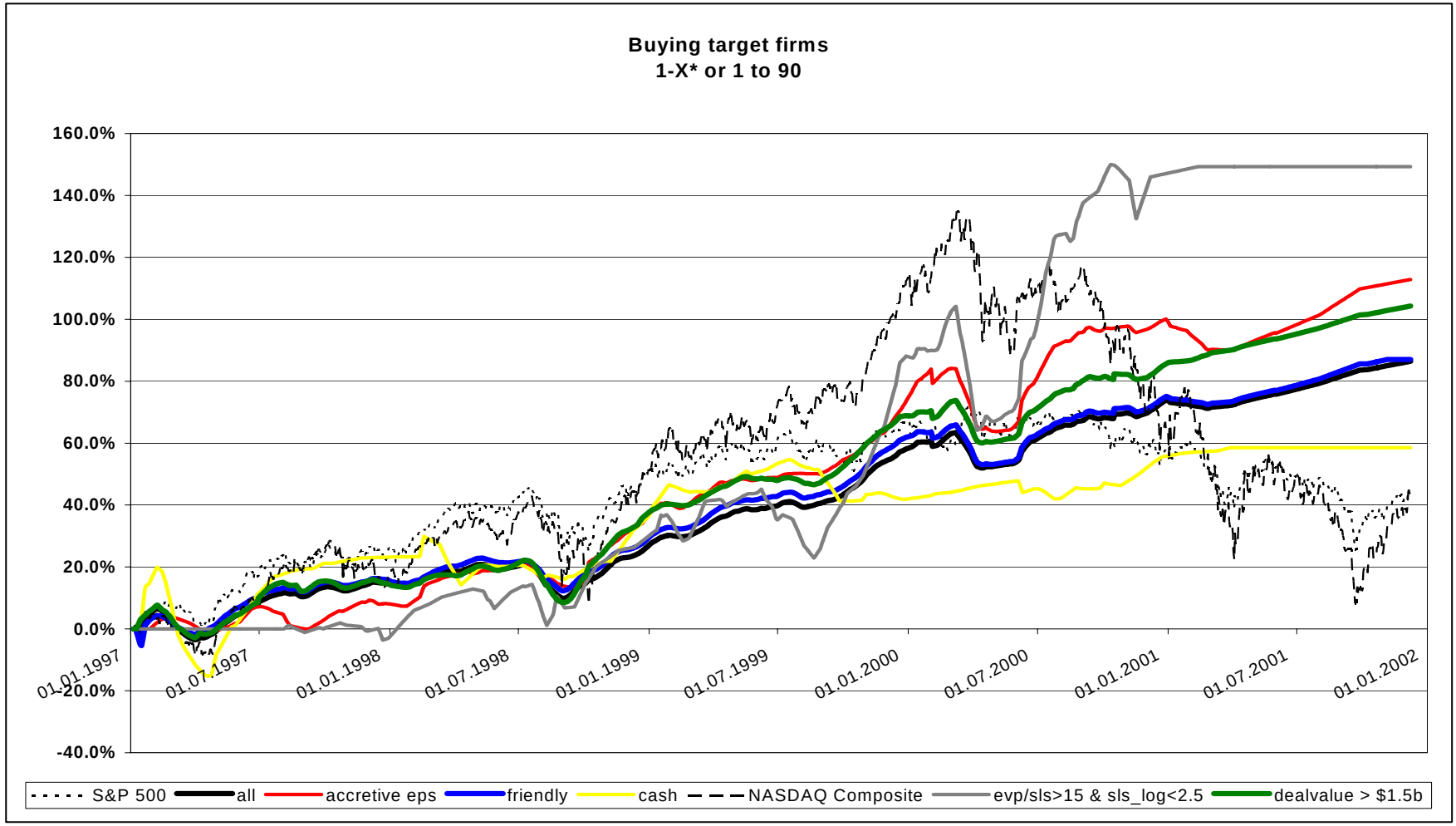


Figure 28 – Buying target firms day 1 to end or day 1 to 180: different investment strategies

The graph depicts a similar result as the previous figure. The only difference is that we hold withdrawn companies for an additional 90 days, that is 180 days in total. The overall returns of the target company investments are slightly lower than in the last figure, but do not differ significantly.

