The relevance of security analyst opinions for investment decisions

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The relevance of security analyst opinions for investment decisions

De relevantie van het oordeel van beleggingsanalisten voor investeringsbeslissingen

(met een samenvatting in het Nederlands)

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Prof.dr. G.U. Weitzel

Voor mijn ouders

Acknowledgements

It was my dad's daily reading of the newspapers' financial pages which made me curious about economics and enthusiastic about investments in particular. During the dot-com bubble (at that time I had never heard of bubbles, and simply thought I was an excellent stock-picker), I was already studying Economics in Utrecht. Although I appreciated most courses, I particularly enjoyed the Investment Management course. It was not surprising that I approached Prof.dr. Arie Buijs as my thesis supervisor in 2004.

One year later I joined the Utrecht University School of Economics (USE) as a junior lecturer. Although I joined Arie's so-called *promobroodjes* in 2006, these events did not trigger concrete dissertation plans because I did not have a particular topic of interest. In 2007, Arie approached me with a plan to write a book on investing, aimed at private investors: *Fabeltjes over beleggen*. I tremendously enjoyed both the research procedure and the writing process of this book, so when the book was almost sold out after two years, Arie and I made plans for a follow-up: *Eigen schuld*. In this book, I wanted to test the relevance of stock market forecasters such as security analysts. Ronald Kok shared his hand-collected data on security analyst recommendations, for which I warmly thank him. While working on the chapter on security analysts in *Eigen schuld*, I felt that I had finally found a topic on which I wanted to spend several years. It was also about time, as I had run out of possibilities for temporary contracts at USE. This brings me to Prof.dr. Clemens Kool: thank you, Clemens, for your trust in my research capabilities by offering me the opportunity to continue teaching at USE while at the same time working on my PhD.

A PhD cannot be written without supervision. Arie, you acted as a mentor with respect to all career-related issues, so it was logical for me to ask you to act as one of my supervisors. I am deeply grateful to you for accepting my request. The biggest part of our conversation was always stimulating and inspiring, but I also appreciate the fact that you could be strict when I tended to lose focus. Your precision in writing constitutes one of the things which I will not forget to apply in my future writings.

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for you. Peter van der Meer, there is always life in the office when you are there. Please read this book: it may convert you away from the dark side of marketing. Finally, Niels Bosma, you often set the scene in our office. Serious discussions are followed up by amusing ones and these good laughs were needed in the process.

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Chapter 1

Introduction

1.1 Introduction

The purpose of this study is to investigate the potential role of security analysts[1] with respect to different investment decisions. The term investment decision refers to the decision to invest in securities (e.g., Capon et al., 1996; Estes and Hosseini, 1988) as well as to the decision by firms to invest in real projects (Myers and Majluf, 1984). Both decisions can be characterized by the investment of capital in exchange for unknown future cash flows. Generally, an investment should only take place when a satisfactory rate of return is expected. The evaluation of investment alternatives is surrounded with uncertainties which include, among others, the required rate of return and the projected growth rate of earnings.

Due to these uncertainties, assessing the value of an investment opportunity can be a time consuming and costly task. Security analysts specialize in this process and may therefore support the investment decision, as research by these analysts is widely available to market participants. Security analysts analyze companies with respect to future earnings, costs, and risks. In addition, analysts may also study stock trading statistics. Based on this information they will issue an earnings estimate, a recommendation as to buy or sell the security (recommendations usually range from 'strong buy' to 'strong sell', or similar expressions), and a target price (i.e., a forecasted stock price) over a 6- to 12-month period.

The opinion of a security analyst reflects the analyst's estimate of the theoretical value of the stock and may therefore help investors in their decision to buy or sell a stock. The opinion may further be of assistance to acquiring firms in valuing a target company when they consider purchasing corporate assets.

The theoretical value of a company is often referred to as its intrinsic value. In an early publication on security analysis, Graham and Dodd (1934: 17) defined intrinsic value as "*that value which is justified by the facts, e.g., the assets, earnings, dividends, definite prospects […]*".[2]

1. Strictly speaking there are two types of security analysts: buy-side analysts and sell-side analysts. Buy-side analysts are generally hired by in-house portfolio managers. The largest part of their recommendations will never be made public but is used only by the investment firm in its aim to deliver satisfactory investment results. Sell-side analysts' research results usually are disseminated widely among the investment public. This thesis refers to sell-side analysts unless indicated differently.

2. Graham and Dodd (1934) admitted that this definition was not exact, but they described the concept of intrinsic value as follows: "*it is quite possible to decide by inspection that a woman is old enough to vote without knowing her age or that a man is heavier than*

Contrary to this rather vague definition, nowadays the intrinsic value of a stock is usually referred to as "*the present value of its expected future dividends based on all currently available information*" (Lee et al., 1999). Hypothetically, security analysts' advice could considerably simplify the investment decision by recommending to buy (sell) stocks for which the intrinsic value exceeds (is lower than) the market price.

There is, however, a theoretical objection to the premise of buying favorably recommended stocks.[3] If an analyst's opinion contains relevant information and if that information pushes a stock in the forecasted direction, then market forces would ensure that this information is incorporated into a stock price instantaneously. This assumption lies at the heart of the Efficient Market Hypothesis (EMH).[4] The EMH (Fama, 1965a; Samuelson, 1965; and Fama, 1970) departs from the premise that market participants have rational expectations and pursue profit maximization. Competition among participants will ensure that all information is quickly absorbed into stock prices. Market prices thus reflect all available information. Therefore, in efficient markets stock prices are expected to equal the firm's intrinsic value per share. Given a stream of good and bad news that is continuously compounded into the market price, the EMH posits that stock prices follow a so-called 'random walk' and exhibit martingale properties: the stock price today equals the rationally expected value of tomorrow's stock price.[5]

Fama (1970) divided the EMH into three different forms. The weak-form version of the EMH asserts that stock prices only reflect information from past trading. The semi-strong form states that all publicly known information is included in stock prices. This comprises trading information, but also public fundamental information on a firm's performance and operations. The third version is the strong form which states that all information is absorbed into stock prices, including information that is only available to insiders. Several empirical studies have been conducted from which a selection is discussed in Appendix 1. These studies

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he should be without knowing his exact weight." (Graham and Dodd, 1934: 19). As an illustration they used Wright Aeronautical Corporation in 1922: its stock price was $8; the company paid out $1 in dividends, earned $2 per share and had $8 per share in cash on their balance sheet. According to Graham and Dodd (1934) this security was underpriced on the stock exchange.

3. Apart from the theoretical perspective there is also a practical problem as recommendations are not symmetrically distributed around a hold-recommendation. Security analysts have the tendency to issue positive recommendations. Barber et al. (2003) documented that strong buy and buy recommendations made up 72.1% of the total number of recommendations in the year 2000. This percentage has dropped since 2000, but evidence for the Netherlands points out that there were 50% buy recommendations, 41% hold recommendations and only 9% sell recommendations in 2012 (author's own calculations). There are several explanations for the optimism of security analysts. Firstly, buy recommendations incur more trades than sell recommendations, in other words buy recommendations are more profitable for the analyst's employer. Secondly, in case of investment banks, sell recommendations may harm the relation between the analyst's employer and the analyzed companies which may in turn have an adverse impact on the underwriter business. A third reason, as stated by Reingold (2007), is of a more personal nature: analysts are not always interested in covering companies which they dislike.

4. Similar considerations were posited by several academics such as Regnault (1863) and Bachelier (1900).

5. Although stock prices, on average, incorporate new information instantaneously, according to Fama (1965b) this incorporation is sometimes associated with overreaction, but stock prices may just as often exhibit underreaction. When overreaction or underreaction would occur systematically, other investors would recognize arbitrage opportunities after which stock prices would return to equilibrium and resume their random walk.

concluded that: *(i)* markets are not strongly efficient, meaning that insider information is not always fully reflected in stock prices; *(ii)* newly available information is quickly absorbed into stock prices; and *(iii)* returns are to some extent predictable using momentum or reversal strategies, or by utilizing variables such a dividend yield and earnings yield (Fama, 1991).

As will be explained in the remainder of this introduction, the purpose of this thesis is to contribute to this theoretical discussion by focusing on opinions published by stock market analysts, based on two types of analyses: fundamental analysis (FA) and technical analysis (TA).

Fundamental analysts study the fundamentals of a company and, in principle, only make use of publicly available information regarding a company's prospects.[6] Fundamental valuation methods include, but are not limited to, the present value calculation and the multiples-based approach. Examples of present value techniques are the discounted cash flow (DCF) method and the dividend discount model (DDM). The DCF method calculates a firm's value by taking into account estimated future cash flows and the cost of capital of the firm. The DDM method discounts future expected dividends and arrives at an intrinsic value of a stock. A well-known multiple is the price-earnings ratio (P/E) in which the stock price is divided by its earnings per share. A deviation of a company's P/E ratio relative to its peer group may then be considered as an indication of over- or underpricing.

If markets are either strongly or semi-strongly efficient, there should not be a stock price response to the publication of analyst opinions, given that analysts only use publicly available information. If markets are less efficient than semi-strong and if analysts can gain a competitive advantage in processing information, there will be a stock price response to analyst opinions which will materialize in a short period after the publication of the opinion.