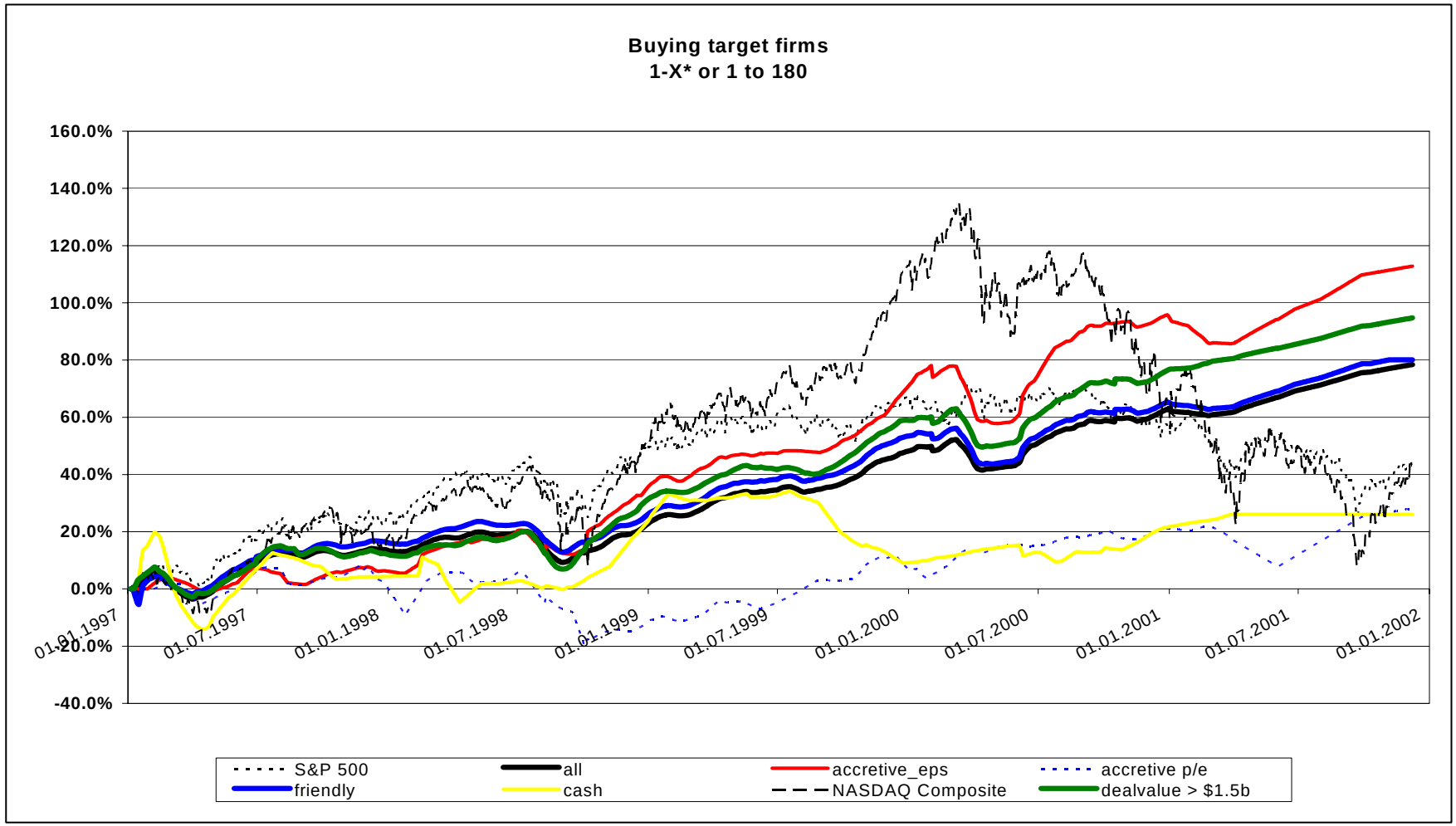


Figure 29 – Short-selling acquirer firms day 1 to day 180 after announcement

We sell the acquirer on day one after announcement short and hold the stock until the deal is completed or for 180 days if the deal is withdrawn. (The simulation also tested holding all socks for 180 days (even if completed earlier) but the return deviates only slightly upwards).

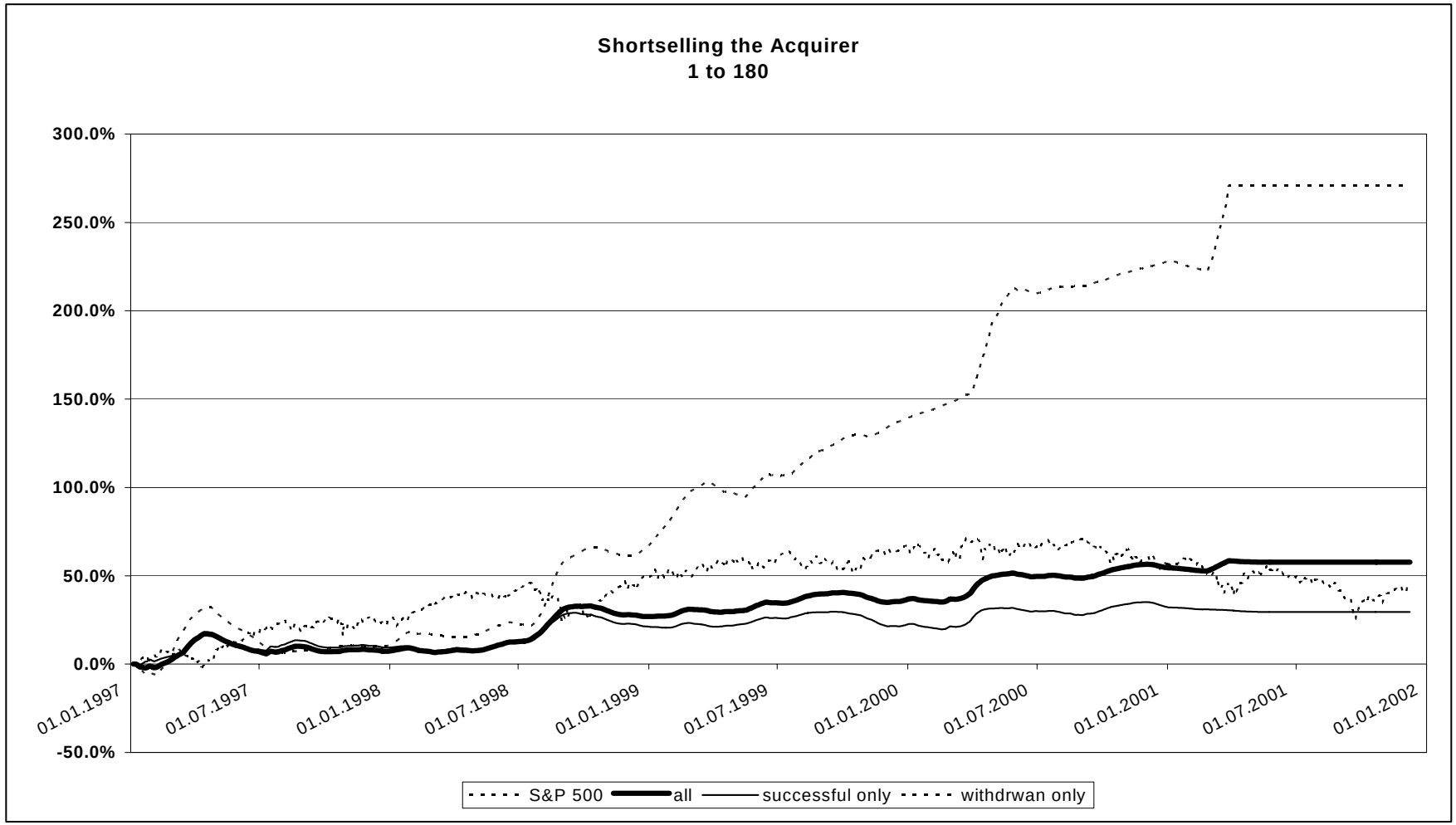


Figure 30 – Short-selling acquirer firms day 1 to day X* or 180, different strategies

We sell the acquirer on day one after announcement short and hold the stock until the deal is completed or for 180 days if the deal is withdrawn. (The simulation also tested holding all socks for 180 days (even if completed earlier) but the return deviates only slightly upwards).