The second category of security analysis is called technical analysis. According to Murphy (1999: 1) "*technical analysis is the study of market action, primarily through the use of charts, for the purpose of forecasting future price trends*". TA relies on the premise that history tends to repeat itself and that certain trends and patterns can be identified in past price data. In other words, these patterns will occur over and over again. Technical analysts believe that a stock price chart is a proxy for market psychology. According to technical analysts, TA offers methods which allow investors to take advantage of this knowledge.

However, if markets are weakly efficient, recommendations based on technical analysis should not lead to additional stock market returns. Even if it once was possible to earn abnormal returns using widely available price charts, market participants would by now have exploited these opportunities; therefore these opportunities should not occur anymore. In addition, semi-strong market efficiency implies that FA, too, would not have a direct impact on

6. Regulation Fair Disclosure was imposed in the US in October 2000. This rule entails that company officials are not allowed to share private information with analysts. If they shared private information they have to make this public simultaneously. The same procedure holds for the Netherlands, as specified in *Wet op het financieel toezicht Artikel 5:25i lid 5*.

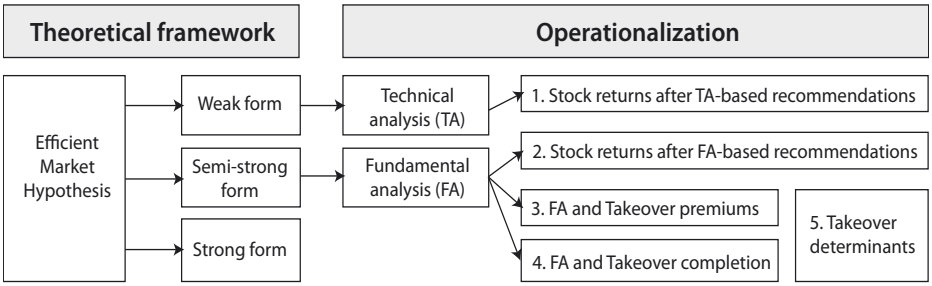
stock prices since these prices incorporate all kinds of fundamental information. The central research question of this thesis is directed at both types of security analyses.

Based on the above discussion, the central research question is as follows: ***Are security analyst opinions relevant for the decisions to invest in common stock or to acquire a company?***

The answer to this question should provide an indication of the extent to which markets are efficient. The research question can be sub-divided into several sub-questions, depending on the type of analysis (fundamental vs. technical) and the area of investments (general stock market investing vs. the acquisition of control over companies). The next sub-sections of this introduction will elaborate on these concepts.

Figure 1.1 depicts the relationship between the theoretical framework and the topics of all sub-questions (numbered from 1 to 5). Sub-questions 1 and 2 apply the concept of security analysis to the valuation of common stocks (see section 1.2). Section 1.3 introduces target prices as another benchmark for investment decisions. This section also introduces mergers and acquisitions (M&A) as additional areas of investment decisions. We derive sub-questions 3 and 4 from these two themes. The fifth sub-question focuses on the determinants of M&A transactions (section 1.4). Section 1.5 concludes this chapter by giving an outline of the thesis.

Figure 1.1 Overview of the theoretical framework and operationalization of the research question



1.2 Different forms of security analysis

1.2.1 Recommendations based on technical analysis

Technical analysis can be applied to a variety of price data. In this thesis only stock prices are considered. A large number of TA methods exist, one of the oldest being the Dow theory. This theory has been developed by Charles Dow who published the first US stock market average on July 3, 1884. His theory is based on the assumption that stock market behavior can be described according to trends. An upward (downward) trend can be characterized by a rising (declining) market where both the peaks and troughs are moving up (down). Dow also posited primary, secondary and tertiary trends. The primary trend is considered to last

for one year or more. Medium-term corrections (i.e., secondary trends) can take three weeks to three months. Tertiary trends are short-term fluctuations within the secondary trend. The Dow theory laid the foundation for the development of several other TA methods. Nowadays the moving average and the trading range breakout rules are the most frequently used TA methods (Brock et al., 1992). Other methods include, but are not limited to, moving average convergence divergence, Bollinger bands, relative strength index, and on-balance volume.

Most methods use freely available price and volume data. According to the weak form of the EMH, TA should therefore not be associated with profitable trading strategies. Trading rules have extensively been studied and tested for profitability in the stock market. Some studies (Wong et al., 2003; Chong and Ng, 2008; and Metghalchi et al., 2008) found abnormal trading returns when applying TA. However, the majority of the studies did not document any indication of abnormal returns. This was shown for US indices (e.g., Kwon and Kish, 2002; Tian et al., 2002; Lento et al., 2007; and Schulmeister, 2009), as well as for non-US indices (Marshall and Cahan, 2005). Technical trading rules have also been applied to individual US stocks but no evidence of excess trading profits was found (Fong and Yong, 2004 and Marshall et al., 2009). Lo et al. (2000) reported that a number of technical indicators exhibited incremental information, but they concluded that their results did not imply that one can use TA to generate excess trading profits.

It is remarkable that practitioners have been applying the method of TA to stocks for more than 100 years, while there is hardly any academic evidence that it is effective. A common response to academic criticism is that chart patterns are subjective and therefore difficult to analyze academically: "*No study has yet succeeded in mathematically quantifying any of them. They are literally in the mind of the beholder*" (Teweles et al., 1977: 176). Similarly, technical analysis is sometimes regarded as being more an art than a science (DeMark, 1994). If technical analysts are indeed "artists", then their recommendations should be different from the outcome of simple technical trading rules. This contention has inspired us to study the quality and the determinants of the recommendations published by technical analysts rather than interpreting chart patterns themselves. Such an analysis has been conducted sporadically in the literature. However, inconclusive results have been reported by Cowles (1933), Dawson (1985), and Brown et al. (1998). These studies have two major limitations; *(i)* the number of recommendations or analysts involved was rather limited, and *(ii)* a relatively long time horizon had been evaluated in these studies while TA is perceived to be valuable in the short-term (Menkhoff, 2010).

These shortcomings are addressed by evaluating abnormal returns surrounding TA-based recommendations. Given the perceived short-term relevance of TA, this study's focus will first be on stock returns in the two trading weeks after the publication of a TA-based recommendation. Following these stock returns, we discuss the determinants of TA recommendations. These recommendations are compared to trading rules and to stock returns in

the two trading weeks prior to the publication of a recommendation. These considerations result in the first sub-question, which is formulated as follows:

Sub-question 1: ***Are security recommendations based on technical analysis associated with positive abnormal returns?***

1.2.2 Recommendations based on fundamental analysis

The second sub-question addresses the relevance of recommendations based on FA. Fundamental stock market analysts typically analyze a group of companies active in the same business sector (Beneish et al., 2001). These analysts study company fundamentals. Commonly used indicators by these analysts are financial statements such as the balance sheet, income statement and statement of cash flows. Fundamental analysts use these statements to calculate, for example, the growth rate (e.g., sales growth) and return ratios (e.g., return on assets). Using these inputs, analysts can calculate a fundamental value (i.e., intrinsic value) for a stock. In the next step, analysts can identify whether the current market price deviates from this fundamental value (Abarbanell and Bushee, 1998).

Block (1999) surveyed financial analysts and found that these analysts hardly use present value techniques in their valuation models. Also according to Asquith et al. (2005) "*most analysts use a simple earnings multiple valuation model*". By contrast Demirakos et al. (2004) found that analysts either use a P/E model or a DCF valuation model as their dominant model. It was the analyst's familiarity with a valuation model which ultimately determined the choice of model. In a more recent study, Imam et al. (2008) documented that the DCF method is gaining popularity as compared to previous studies.

The analyst's study of company fundamentals is usually summarized in a detailed research report. This report contains a textual elaboration on all findings, as well as three summary measures: an earnings expectation, a recommendation to buy or sell the stock and a target price. Although earnings expectations are relevant to investors, they are of limited use given that they provide only one input in DCF and DDM valuation models. Both a growth rate and a discount rate are needed to compute the intrinsic value. Therefore the recommendation and the target price are of particular interest. A recommendation to investors has usually five different levels: strong buy, buy, hold, sell, and strong sell. A target price is a forecasted price for the stock over, usually, a 12-month period.

The second sub-question deals with the relevance of recommendations for emerging markets stocks (the relevance of target prices will be introduced in section 1.3). Emerging markets are often viewed to be "*too hard to research*" (Moshirian et al., 2009: 74) and thorough research by analysts may therefore have a strong impact on stock prices. There is a vast amount of literature documenting the relevance of recommendations, although this literature predominantly discusses analyst recommendations for developed economies, particularly the US. Bidwell (1977) found that average stock returns after a buy recommendation were not dif-

ferent from zero. The studied recommendations also included reiterations, i.e., a confirmation of an already existing buy recommendation. Recommendation revisions represent the change in opinion by an analyst. Positive (negative) revisions are associated with positive (negative) abnormal returns on the short-term (Stickel, 1995 and Womack, 1996). Thus, the change in recommendations may be more relevant for short-term stock returns than the level of the recommendation. Moshirian et al. (2009) found that analyst recommendations generally have a greater impact on stock prices in emerging economies than in developed markets. The finding that recommendations in general matter for future returns stands in contrast with the semi-strong form of the EMH as analysts generally only use publicly available information.