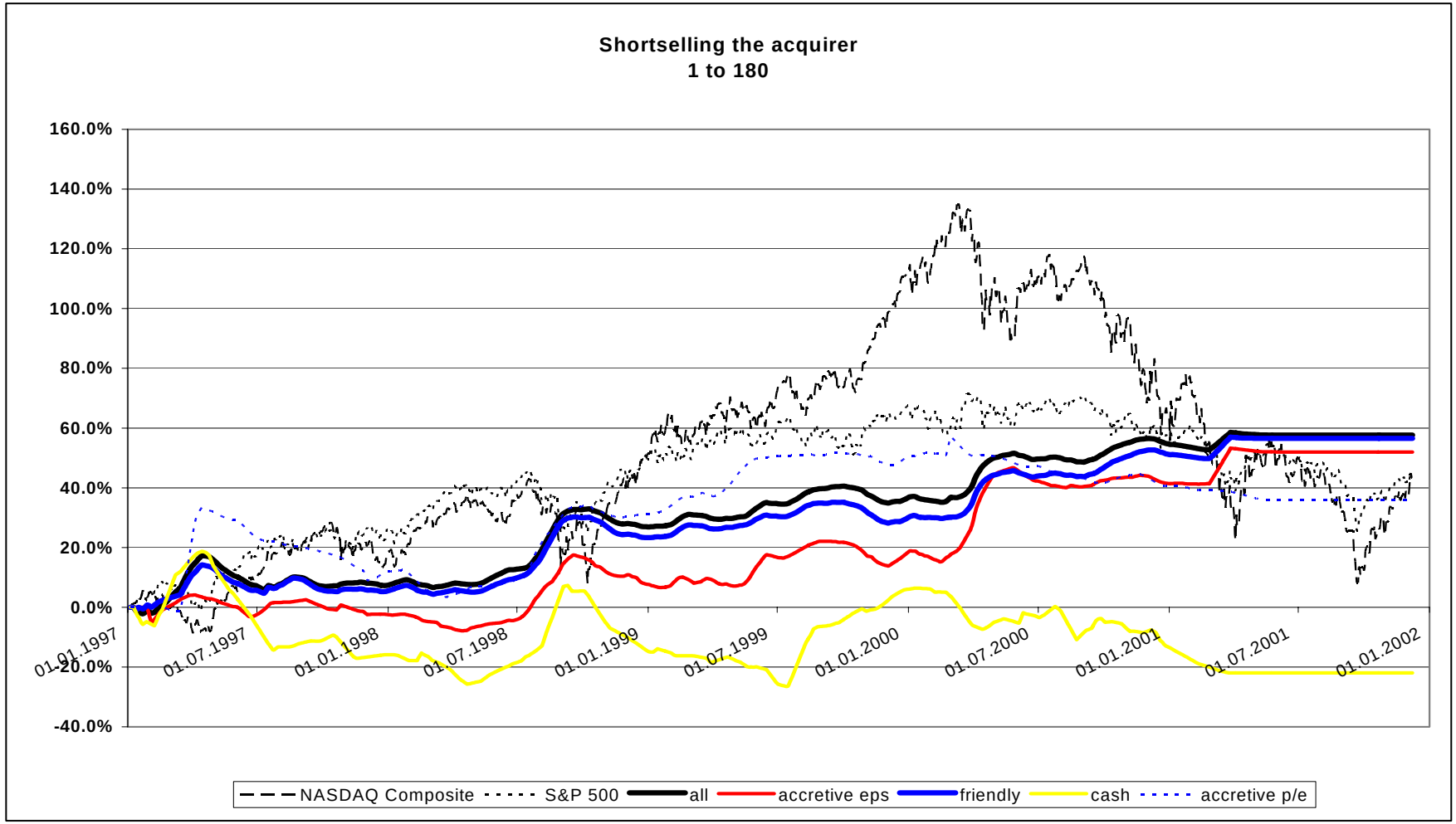
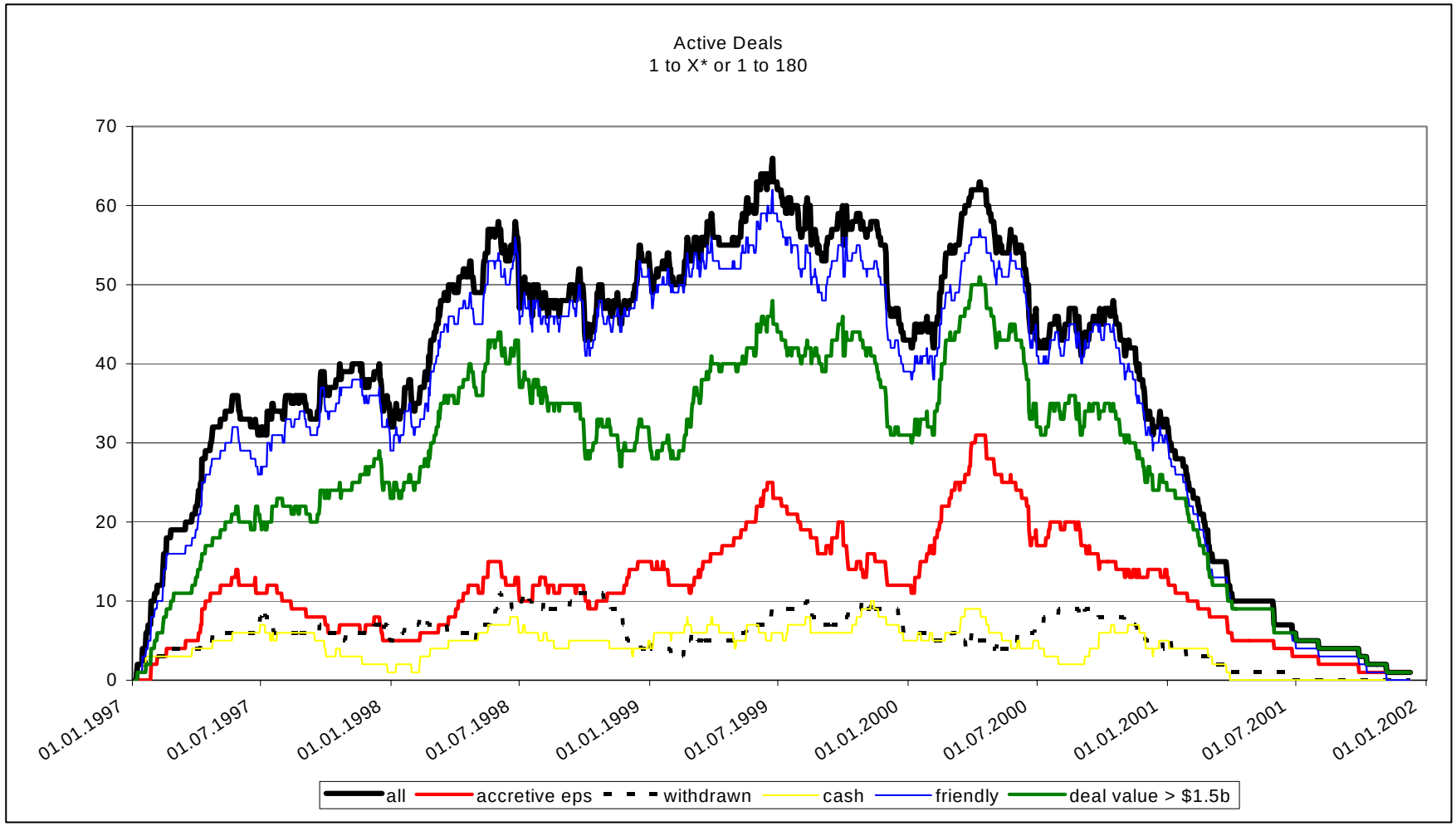