A possible explanation for a stock price response to the publication of analyst recommendations is that analysts uncover new information which the market takes into account in forming a stock price. As the new information should be incorporated instantaneously in the price, there should not be additional long-term stock price effects. Researchers have also studied these long-term returns after the publication of analyst recommendations. Usually, calendar strategies are developed to measure these effects. Such a strategy involves the creation of different portfolios. The first portfolio contains the most positively recommended stocks, and the last portfolio contains the stocks on which analysts are most bearish. These portfolios are then updated regularly using newly issued recommendations. Barber et al. (2001) indicated that a portfolio consisting of highly favored stocks outperformed a portfolio containing the least favored stocks. By contrast, another study by Barber et al. (2003) showed that positively recommended stocks underperformed during the collapse of the dot-com bubble. Jegadeesh et al. (2004) also created portfolios and showed that future returns were independent of recommendation levels. Instead, portfolios formed on the basis of the quarterly change in the average recommendation lead to outperformance when recently upgraded stocks were purchased while downgraded stocks were (short-) sold. These findings suggest that recommendation revisions are a better predictor of future stock returns than recommendation levels.

Although the majority of the findings on the short-term impact of security recommendations on stock prices indicate a positive relation between recommendation revisions and price impact, the findings regarding portfolio strategies are less consistent. Furthermore, there is relatively little attention for the relevance of analysts in emerging markets. The second subquestion therefore pursues a better understanding of the impact of security recommendations in emerging markets, and is structured as follows:

Sub-question 2: ***Do recommendations by fundamental analysts have a short-term price impact, and are portfolio strategies based on these recommendations associated with abnormal returns?***

1.3 Using analyst opinions in M&A transactions

While sub-questions 1 and 2 reflected on the analyst's role in the decision to buy a stock, the next two sub-questions consider the role of analyst opinions in the decision to acquire another company. A takeover[7] is the process in which one party (the acquirer) obtains control over the assets of another party (the target) in exchange for cash, stocks, or another means of payment. "*The primary motivation for most mergers is to increase the value of the combined enterprise*" (Brigham and Ehrhardt, 2013: 868). In other words, the combination of companies should be worth more than the sum of its parts. These so-called synergy gains are an important reason why companies embark on acquisitions (Mukherjee et al., 2004). Synergies can consist of economies of scale, growth through cross-selling and the removal of inefficient management (Powell, 2007).[8]

In the remainder of this section the potential role of analyst recommendations and target prices in the context of M&A is explained.

1.3.1 Takeover valuation

The potential relevance of FA-based recommendations was introduced in sub-question 2. Sub-question 3 focuses on the relevance of a price forecast published by fundamental analysts, a so-called target price. Such a forecast reflects the opinion of an analyst on the future value of a stock. Usually the time horizon for realization of this target is 12 months. While the publication of a target price generally affects the stock price (Brav and Lehavy, 2003; Huang et al., 2009; and Gell et al., 2010), it is of particular interest whether target prices reflect future stock prices over a longer time horizon, given that (individual) investors generally act after a delay in response to new information (e.g., Barber et al., 2001). The literature on target prices documents that price forecasts are generally too high and rather inaccurate, as the empirical evidence documents that the percentage of target prices which have been met varies from only 33 percent of the cases (Bonini et al., 2010) to 54 percent (Asquith et al., 2005).

This inaccuracy may be driven by three different factors. First, analysts estimate future stock prices using, among others, intrinsic value models such as the DCF model (Imam et al., 2008). Intrinsic values may, however, deviate from market prices (DeBondt and Thaler, 1987 and Lakonishok et al., 1994). Second, analysts generally forecast the stock price for a 12-month horizon. The adjustment process of price to intrinsic value can take longer than expected (Lee et al., 1999) as this process may take up to several years (Lee et al., 1991). Third, stock returns are to a large extent driven by the exposure of a stock to general market move-

7. Despite different definitions, we follow the convention in the M&A literature and use the terms 'mergers', 'acquisitions', and 'takeovers' interchangeably.

8. Other arguments for M&A are tax considerations, purchase of assets below the replacement costs, breakup value, management incentives, diversification (Mukherjee et al., 2004), financial motives, and the acquisition of free cash flow (Powell, 2007).

ments. Erroneous estimates of future market movements may therefore also cause inaccuracy in long-term stock price predictions.

The findings of other studies regarding the inaccuracy of target prices may thus be driven by both the time horizon present in the forecast and the market movements during this time period. To overcome these concerns, we test the potential relevance of target prices by relating these price forecasts to valuations that are announced in takeover bids. The valuation methodologies for M&A targets are similar to valuation techniques used by security analysts, as there are broadly two tools used for takeover target valuation: the DCF approach and the multiples-based approach (Mukherjee et al., 2004 and Weston et al., 2003). Takeover bids therefore present an opportunity to evaluate the valuation skills exhibited by fundamental security analysts prior to the takeover bid. A fundamental difference between the target price and a takeover bid is that the former represents the value for a stand-alone entity while the latter may include potential synergy gains (Houston et al., 2001). In the assessment of the valuation skills of analysts as judged by their published target prices, the analysis therefore controls for the estimated synergy gains.

Sub-question 3: ***Do security analyst target prices provide an indication of a company's future value?***

1.3.2 Takeover completion

In addition to an indication of the valuation of takeover targets, analyst opinions may also be relevant for the outcome of a takeover process. In such a process, the acquiring company usually will offer a premium on top of the target company's latest share price as target shareholders are unlikely to accept a bid for their shares at or lower than the prevailing market price. Even with such a premium, a takeover bid could be rejected by the target company's shareholders if they perceived the offered price to be too low. O'Sullivan and Wong (1998) and Holl and Kyriazis (1996) estimated that 18 to 25 percent of all announced takeover bids do not result in a deal.

Rejected takeover offers can be costly for various parties involved in the takeover process. The acquiring firm is harmed since the preparation of a bid is expensive and failed bids give competitors additional time to prepare a competing offer. Involved investment banks can be adversely affected as their reputation can be harmed and they do not receive deal closing fees. Investors in the takeover target (including potential merger arbitrageurs) may suffer losses given that the stock price of the target company usually declines after a withdrawn takeover bid. Given these costs of failed attempts, indicators for the chances of success of a takeover bid can be of great value to parties involved in the merger process.

We suggest that security recommendations and target prices can be used to function as such an indicator. Prior to a takeover announcement, these analyst opinions are published in the absence of specific takeover plans and they thus apply to the stand-alone value of the

takeover target (i.e., the value in the absence of a takeover bid). A given takeover bid is more likely to fall short of these expectations if shareholders have high growth expectations for the stand-alone target company. Accordingly, it is expected that attempted mergers will less frequently be consummated when analysts are bullish about the target company as a stand-alone entity. Conversely, when a stock is subject to sell recommendations, investors would in general have lower expectations about the stand-alone growth potential and, for a given price, they could thus be more willing to sell their shares to an acquirer. This argument holds for both recommendations and target prices.

In addition to recommendations and target prices, the dispersion of the estimates by analysts is also expected to play an important role in merger consummation. According to Doukas et al. (2006), the level of opinion divergence is positively related to future stock returns. Therefore, strong divergence of analyst opinions may indicate that at least some shareholders of the target company expect a high stand-alone growth for the target company. An even higher bid price might in that case be required in order to convince the majority of shareholders to sell their holdings.

To summarize, the literature reveals that analysts' opinions and opinion divergence are related to future stock returns. In the fourth sub-question we relate these insights to the concept of merger completion:

Sub-question 4: ***Can analyst opinions be used to predict merger completion?***

1.4 Determinants for M&A transactions

The previous section discussed the role of security analyst opinions in the bidding process for a target company. Though prominent, the bidding process is only one part of the takeover process. This part of the thesis therefore focuses on the question why takeovers occur. The emphasis in this section will be on determinants for mergers and acquisitions and lies outside the realm of security analysts.

As discussed in section 1.3, general motives for takeovers vary from synergy gains (Brigham and Ehrhard, 2013) to diversification benefits (Mukherjee et al., 2004). Despite the fact that these factors apply to most companies, cross-country analyses (e.g., Erel et al., 2012) show that country characteristics also play a role. According to Rossi and Volpin (2004), M&A flows are significantly associated with a country's corporate governance framework. Stronger investor protection and better accounting standards are both positively related to a more active market for mergers and acquisitions. A good protection for minority shareholders reduces the private benefits of controlling shareholders and this protection makes a firm's control more contestable. Investor protection not only explains the differences in M&A volume across countries, but it is also related to the absolute level of cross-border acquisitions volume.

Recently Erel et al. (2012) identified other factors which contributed to the level of M&A transactions between countries. The greater existing trade flows are between countries, the more cross-border M&A activity take place. Furthermore, geographical and cultural distances are negatively related to M&A activity. Additionally, valuation plays an important role: a rise in the stock market, a high market-to-book ratio and an appreciation in the currency are all associated with a higher probability of being an acquirer. Targets are often located in weaker performing economies.