Figure 31 – Number of active deals on each day, depending on investment strategy

The figure shows how many deals are active on each day. A deal is activated one day after its announcement and deactivated when delisted (in successful cases) or (in this chart) after 180 when withdrawn.



Appendix V Matlab Program

The program consists of three parts. The first part calculates the compounded returns as it has already been done in the excel file. The second part compares those compounded returns with an index, such as the S&P 500 or the NASDAQ composite to calculate the market excess return.

The third part simulates investing in target and acquiring companies as described in chapter 5.1.

```
clear all

% load data
filename='stockquotes.xls'; % contains stock quotes and additional information to deals
sheetname='Tabelle1';
data=xlsread(filename,sheetname);


% assign data
no_obs=size(data,1); % no of observationss
original_target_price=data(:,3:12); % read all rows for columns 5 to 12
original_acquirer_price=data(:,13:21);
date_ann=data(:,1); % real all date of announcements
days_to_completion=data(:,2); % shows how many days it took to complete the deal
success=data(:,22); % 1 if successful and 0 if withdrawn
toehold=data(:,23); % 1 if successful and 0 if withdrawn
friendly=data(:,24); % 1 if successful and 0 if withdrawn
accretive_eps=data(:,25); % 1 if successful and 0 if withdrawn
cash=data(:,26); % 1 if successful and 0 if withdrawn
accretive_P_E=data(:,27); % 1 if successful and 0 if withdrawn
epv_sls=data(:,28); % enterprise value per sales
sls_log=data(:,29); % log(sales)
prem_d_1=data(:,30); % premium one day before announcement
big=data(:,31); % is the deal from the big transaction-value sample or the small transaction-value sample


% when the investment started relative to day 0
investment_start(1)=-7;
investment_start(2)=-1;
investment_start(3)=0;
investment_start(4)=1;
investment_start(5)=7;
investment_start(6)=30;
investment_start(7)=60;
investment_start(8)=90;
investment_start(9)=180;

% how long the investment lasts
investment_duration(1)=6;
investment_duration(2)=1;
investment_duration(3)=1;
investment_duration(4)=6;
investment_duration(5)=23;
investment_duration(6)=30;
investment_duration(7)=30;
investment_duration(8)=90;


%--- read second excel file with indices
filename='indices.xls';
sheetname='Tabelle1';
indices=xlsread(filename,sheetname);

```

```
% regroup data
index_date=indices(:,1);
index_value=indices(:,4); %2=nasdaq composite, 3= nasdaq100, 4= s&p composite, 5=djindustrial


% calculate return between each period

for i=1:no_obs % for each sample, start with 2 because of headlines in the excel sheet
   for j=1:9 % for each period
      % calculate return for target share for each period
     return_t(i,j) = log(original_target_price(i,j+1)) - log(original_target_price(i,j));

       % if deal is successful calculate return between final price and last shareprice before
       % final price. if deal failed set the return to 0 (not relevant)

       if success(i)==1 & j==9
                                  l(i)=9; % l point to the last known stockprice before delisted
           if days_to_completion(i)<181 l(i)=8; end
           if days_to_completion(i)<91  l(i)=7; end
           if days_to_completion(i)<61  l(i)=6; end
           if days_to_completion(i)<31  l(i)=5; end
           if days_to_completion(i)<8   l(i)=4; end
         return_t(i,j)=log(original_target_price(i,j+1)) - log(original_target_price(i,l(i)));
       end

    % calculate return for target share for each period
   if ~(j==9) return_a(i,j) = log(original_acquirer_price(i,j+1)) - log(original_acquirer_price(i,j)); end
   end
end


% CALAULATE EXCESS MARKET RETURN RELATIVE TO MARKET INDEX
% input: return_t and return_a
% output: excess_t and excess_a

for i=1:no_obs

   % calculating return for investment_start until
   % investment_start+investment_duration

   for d=1:9

      % x_start and x_end point to the date where we can find the index of the date of
      % the announcemen

     if d==9 & (success(i)==1) % special case for the last column which calculates excess return between final takeover price
                               % and the last knwn price before takeover
                            x_start = find(index_date==date_ann(i)+investment_start(l(i)));
%      no index for weekends available, try next days
       if isempty(x_start) x_start = find(index_date==date_ann(i)+investment_start(l(i))+1); end
       if isempty(x_start) x_start = find(index_date==date_ann(i)+investment_start(l(i))+2); end
       if isempty(x_start) x_start = find(index_date==date_ann(i)+investment_start(l(i))+3); end

       x_end   = find(index_date==date_ann(i)+days_to_completion(i));
%      no index for weekends available, try next days
       if isempty(x_end) x_end = find(index_date==date_ann(i)+investment_start(d)+days_to_completion(i)+1); end
       if isempty(x_end) x_end = find(index_date==date_ann(i)+investment_start(d)+days_to_completion(i)+2); end
       if isempty(x_end) x_end = find(index_date==date_ann(i)+investment_start(d)+days_to_completion(i)+3); end

     end

    if d<9 % normal case (all except last column)

      x_start = find(index_date==date_ann(i)+investment_start(d));
```

```
%       no index for weekends available, try next days
    if isempty(x_start) x_start = find(index_date==date_ann(i)+investment_start(d)+1); end
    if isempty(x_start) x_start = find(index_date==date_ann(i)+investment_start(d)+2); end
    if isempty(x_start) x_start = find(index_date==date_ann(i)+investment_start(d)+3); end

   x_end   = find(index_date==date_ann(i)+investment_start(d)+investment_duration(d));
%       no index for weekends available, try next days
    if isempty(x_end) x_end = find(index_date==date_ann(i)+investment_start(d)+investment_duration(d)+1); end
    if isempty(x_end) x_end = find(index_date==date_ann(i)+investment_start(d)+investment_duration(d)+2); end
    if isempty(x_end) x_end = find(index_date==date_ann(i)+investment_start(d)+investment_duration(d)+3); end
 end

   index_startvalue = index_value(x_start);
   index_endvalue   = index_value(x_end);
   index_change=log(index_endvalue) - log(index_startvalue);

   excess_t(i,d)=return_t(i,d)-index_change;
   if ~(d==9) excess_a(i,d)=return_a(i,d)-index_change; end

 end  % end inner for loop

end % end outer for loop



% CALCULATE CUMULATIVE RETURN GENERATED BY INVESTING IN TARGET OR ACQUIRER
% STOCKS


duration=1800; % for how many days the merger arbitrage index should be calculated
duration=duration-1;

startday=35435; % starting towards the end of december 1996
endday=startday+duration; % calculates the final day where the index is calculated

% initialize variable
for i=1:duration+1
 total_returns_t(i)=0;
 total_returns_a(i)=0;
end

% calculate number of active deals for each day
for day=startday:endday

 active_deals(day-startday+1,1)=day; % write day number in the first column of acive_deals

 for i=1:no_obs % check all deals for activity today, (i) can be interpreded as the index of the deal

   dealstart=date_ann(i); % when does deal i start
   dealend=date_ann(i)+days_to_completion(i); % when does it end
   %dealend=date_ann(i)+180; % when calculating returns for acquirer,
   %we assume we hold all positions for 180 days, even when the deal
   %is completed earlier

   % for withdrawn deals
   if ~(days_to_completion(i)>0)
    dealend=date_ann(i)+180;  % in case there's 'NaN' in days_to_completion the deal was not completed
   end                  % so we set the deal's duration


    % check whether deal is active and set it to active or inactive
    active_deals(day-startday+1,i)=0; % set default to 0 (=deal i is inactive today)

  %if big(i)==1  % ;sls_log(i)<2.6 & epv_sls(i)>15 %& friendly(i)==1 % success(i)=1 only special deals can be set to active
```

```
182.
183.          if   (dealstart-1) < day active_deals(day-startday+1,i)=1; end % deal has started or is just starting (that's why -1)
184.          if   (dealend-1)   < day active_deals(day-startday+1,i)=0; end % deal has already ended --> set to inactive