Erel et al. (2012) included transactions from 1990 to only 2007. In other words, the period of financial and economic crises from 2008 onwards were not covered in this study. In the final sub-question of this thesis special attention is devoted to the effects of these crises on the M&A deal flow in the European Union. Few studies investigated the effects of a financial crisis on cross-border M&A transactions, most notably during the 1997-1998 East Asian financial crisis (Krugman, 2000; Aguiar and Gopinath, 2005; and Acharya et al., 2010). This literature suggests 'fire-sale opportunities' as a determinant of increased inbound M&A activity for countries experiencing a crisis. A fire-sale in this respect is the sale of a firm for a discount. A fire-sale can occur when selling firms are in a weak bargaining position, which can happen when these firms are in distress or in times of an economic crisis (Ang and Mauck, 2011).

The fire-sale literature with respect to M&A transactions largely depends on observations of the East Asian crisis. In this thesis we investigate whether the European financial and economic crises are also characterized by the phenomenon of fire-sale M&A. The study further considers whether well-known takeover determinants also apply to European cross-border mergers. This leads to the fifth sub-question:

Sub-question 5: ***What are the determinants for cross-border M&A in the European Union during the financial and economic crises of 2008 onwards?***

1.5 Outline and contributions

Chapters 2 to 6 contain an empirical approach to the research sub-questions based on a number of datasets. Chapter 2 comprises the examination of the first sub-question which covers the relevance of investment recommendations based on technical analysis. The research sample in this chapter consists of more than 5000 recommendations for stocks listed in the Netherlands published during the period 2004 to 2010. The recommendations data originate from the Dutch investment website Guruwatch. Stock price and trading volume data stem from Thomson Reuters Datastream. Stock returns were studied for a period of two weeks prior to a recommendation and two weeks after a recommendation was published. No indications of meaningful abnormal returns could be found after the publication of technical analyst recommendations. These recommendations are to a large extent based on simple technical

analysis rules and are therefore generally trend-following. This study thus creates a better understanding of the potential role of technical analysts in the investment decision process. Therefore, chapter 2 provides an indication of the extent to which the Dutch stock market is weakly efficient.

Chapter 3 analyzes and discusses the second research sub-question which considers fundamental analyst recommendations in relation to semi-strong market efficiency. As the existing literature is mostly focused on US analyst recommendations, evidence for stock recommendations in emerging markets is scarce. To address the second sub-question we use a non-US sample. This sample contains more than 31000 fundamental analyst recommendations which were published for stocks listed on the South African stock market (i.e., the Johannesburg Stock Exchange) during the period 1995 to 2011. Studies regarding analyst recommendations on the South African stock market have suffered from various limitations, ranging from small samples to untimely recommendation data. The analysis in chapter 3 overcomes these limitations by using daily recommendation data taken from the internationally recognized Institutional Brokers' Estimate System (I/B/E/S). The publication of buy (sell) recommendations generally has a positive (negative) impact on stock prices. More specifically, recommendation upgrades (downgrades) are generally associated with positive (negative) abnormal returns. An analysis of the portfolios formed in this study indicates that stocks that received a strong buy recommendation continue to outperform beyond the initial price impact. The same conclusion applies for stocks receiving a recommendation upgrade. A portfolio consisting of stocks which received a recommendation downgrade underperformed the market. Chapter 3 contributes to the understanding of the value of analyst recommendations in a South African context. Furthermore, this chapter also adds to the understanding of the degree of semi-strong efficiency of the South African stock market.

The fourth chapter investigates and discusses the third research sub-question regarding target prices. These price forecasts are generally published in addition to recommendations. The objective is to shed more light on the valuation skills of fundamental analysts by relating their price forecasts to the price paid in a takeover bid. In this study we use a sample of 592 completed US acquisitions during the period 2004 to 2010. We identified M&A deals using Thomson Reuters SDC. The study reveals that the level of the return forecasted by analysts is strongly related to the bid premium in a successful acquisition. This relation also holds when we correct the bid premium for synergy gains as estimated by the acquiring company's management. This study enhances the understanding of the relevance of target prices and thereby illustrates why investors react to a change in the target price.

Chapter 5 examines the fourth research sub-question by considering the role of recommendations and target prices in the consummation of a takeover. Takeover bids are sometimes rejected by the target company's shareholders. Security analyst opinions can potentially be used as a benchmark for investors to evaluate a takeover bid. In this chapter we assess 860

intended takeovers in the US during the period 1999 to 2010. The realization of intended takeovers is negatively related to both the level of the forecasted return and the dispersion of this level. Analyst recommendations are not related to takeover completion. The relationship between merger completion and security analyst opinions can contribute to the understanding of why some bids fail.

Chapter 6 investigates the fifth research sub-question. In this chapter we identify merger determinants in a European cross-border context. The synergy motive for takeovers is widely documented in the literature. Less is known about why cross-borders merger occur. We use a sample of cross-border acquisitions in the European Union (EU) during the period 1999 to 2012. The relative valuation of the acquirer versus the target plays an important role for the determination of becoming either an acquirer or a target. We did not find consistent evidence of fire-sales by companies based in a country experiencing a financial or economic crisis. By including the period 2008 to 2012 this study further contributes to our understanding of fire-sales during financial and economic crises.

Chapter 7 consists of a conclusion and discussion of all findings, also with regard to the main research question, namely whether security analyst opinions are relevant for the decisions to invest in common stock or to acquire a company. Finally, chapter 7 closes with a discussion of the limitations of the thesis and suggests avenues for future research.

Chapter 2

Are chartists artists? The determinants and profitability of recommendations based on technical analysis[9]

2.1 Introduction

The relevance of recommendations published by security analysts has been subject to extensive academic research. The larger part of the literature is directed towards recommendations on the basis of fundamental analysis.[10] Technical analysts represent a different category. They believe that past stock prices and trading volume may show patterns that indicate future trends. If that were true, price patterns on the stock market[11] would contradict weak-form market efficiency, which states that all information from historical data is already incorporated in current prices.

Tools based on technical analysis (TA) are widely available to investors. Many brokers offer TA functionalities to their clients, and investors can furthermore rely on commercial charting packages offered by professional vendors. TA is broadly used among investors. For the Netherlands, Hoffmann et al. (2010) showed that the number of private investors using TA was larger than the number of investors relying on fundamental analysis. The use of TA is not limited to private investors only. For professional investors, Carter and Van Auken (1990) and Menkhoff (2010) found that 35 percent and 87 percent, respectively, considered TA to be important for trading decisions.

Most of the research regarding the profitability of TA focuses on the usefulness of individual trading rules (i.e., trading rules based on one single method). The number of existing TA trading rules is very large. Common trading rules rely on moving averages and on trading range breakouts (Brock et al., 1992). These rules are mostly applied on observed stock prices, while past trading volume is generally only used as a secondary tool (Sullivan et al., 1999). Although some studies support the value of TA to some extent (e.g., Wong et al., 2003;

9. This chapter is a modified version of a similarly titled paper. This paper was presented at a research seminar at the Utrecht University School of Economics on January 16, 2013.

10. See chapter 3 for a detailed study on fundamental analyst recommendations.

11. In this chapter we focus solely on technical analysis applied to stocks and stock indices.

Chong and Ng, 2008; and Metghalchi et al., 2008), many others did not find any evidence that TA can be used to generate abnormal returns (e.g., Lo et al., 2000; Kwon and Kish, 2002; Tian et al., 2002; Marshall and Cahan, 2005; Lento et al., 2007; Marshall et al., 2009; and Schulmeister, 2009). Confronted with academic criticism of their methodology, technicians occasionally respond that technical analysis is an art rather than a science, as also stated by DeMark (1994: xi): "*Technical analysis has always had more art than science to it.*" This suggests that technicians take into account more than simple trading rules when formulating investment recommendations. Therefore, in order to address this "art"-component of TA, not trading rules but TA-based recommendations published by specialized technicians should be studied, particularly because the "art"-aspect of a technical analyst is likely to transcend the pure TA rules. Two major questions are relevant here: first, are recommendations associated with positive abnormal returns, and second, to what extent do these recommendations differ from signals derived from technical trading rules?

Evaluations of recommendations issued by technical analysts are relatively scarce and evidence is mixed. Cowles (1933) was the first to analyze recommendations published by technicians. He found that this type of recommendation published in the Wall Street Journal underperformed a buy-and-hold strategy. Brown et al. (1998) applied different statistical methods to Cowles' dataset and found that these recommendations in fact yielded risk-adjusted abnormal returns. Dawson (1985) analyzed recommendations issued by a Singapore investment advisory firm. He found that the recommended stocks did not outperform the market. Dawson (1985: 183) added that "*from an optimal research perspective more than one investment advisor should be included.*" However, no other TA sources were available at that time.

The existing studies (Cowles, 1933; Dawson, 1985; and Brown et al., 1998) have severe limitations: the number of considered recommendations is small, and the recommendations are published by only a limited number of technical analysts. Furthermore, the short-term profitability of TA has not been tested in these papers while Menkhoff (2010) reported that TA was most frequently used for investment decisions with a horizon of just some weeks.[12]

In our research, we employed a dataset of 5017 cases, containing 3967 stock recommendations and 1050 index recommendations[13] on the basis of TA in the period 2004 to 2010. Recommendations were issued both by individual analysts and by professional trading services, such as banks and online signal services. Regression analysis shows that recommendations are not followed by abnormal returns. In fact, on average, buy recommendations on the stock index are followed by a small but statistically significant decrease of the market index on the subsequent trading day. Hence, judging from an abnormal return perspective, a technical analyst is not an artist.

12. The number of weeks was not specified.

13. An index recommendation reflects an analyst's view regarding the prospects of a stock index.

Another test focused on the determinants of technical recommendations. If technicians are artists, then their recommendations are likely to be different from the outcomes based on simple trading rules. We found that the sign of the recommendation (i.e., buy or sell) was positively related to the signs of trading signals coming from a number of frequently used TA rules. In a related fashion we also analyzed abnormal returns in the weeks surrounding the issue of these recommendations. We evaluated stock returns in the ten trading days up to and including the day of the recommendation, and, following Brock et al. (1992), we also assessed the returns over the period of ten trading days subsequent to the issue of a recommendation. Our results showed that technicians based their recommendations on recent stock price trends. Risk-adjusted cumulative returns were positive (negative) up to the publication day of the buy (sell) recommendation. The same pattern exists for index recommendations. We conclude that the sign of a recommendation is simply determined by recently observed short-term price trends, and that, also in this regard, technical analysts do not exhibit any artistic abilities.

Recommendations by individual analysts are most likely more "artistic" than recommendations issued by professional services. As a first robustness check we therefore analyzed abnormal returns surrounding recommendations stemming from individual analysts only. We did not find materially different results as compared to our original tests. In a second robustness check we tested whether "artist-driven" recommendations outperformed other recommendations. For this purpose we split the recommendations in two groups. We compared recommendations which were not in line with the aggregate concurrent signal of TA trading rules (i.e., relatively "arty" recommendations) with recommendations that were in line with what common trading rules suggested. Returns between both groups did not differ significantly.

This chapter contributes to the current literature in several ways. First, it contributes to the scarce empirical evidence on the value of recommendations based on technical analysis. Second, it provides evidence of the determinants of TA-based recommendations. The findings of this chapter are also relevant for practitioners because technical analysis is widespread among investors. This study indicates that investors should not trade on the basis of TA recommendations or TA trading rules.

The chapter proceeds as follows. The next section gives a review of a number of popular TA methods, discusses literature regarding TA as applied to stocks and stock indices, and contains the development of our hypotheses. Section 2.3 gives the data description and methodology. Section 2.4 presents tests and results after which section 2.5 presents robustness checks. Section 2.6 contains limitations of this study, and section 2.7 concludes the chapter.

2.2 Literature and hypotheses

Technical analysis is widely used among investors (Menkhoff, 2010). One of the appeals of TA is that even people without a proper background in finance can be enabled to pick up buy or sell signals for stocks and stock indices. TA methods are based on information derived from past prices or trading volume. Clearly, any consistently successful method would conflict with the Efficient Market Hypothesis (EMH) (Fama, 1970). The weak form of the EMH states that all past trading information is already reflected in current prices. The EMH is related to the random walk hypothesis (Fama, 1965b) which states that since new information will be immediately absorbed by the market and reflected in stock prices, future price changes can only be a result of unanticipated future news events and will be independent of past price changes. Since surprises are, by definition, random and unpredictable, price changes will be unpredictable as well. However, since the 1980s some papers have been published which show that stocks do not follow a perfect random walk (see for example Lo and MacKinlay, 1988). Since then, the potential profitability of technical trading rules has been examined extensively in the literature. Section 2.2.1 discusses popular technical trading rules together with empirical findings regarding their profitability. Section 2.2.2 then continues with a discussion of findings regarding the value of TA-based recommendations. Hypotheses are formulated in section 2.2.3.

2.2.1 Literature review on technical trading rules

The largest part of the TA literature discusses the investment value of technical trading rules. Lo et al. (2000) found that a number of technical indicators exhibited incremental information, especially for NASDAQ stocks. Although they concluded that TA may add value to investing, they stated that their results did not necessarily imply that one can use TA to generate excess trading profits.

This section discusses the mechanics of individual trading rules and some findings regarding their usefulness. As Brock et al. (1992) stated that moving averages (MA) and trading range breakouts (support and resistance levels) are the two most popular technical analysis methods, this section starts with a discussion of these rules. From a literature search we identified other frequently used TA rules. Most prominent trend-following rules are the moving average crossover, moving average convergence divergence, rate of change, and on-balance volume. We also considered two countertrend indicators, namely the relative strength index and the Bollinger bands methodology. In addition to defining commonly used rules, we will discuss empirical evidence regarding the profitability of trading rules. Here we only discuss

recent empirical literature, as earlier studies do not take into account data snooping biases[14] (Park and Irwin, 2007).

Moving average

According to Brock et al. (1992: 1733), moving average (MA) rules belong to the "*most popular technical rules*". The popularity of MA rules has been further confirmed by Cesari and Cremonini (2003) and Wong et al. (2003). The MA rule compares the current price (or the average price over the past x days) to a long-term average stock price over y days, where $y > x$. More formally constructed, for stock i the outcome of an MA at time t based on n observations can be defined as (Wong et al., 2003):

$$MA(P_i)_{t,n} = \frac{1}{n}\sum_{j=t-n+1}^{t} P_{i,j}$$

$$= (P_{i,t} + P_{i,t-1} + \cdots + P_{i,t-n+2} + P_{i,t-n+1})/n$$

In this equation, $MA(P_i)_{t,n}$ is the simple n-day moving average at day t, and $P_{i,t}$ is the closing price for stock i at day t. Hence the calculated value of $MA(P_i)$ at time t will be positioned at the same spot on the time axis as the last observation of P_t used in the definition.

Usually two different time series of MA values are combined: a short-term moving average (MAS) and a long-term moving average (MAL). The number of stock prices of MAS typically varies between 1 day (in which case the original price series serves as the MAS) and 10 days. The number of stock prices included in the MAL is usually between 10 and 200 days. According to Brock et al. (1992), a commonly used MA rule is 1-200. This rule entails a combination of two moving averages in which the MAS is based on 1 day and the MAL on 200 days. Brock et al. (1992) further mentioned that MA 1-150, MA 5-150, and MA 2-200 are often applied.

For the purpose of defining trading rules, let k be the number of periods for MAS and l the number of periods for MAL. The trading rules can be summarized as: "Buy" if $MAS(P_i)_{t,k} > MAL(P_i)_{t,l}$ and "Sell" if $MAS(P_i)_{t,k} < MAL(P_i)_{t,l}$.

Evidence on the profitability of MA rules is mixed. Significant positive abnormal returns for MA rules for the Singapore stock exchange were found by Wong et al. (2003). Chong and Ng (2008) confirmed the profitability of MA rules on the LSE FT30 index and Metghalchi et al. (2008) found outperformance using MA rules on the Swedish stock index.

Other publications report the opposite. Kwon and Kish (2002) evaluated a number of MA rules on US indices in different time periods and found that the profitability of technical trading rules had decreased to zero over time. Tian et al. (2002) evaluated 412 different

14. There will always be some rules which perform better when a large number of trading rules are tested, which may be due to pure luck. In the more recent literature one commonly corrects for such a selection bias.

trading rules based on, among others, the moving average on both US and Chinese markets. While these authors found no evidence of any predictive power of technical rules on the performance of US stocks, they found evidence that some MA rules led to outperformance in the less efficient Chinese market. Marshall and Cahan (2005) also studied less efficient markets and focused on the New Zealand stock exchange. Contrary to Tian et al. (2002) they concluded that MAs are not profitable even for a market which is characterized as less efficient (i.e., New Zealand).

Fong and Yong (2005) evaluated MA rules for individual US internet stocks from 1998 to 2002, and they concluded that market prices of most internet stocks behaved as random walks and hence they did not find evidence of significant trading profits using TA. Finally, Marshall et al. (2009) found that MA rules were not profitable for US stocks for their dataset. Their results held for different firm sizes, liquidity and industry effects.

Trading range breakout

The trading range breakout (TRB) method is also known as the support and resistance indicator (Brock et al., 1992). This indicator signals minimum and maximum prices, respectively, for which a stock has traded over the past n days. Following Brock et al. (1992) we apply 50, 150 and 200 days:

$$SUPPORT_{i,t} = MIN(P_{i,t-1}, P_{i,t-2}, \ldots, P_{i,t-n-1})$$

$$RESISTANCE_{i,t} = MAX(P_{i,t-1}, P_{i,t-2}, \ldots, P_{i,t-n-1})$$

According to technical analysts, investors will usually sell at the local maximum price. If on the other hand the stock price increases above this so-called resistance level, technical analysts become bullish on the stock. The reverse holds for the support level. The trading rules can thus be defined as "Buy" if $P_{i,t} > RESISTANCE_{i,t}$ and "Sell" if $P_{i,t} < SUPPORT_{i,t}$.