185.
186.      %end % special conditions if end
187.
188.
189. % assign deal phase if deal is active: 1=0-1 2=1-7 3=7-30 4=30-60 5=60-90 6=90-180
190.        if active_deals(day-startday+1,i)==1
191.             if day-dealstart<180   deal_phase(day-startday+1,i)=6;    end
192.             if day-dealstart<90    deal_phase(day-startday+1,i)=5;    end
193.             if day-dealstart<60    deal_phase(day-startday+1,i)=4;    end
194.             if day-dealstart<30    deal_phase(day-startday+1,i)=3;    end
195.             if day-dealstart<7     deal_phase(day-startday+1,i)=2;    end
196.             if day-dealstart<1     deal_phase(day-startday+1,i)=1;    end
197.
198.     % check whether deal is in it's final phase, that is between stock
199.     % price of day X and its takeover price. Deal_phase=9 means final phase
200.     % withdrawn deals are never in their final phase because
201.     % days_to_completion contains n/a for those cases
202.
203.               if day-dealstart>0 & days_to_completion(i) < 8         deal_phase(day-startday+1,i)=9; final_days=days_to_completion(i)-7;
204.               elseif day-dealstart>29 & days_to_completion(i) < 61   deal_phase(day-startday+1,i)=9; final_days=days_to_completion(i)-30;
205.               elseif day-dealstart>59 & days_to_completion(i) < 91   deal_phase(day-startday+1,i)=9; final_days=days_to_completion(i)-60;
206.               elseif day-dealstart>89 & days_to_completion(i) < 181  deal_phase(day-startday+1,i)=9; final_days=days_to_completion(i)-90;
207.               elseif day-dealstart>179 & days_to_completion(i) > 180 deal_phase(day-startday+1,i)=9; final_days=days_to_completion(i)-
    180; end % also catch deals which end on day 180 or later
208.
209.     %    we only invest from day 1 and omit day 0-1 investments
210.     %    if deal is active (e.g. in phase 2: = day is between day 1 and 7 after announcement) then
211.     %    increase total_returns for today by the amount the target share increased
212.     %    between days 1-7 and divide it by 6 (linear interpolation)
213.
214.          %    if deal_phase(day-startday+1,i)==1 & (return_t(i,3)<0 | return_t(i,3)>0) total_returns_t(day-startday+1)=total_returns_t(day-
    startday+1)+return_t(i,3)/1; end
215.               if deal_phase(day-startday+1,i)==2 & (return_t(i,4)<0 | return_t(i,4)>0) total_returns_t(day-startday+1)=total_returns_t(day-
    startday+1)+return_t(i,4)/6; end
216.               if deal_phase(day-startday+1,i)==3 & (return_t(i,5)<0 | return_t(i,5)>0) total_returns_t(day-startday+1)=total_returns_t(day-
    startday+1)+return_t(i,5)/23; end
217.               if deal_phase(day-startday+1,i)==4 & (return_t(i,6)<0 | return_t(i,6)>0) total_returns_t(day-startday+1)=total_returns_t(day-
    startday+1)+return_t(i,6)/30; end
218.               if deal_phase(day-startday+1,i)==5 & (return_t(i,7)<0 | return_t(i,7)>0) total_returns_t(day-startday+1)=total_returns_t(day-
    startday+1)+return_t(i,7)/30; end
219.               if deal_phase(day-startday+1,i)==6 & (return_t(i,8)<0 | return_t(i,8)>0) total_returns_t(day-startday+1)=total_returns_t(day-
    startday+1)+return_t(i,8)/90; end
220.
221.     % acquirer share is sold short on day 1 until either day 180 or if deal
222.     % ends earlier
223.               if deal_phase(day-startday+1,i)==1 & (return_a(i,3)<0 | return_a(i,3)>0) total_returns_a(day-startday+1)=total_returns_a(day-
    startday+1)+return_a(i,3)/1; end
224.               if deal_phase(day-startday+1,i)==2 & (return_a(i,4)<0 | return_a(i,4)>0) total_returns_a(day-startday+1)=total_returns_a(day-
    startday+1)+return_a(i,4)/6; end
225.               if deal_phase(day-startday+1,i)==3 & (return_a(i,5)<0 | return_a(i,5)>0) total_returns_a(day-startday+1)=total_returns_a(day-
    startday+1)+return_a(i,5)/23; end
226.               if deal_phase(day-startday+1,i)==4 & (return_a(i,6)<0 | return_a(i,6)>0) total_returns_a(day-startday+1)=total_returns_a(day-
    startday+1)+return_a(i,6)/30; end
227.               if deal_phase(day-startday+1,i)==5 & (return_a(i,7)<0 | return_a(i,7)>0) total_returns_a(day-startday+1)=total_returns_a(day-
    startday+1)+return_a(i,7)/30; end
228.               if deal_phase(day-startday+1,i)==6 & (return_a(i,8)<0 | return_a(i,8)>0) total_returns_a(day-startday+1)=total_returns_a(day-
    startday+1)+return_a(i,8)/90; end
229.
230.      % if deal is in final phase, does not contain N/A and is not an extreme case
231.               if deal_phase(day-startday+1,i)==9 & (return_t(i,9)<0 | return_t(i,9)>0) & (return_t(i,9)/final_days)
232.                 total_returns_t(day-startday+1)=total_returns_t(day-startday+1)+return_t(i,9)/final_days;
```

```
            end


        else % if deal is inactive or is excluded because of certain trading criteria
            deal_phase(day-startday+1,i)=0;
        end % end if

    end  % end inner for for loop which checks all the deals for one specific day

    % calculate number of active deals for today
    number_active_deals(day-startday+1)=sum(active_deals(day-startday+1,:)==1);

end % go to next day


% calculate merger arbitrage index for all days
index_t(1)=0;
index_a(1)=0;
for i=1:duration
      if number_active_deals(i)>0
        index_t(i+1)=index_t(i)+((total_returns_t(i)/number_active_deals(i))); % buy target
        index_a(i+1)=index_a(i)-((total_returns_a(i)/number_active_deals(i))); % short acquirer
      else
        index_t(i+1)=index_t(i);
        index_a(i+1)=index_a(i);
      end


 end

% plot the index
index_t=transpose(index_t);
index_a=transpose(index_a);
number_active_deals=transpose(number_active_deals);
plot(index_t)
```