The TRB method has received considerable attention in the literature. Marshall et al. (2009) found that TRB rules were not profitable for US stocks for their dataset. Tian et al. (2002) also evaluated trading rules based on TRB rules on both US and Chinese markets. Similar to their findings on the MA rules, they did not find evidence of predictive power for US stocks, although the TRB method was more valuable on the Chinese market. In contrast to Tian et al. (2002), Marshall and Cahan (2005) concluded that TRBs are not profitable even for a market which is characterized as less efficient.

Moving average crossover

The moving average crossover is related to the basic MA rule. The difference is that a buy (sell) signal is generated only on the day that the short period MA crosses the long period MA from below (above) (Schulmeister, 2009). The frequency of issued signals by this method is there-

fore lower than for the regular MA rules. We follow Brock et al. (1992) in limiting ourselves to the 1-150, 5-150, 1-200 and 2-200 rules. The following trading rules can be identified: "Buy" if $MAS(P_i)_{t,k} > MAL(P_i)_{t,l}$ while $MAS(P_i)_{t-1,k} < MAL(P_i)_{t-1,l}$. A sell recommendation is issued if $MAS(P_i)_{t,k} < MAL(P_i)_{t,l}$ while $MAS(P_i)_{t-1,k} > MAL(P_i)_{t-1,l}$.

Moving average convergence divergence

This rule is associated with three different trading signals. One follows from the moving average convergence divergence (MACD) itself, the others from the MACD signal line and the MACD histogram. We start with the definition of the MACD.

(i) The MACD is based on two exponential moving averages (EMA) and is defined as the difference between two different EMAs. According to Murphy (1999) the 12-day EMA and the 26-day EMA are the most frequently used ones (Murphy, 1999):

$$MACD_{i,t} = EMA(P_i)_{t,12} - EMA(P_i)_{t,26}$$

The EMA is a variant of the simple MA, but this rule gives a higher weighting to the most recent closing price. This weighting factor is defined as $\frac{2}{n+1}$ where n is the EMA-period:

$EMA(P_i)_{t,n} = \left[P_{i,t} - EMA(P_i)_{t-1,n}\right] \times \frac{2}{n+1} + EMA(P_i)_{t-1,n}$. The $MA(P_i)_{t,n}$ is generally used as a value for the first-day EMA-period. The following trading rule can be followed: "Buy" if $MACD_{i,t} > 0$ and "Sell" if $MACD_{i,t} < 0$.

To our knowledge, only Chong and Ng (2008) have tested the profitability of the basic MACD rule. Using data of the FT30 index from 1935 to 1994, they found that the MACD rule outperformed a simple buy-and-hold strategy.

(ii) The MACD signal line is a method related to the MACD. In this case a 9-day EMA of the MACD is constructed. This is the so-called signal line:

$$MACDSIGNAL_{i,t} = \left[MACD_{i,t} - EMA(MACD_i)_{t-1,n}\right] \times \frac{2}{n+1} + EMA(MACD_i)_{t-1,n}$$

As a starting value $MA(MACD_i)_{t-1,n}$ is used. The following trading rule can be defined: "Buy" if $MACDSIGNAL_{i,t} > 0$ and "Sell" if $MACDSIGNAL_{i,t} < 0$.

(iii) Another method related to the MACD is the MACD histogram, which represents the difference between the MACD and the signal line:

$$MACDHISTOGRAM_{i,t} = MACD_{i,t} - MACDSIGNAL_{i,t}.$$

Positive histogram values indicate an uptrend, and negative values indicate a downtrend. In other words: "Buy" if $MACDHISTOGRAM_{i,t} > 0$ and "Sell" if $MACDHISTOGRAM_{i,t} < 0$.

Rate of change

Rate of change (ROC) is related to momentum. ROC is perhaps the easiest of all methods to understand as it relates the current price to the price n days ago. A common time period is 10 trading days:

$$ROC_{i,t} = P_{i,t} - P_{i,t-9}$$

A price increase corresponds to a positive momentum, and a negative value of ROC indicates negative momentum. The resulting trading rule is defined as follows: "Buy" if $ROC_{i,t} > 0$ and "Sell" if $ROC_{i,t} < 0$.

Jegadeesh and Titman (1993) found that momentum strategies are associated with positive abnormal returns over one to four calendar quarters when using formation periods of one to four quarters. In contrast, Gutierrez and Kelley (2008) showed that for a shorter formation period (five days) short-term winners were followed by a 10-day return reversal.

On-balance volume

On-balance volume (OBV) is the best-known indicator based on trading volume. The indicator starts at 0 and adds trading volume (V) of positive trading days (i.e., the stock closed up) and deducts V of negative trading days:

$$OBV_{i,t} = OBV_{i,t-1} + \begin{Bmatrix} V\ if\ P_{i,t} > P_{i,t-1} \\ 0\ if\ P_{i,t} = P_{i,t-1} \\ -V\ if\ P_{i,t} < P_{i,t-1} \end{Bmatrix}$$

The OBV indicator stipulates that volume precedes price changes. Rising prices reflect positive volume pressure which in turn can lead to higher prices. Usually MA rules are applied to the OBV. Again, we consider the following MA rules: MA 1-150, MA 5-150, MA 1-200, and MA 2-200. This brings us to the following trading signals: "Buy" if $MAS(OBV_i)_{t,k} > MAL(OBV_i)_{t,l}$ and "Sell" if $MAS(OBV_i)_{t,k} < MAL(OBV_i)_{t,l}$.

Relative strength index

Wong et al. (2003) suggested that the relative strength index (RSI) is the most frequently used countertrend indicator. The RSI uses closing prices and is the ratio of up-closes, $U_{i,t}$, to down-closes, $D_{i,t}$, over the time period selected for stock i. The length of this period is usually 14 days. The up-closes and down-closes are defined such that:

$$U_{i,t}\begin{Bmatrix} P_{i,t} - P_{i,t-1}\ if\ P_{i,t} > P_{i,t-1} \\ 0 \qquad\qquad otherwise \end{Bmatrix} \text{ and } D_{i,t}\begin{Bmatrix} P_{i,t-1} - P_{i,t}\ if\ P_{i,t-1} > P_{i,t} \\ 0 \qquad\qquad otherwise \end{Bmatrix}$$

The next step is to define the average level of the up- and down-closes:

$$\overline{U}_{i,t} = \frac{1}{14}\sum_{t-13}^{t} U_{i,t}$$

$$\overline{D}_{i,t} = \frac{1}{14}\sum_{t-13}^{t} D_{i,t}$$

Thereafter the relative strength is calculated as follows: $RS_{i,t} = \frac{\overline{U}_{i,t}}{\overline{D}_{i,t}}$. The RSI at time *t* is defined as: $RSI_{i,t} = 100 - \frac{100}{1+ RS_{i,t}}$. The RSI is an oscillator with a level between 0 and 100. According to the RSI, a level higher than 70 normally indicates that the stock price has risen but is now overbought (i.e., one should sell the stock). A level lower than 30 indicates the exact opposite. Hence, the RSI method can be interpreted as a countertrend indicator. The trading rules can be summarized as: "Buy" if $RSI_{i,t} < 30$ and "Sell" if $RSI_{i,t} > 70$.

Empirically, Wong et al. (2003) and Chong and Ng (2008) found abnormal returns for a trading strategy based on the RSI rule.

Bollinger bands

The second countertrend indicator is the Bollinger band method (BB). This rule is related to MA trading rules because the BB method contains a moving average, around which two bands are plotted. According to Lento et al. (2007) the BB(20,2) is the traditional method. This refers to a 20-day moving average; the distance between the MA and the bands in this case is twice the standard deviation of the stock price measured over the most recent 20-day period, $\sigma_{P_i,20}$.

At time *t* the upper band for stock *i* can thus be defined as:

$$BBUPPER_{i,t} = MA(P_i)_{t,20} + 2\sigma_{P_i,20}.$$

The lower band can be defined as:

$$BBLOWER_{i,t} = MA(P_i)_{t,20} - 2\sigma_{P_i,20}.$$

When the actual stock price exceeds one of those bands, it signals, according to the BB rule, that the stock price will return to the moving average. The BB method can thus be considered as a countertrend indicator. The trading rules can be specified as follows: "Buy" if $P_{i,t} < BB_{LOWER_{i,t}}$ and "Sell" if $P_{i,t} > BB_{UPPER_{i,t}}$.

Lento et al. (2007) conducted research on the profitability of BB patterns. This strategy underperformed a simple buy-and-hold strategy. Leung and Chong (2003) compared BB rules with MA rules and concluded that BB rules underperformed compared to MA rules.

2.2.2 Literature review on recommendations by technical analysts

According to some technical analysts the value of TA may not lie in strictly applying technical trading rules, but rather in interpreting and combining various signals into one recommendation (e.g., Dawson, 1985). This suggests that academic research should focus on recommendations based on technical analysis, rather than on trading rules themselves.

Surprisingly, technical recommendations are hardly discussed in the literature. Cowles (1933) was the first to analyze technicians. The editors of the Wall Street Journal at that time applied the Dow Theory – a theory in which different market phases and trends are described – to the Dow Jones Industrial Average (DJIA). They published 255 stock market forecasts using that methodology. Over the course of 26 years the recommendations yielded a 12 percent average annual rate of return. The DJIA in turn rose 15.5 percent per annum in that period. The results for the Dow Jones Railroad Average showed a similar pattern, which led Cowles (1933: 323) to conclude that the returns were "*poorer than the result of a continuous outright investment in representative common stocks for this period*". More recently Brown et al. (1998) applied a risk correction to Cowles' analysis. They concluded that the recommendations actually outperformed the Dow Jones indices when a risk measure was taken into consideration.

Whereas Cowles (1933) and Brown et al. (1998) conducted research on index recommendations, Dawson (1985) focused on recommendations for individual stocks. He evaluated 292 round-trip stock recommendations which were based on TA. A round-trip implies that an initial buy recommendation has been closed at a later stage. The recommendations in their sample were issued by a Singapore investment advisory firm and were published in its newsletter. After controlling for transaction costs, trades based on these recommendations did not generate abnormal returns.

2.2.3 Development of hypotheses

Fund managers perceive TA to be valuable in the short run (Menkhoff, 2010). In prior research on TA-based recommendations, only returns for a medium to long-time horizon were evaluated. For example, in Dawson (1985) returns were calculated for holding periods of up to 280 days with a mean of 36 trading days. Another limitation of Dawson's (1985) is the use of only one investment advisor. A similar concern applies to Cowles (1933) and Brown et al. (1988). We tried to fill this gap by evaluating short-term abnormal returns surrounding TA-based recommendations, using a large dataset covering thousands of recommendations published by different analysts.

In section 2.2.1 we reported that research has shown that technical trading rules are generally unable to yield abnormal returns. Specifically for the Dutch stock market over the period 1983 to 2002, Griffioen (2003: 163) studied 787 computerized technical trading rules applied on both individual stocks and the AEX index. He found that technical trading techniques "*are not genuinely superior […] to the buy-and-hold benchmark*". Technical analysts stress that they are artists, suggesting that their recommendations are possibly more suited for the construction of outperforming strategies than individual TA rules. Section 2.2.2 discussed the literature regarding technical recommendations. Early studies found no evidence of abnormal returns, whereas Brown et al. (1998) concluded for a relatively small sample that recommendations did contain value.

Following weak-form market efficiency (Fama, 1970), and thus contrary to the technician's claim, we expect that technical recommendations can not be used to generate abnormal returns. Consistent with Brock et al. (1992), we employ a time period of 10 days after the recommendation. We can formulate this as follows:

H1: Recommendations based on technical analysis are not associated with statistically significant abnormal returns in the 10-day period following a recommendation.

Independent of abnormal returns after the recommendation, technicians can only be called artists if they base their recommendations on other things than simple trading rules. Our second hypothesis therefore focuses on the determinants of TA-based recommendations. In accordance with section 2.2.1 we select the following methods: MA, moving average crossover, TRB, RSI, BB, MACD, ROC, and OBV. For the MA, TRB, and OBV rules, several variations will be tested. The MACD method contains three different rules. Table 2.1 summarizes how buy and sell signals are derived from each TA method.

Table 2.1 Trading rules based on frequently used TA methods

	Technical analysis method	Corresponding to buy recommendation when:	Corresponding to sell recommendation when:
1	Moving average (MA) [4 different variations]	the short run MA is higher than the long run MA	the short run MA is lower than the long run MA
2	Moving average crossover [4 different variations]	the short run MA crosses the long run MA from below	the long run MA crosses the short run MA from above
3	Bollinger bands (BB)	the stock price is below the lower band	the stock price is above the upper band
4	Moving average convergence divergence (MACD)	the MACD is positive (>0)	the MACD is negative (<0)
	MACD Signal	the MACD Signal is positive (>0)	the MACD Signal is negative (<0)
	MACD Histogram	the MACD Histogram is positive (>0)	the MACD Histogram is negative (<0)
5	Relative strength index	the RSI has a value lower than 30	the RSI has a value higher than 70
6	Rate of change (ROC)	the ROC is positive (>0)	the ROC is negative (<0)
7	Trading range breakout (TRB) (support and resistance levels) [3 different variations]	the stock price is higher than the resistance level	the stock price is below the support level
8	On-balance volume (OBV) [4 different variations]	the short run MA of the OBV exceeds the long run MA	the short run MA of the OBV is below the long run MA

We expect that technicians are simply following technical trading rules. The sign of the recommendation (i.e., buy or sell) will thus be related to the trading signal of the technical trading rules. This relation is postulated in the second hypothesis of this chapter.

H2: TA recommendations are positively associated with trading signals stemming from technical trading rules.

Related to the second hypothesis, the third hypothesis considers stock price patterns prior to a recommendation. A collective feature of technical trading rules is that they are based on

previous price or volume patterns; MA rules for example may use past stock prices from a time period as long as 200 days. Most TA methods are trend-following – only the RSI and BB methods are countertrend indicators – and as such the general rule for most methods is that they trigger a positive (negative) signal when stocks are in an uptrend (downward trend).

We therefore hypothesize that the price pattern prior to the publication of the recommendation is in line with the direction of the recommendation. In other words, we expect that a buy recommendation has been preceded by a stock price increase during the 10-day period prior to and including the day of the recommendation. Similarly, we expect that a sell recommendation has been preceded by a stock price decrease during this 10-day period. The third hypothesis is formulated as follows:

H3: Buy (sell) recommendations based on technical analysis are preceded by positive (negative) abnormal returns in the period of ten trading days up to and including the day of the publication of the recommendation.

In the following section we present our sample and the methodology we used to test our hypotheses.

2.3 Data and methodology

2.3.1 Sample selection

We used a unique dataset containing analyst recommendations issued by technical analysts for Dutch listed firms and for the major indices in the Netherlands.[15] Some recommendations had been issued by individual analysts, others by automated technical analysis websites. The dataset contained, in total, 5696 buy, hold and sell recommendations[16] related to the Dutch stock market recorded in the period November 2003 to December 2010.[17] The dataset did not include delisted stocks. We do not expect that this bias impacts our results as we are primarily concerned with short-term stock price movements.

Recommendations need to meet a number of criteria in order to be included in the final dataset for this research: (1) we only consider buy and sell recommendations; (2) recommendations had to be recorded on trading days; (3) when an analyst had issued several identical recommendations on a particular day for the same stock or index, only one recommendation

15. We are grateful to Guruwatch.nl for sharing their dataset. Guruwatch has tracked the best known Dutch technicians. The website operates completely independently of the analysts who are covered. Furthermore Guruwatch did not receive compensation in any form from the technicians featured on their website. We are not authorized to mention analysts by name or to publish their individual results.

16. A well-known problem with technicians is that they often do not publish a clear-cut buy or sell signal. Cowles (1933: 309) has already taken note of this, stating that "*some of the forecasters seem to have taken a page from the book of the Delphic Oracle, expressing their prophecies in terms susceptible of more than one construction*". The technical outlooks have been carefully interpreted by the data vendor as buy, hold or sell recommendations.

17. Only for the second quarter of 2005 no data has been recorded in the database.

will be included; (4) when an analyst did issue both a sell and a buy recommendation on a given day for the same stock or index, both recommendations are omitted; and (5) with respect to index recommendations only the major Dutch index (AEX index) is considered. The database contains relatively few recommendations for the other indices. Our final sample totals 5017 recommendation which can be broken down into 3967 recommendations for 96 individual stocks and 1050 index recommendations. The recommendations in our final sample were issued in the period from January 7, 2004 to November 30, 2010. Overall, recommendations were collected from 101 different analysts, with the least active analyst providing 1 recommendation and the most active analyst providing 1237 recommendations. Table 2.2 depicts the composition of our final sample.

Table 2.2 The distribution of buy and sell recommendations

Category	Recommendation	Number	Percentage
Stock	Buy	2687	67.7%
	Sell	1280	32.3%
	Total	3967	100%
Index	Buy	605	57.6%
	Sell	445	42.4%
	Total	1050	100%

Approximately two-thirds of the total number of stock recommendations represents a buy recommendation. The distribution of buy and sell recommendations on the index is more balanced as 57.6 percent of the recommendations constitute a buy recommendation whereas 42.4 percent pertain to sell recommendations.

We used Thomson Reuters Datastream to collect all stock-related variables on a daily basis for each stock in our final sample: stock price, total return (stock price including reinvested dividend), trading volume, market capitalization, and market-to-book ratio. As a proxy for the market index we use the AEX index which is the major stock index of the Netherlands. Also for this index we collected daily prices and total returns. For the risk-free interest rate we use the Dutch 1-month interest rate (as in Griffioen, 2003) provided by Thomson Reuters; this rate is similar to the 1-month Euribor rate.