Appendix VI The Data CD

Textfile

DIPLOMARBEIT.PDF	this document

Datafiles

MERGER SAMPLE.XLS	
Original:	original sample
Merger sample:	slightly adjusted sample with many derived factors
TR/AR	Target Return graphs, Aquirer return graphs
Index TR-	results from the simulation
Sim XXX	graphs from Index TR-
Active deals	active deals, as listed in Index TR-
XX pivot	various pivot tables
etc	
MERGER SAMPLE SPSS.XLS	file used for SPSS (Chapter 4.3)
LOGIT_ANALYSIS.WF1	eviews file for logit analysis

Matlab files

INVESTMENT.M	program as listed in Appendix V
INDICES.XLS	contains data about S&P 500 and NASDAQ
STOCKQUOTES.XLS	contains stockquotes and other information about the deals
excess_market_return.m	calculation of excess return relative to day 0
excess_market_return_intra.m	excess return for each period
excess_market_return_acquirer.m	excess return for acquirer companies

Erklärung

Ich erkläre hiermit,

- dass ich die vorliegende Arbeit ohne fremde Hilfe und ohne die Benützung anderer als der angegebenen Hilfsmittel verfasst habe,
- dass ich ohne schriftliche Zustimmung des Rektors keine Kopien dieser Arbeit an Dritte aushändigen werde, ausgenommen nach Abschluss des Verfahrens an Studienkollegen und -kolleginnen oder an Personen, die mir wesentliche Informationen für die Diplomarbeit zur Verfügung gestellt haben.

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