2.3.2 Methodology

To test Hypotheses 1 and 3, we computed abnormal returns in the 20-day period around the publication of technical recommendations. The recommendations in our sample came with a date but not with a timestamp. Hence, for a particular day, recommendations might be issued before trading starts, during trading hours, or after the market was closed. In all cases we treated the return on the publication day (day 0) as a return occurring prior to the publication of the recommendation, as it is possible that recommendations which are issued before the

trading starts, are based on stock futures or other indicative opening prices. In our return analysis, we therefore treated the period (−9, 0) as a pre-recommendation period. Analogously, period (1, 10) was the post-recommendation period. For each stock in our sample we collected daily stock prices (including reinvested dividend) as of January 1, 2003. We defined the abnormal return for stock i on day t as the difference between the realized excess return and the expected excess return, see equation 2.1.

$$(2.1)\ AR_{i,t} = R_{i,t} - E(R_{i,t})$$

The realized excess return ($R_{i,t}$) for stock i on day t is defined as the difference between the raw stock return including reinvested dividends (as defined in equation 2.2) and the risk free rate, see equation 2.3.[18]

$$(2.2)\ r_{i,t} = \frac{P_{i,t}}{P_{i,t-1}} - 1$$

$$(2.3)\ R_{i,t} = r_{i,t} - r_{f,t}$$

Daily excess returns for the index are calculated similarly to a stock's excess return, see equations 2.4 and 2.5. $P_{m,t}$ refers to the level of the market index at time t. Market prices include reinvested dividends.

$$(2.4)\ r_{m,t} = \frac{P_{m,t}}{P_{m,t-1}} - 1$$

$$(2.5)\ R_{m,t} = r_{m,t} - r_{f,t}$$

The expected excess return $E(R_{i,t})$ is estimated using the Carhart 4-factor model (1997) model.[19] This model reads as:

$$(2.6)\ E(R_{i,t}) = \alpha_{i,t} + \beta_{1i,t}R_{m,t} + \beta_{2i,t}SMB_t + \beta_{3i,t}HML_t + \beta_{4i,t}UMD_t$$

The left-hand side of this model, $E(R_{i,t}) = E(r_{i,t}) - r_{f,t}$, is the expected excess return for stock i at day t. Further $R_{m,t} = r_{m,t} - r_{f,t}$ is the observed excess return on the AEX index (see Griffioen, 2003) with $r_{m,t}$ denoting the market return including reinvested dividend payments. SMB_t and HML_t are the Fama and French (1993) factors at day t referring to the size effect (SMB, small minus big) and the book value effect (HML, high minus low), respectively. To compute these factors, we used all listed stocks in the Netherlands in the period 2003 to 2010. We computed these factors on a daily basis where SMB_t represents the return on a portfolio consisting of the

18. The analysis of abnormal returns has also been conducted using logarithmic returns. These results (not reported) exhibited a similar economic and statistical significance as the results reported in this chapter.

19. This model is an extension of the Fama and French 3-factor model (1992). Fama and French (1993) showed that including factors for size and book value increased the explanatory power of portfolio returns to 90%, as compared to about 70% in the traditional 1-factor CAPM model. Carhart (1997) added a fourth factor to capture the momentum effect as documented by Jegadeesh and Titman (1993).

30% smallest stocks less the return on a portfolio consisting of the 30% largest stocks, both in terms of market capitalization. HML_t is the return on a portfolio that is long in the 50% stocks with the highest book-to-market ratio, and short in the 50% lowest book-to-market stocks. Finally, UMD_t refers to the Carhart (1997) momentum factor. This is the return on a portfolio that is long in the 30% stocks with the highest return in the past year, and short in the 30% stocks with the lowest return.[20] The alpha and the four beta-coefficients in this expected return regression are estimated on a daily basis, with an estimation period of 260 trading days.

As a measure for the expected market excess return we first calculated the mean-adjusted excess return, see equation 2.7. As estimation period for the mean-adjusted excess return we used the period of 250 days prior to the 10th day before a recommendation is issued. Next we calculated the abnormal return by subtracting the expected return from the observed return, see equation 2.8.

$$(2.7)\ E(R_{m,t}) = \frac{1}{250} \times \sum_{-10}^{-260} R_{m,t}$$

$$(2.8)\ AR_{m,t} = R_{m,t} - E(R_{m,t})$$

Since Menkhoff (2010) found that TA-based decisions are mostly used for short-term asset allocation decisions, we are, for both stocks and the index, interested in the average abnormal return (AAR) in the twenty trading days around the publication of TA-based recommendations. As we refer to event days instead of calendar days, we denote the days around the recommendation by *t'*. We calculated two series of AAR values, one for buy and one for sell recommendations. The estimator of an AAR for day *t'*, is defined as:

$$(2.9)\ AAR_{t'} = \frac{1}{N_{t'}} \sum_{i=1}^{N_{t'}} AR_{i,t'}$$

Where $AR_{i,t'}$ is the abnormal return for stock *i* on day *t'* and $N_{t'}$ is the number of firms with a buy or a sell recommendation at day *t'*. For the calculation of the significance of abnormal returns we calculated a t-statistic to test the hypothesis that the average abnormal return on an event day is equal to the average abnormal return in the estimation period (−260, −10):

$$(2.10)\ t - statistic_{t'} = \frac{AAR_{t'} - \frac{1}{250}\sum_{-10}^{-260} AAR_{t'}}{S(AR)_{t'}/\sqrt{N_{t'}}}$$

Where $S(AR)_t$ is an estimate of the standard deviation of the average abnormal return. In addition, we used a nonparametric test. With the generalized sign test (Sanger and McConnell, 1986; Cowen and Sergeant, 1996) we tested if the frequency of positive (negative) abnormal

20. One may argue that TA recommendations are partly based on momentum so that we shoud not control for this factor. Unreported tests document that our results do not qualitatively change when we omit the UMD factor from our analyses.

returns on each day in the event window differs significantly from the frequency of positive (negative) abnormal returns in the period (−260, −10) prior to a buy (sell) recommendation. This statistic is defined as in equation 2.11, where p refers to the fraction of positive abnormal returns in the pre-event window, and $p_{t'}$ to the fraction of positive abnormal returns on day t'.

$$(2.11)\ GS - statistic_{t'} = \frac{|p_{t'} - p|}{\sqrt{p(1-p)/N_{t'}}}$$

Finally the cumulative average abnormal return (CAAR) is defined as the summation of average abnormal returns over a certain event window:

$$(2.12)\ CAAR_{t'} = \Sigma_{t'}^{T} AAR_{t'}$$

We calculated CAARs in four different 5-day event windows. We recorded CAARs for the period (−9, −5), (−4, 0), (1, 5), and (6, 10). The t-statistics for the CAARs are based on the hypothesis that the CAAR in a 5-day window is not different from the average cumulative 5-day return in the estimation period (−260, −10).

Hypothesis 2 refers to the relation between recommendations and trading signals resulting from TA methods. While our sample contains recommendations, we still have to calculate daily trading signals for each stock and the index. For all eight trading rules listed in Table 2.1, we calculated trading signals for each stock in our sample on a daily basis. Some TA methods, such as the MA method, can have several versions. In those cases we considered the most common ones. For the calculation of each trading signal, we used daily stock data. For each stock on any given day, three distinct signals were possible for each trading rule. We labeled these as "1" on days for which the trading rule issued a buy signal, "−1" on days for which a rule issued a sell signal, and "0" on days without a buy or a sell signal. Note that for the MA crossover rule there were many days with a 0-score since it only issued a buy or sell signal on the day of the crossover.

Next, we calculated the average signal value for each trading rule in three different states: (1) for days on which a buy recommendation had been published by technical analysts; (2) for days on which a sell recommendation had been published; and (3) for all other days. We calculated these averages separately for the stock sample and the index sample. A positive (negative) average signal value for days on which a buy (sell) recommendation had been issued would indicate that a recommendation indicated the same direction as a trading rule.

For each trading rule, we compared the average trading rule signal when a buy recommendation had been issued with the average trading rule signal when a sell recommendation had been published. We used a simple t-test to test whether the difference is statistically significant. We also employed a multinomial logistic regression model, in which we regressed all observed recommendations across all stocks and trading days (an ordinal variable which

takes on the values "1" for buy, "0" for no recommendation or "–1" for a sell recommendation) on the concurrent signal values for each TA rule. We conducted this procedure for both stock recommendations and index recommendations.

2.4 Empirical results

2.4.1 Returns after the publication of TA-based recommendations

Panel A of Table 2.3 shows the daily abnormal returns for the 10-day period after the publication of the recommendation. We detect some statistically significant abnormal returns in the ten days after the publication. For example the index decreased significantly on both the first and the fourth day after a buy recommendation had been published. However, these instances did not occur consistently after the publication of a buy or a sell recommendation. Moreover, none of these statistically significant event days are economically significant (i.e., all significant returns are very small in size).

This conclusion is supported by an analysis of the cumulative average abnormal return (CAAR) after the publication of a recommendation; see Panel B of Table 2.3. Interestingly the CAAR for the index is significant and negative (–0.30%) in the week after a buy recommendation, while the CAAR is significant and positive in the second week after a sell recommendation (0.29%). Also with regard to stock recommendations we find a weakly significant average price increase in the second week after the publication of a sell recommendation. Hence, the statistical evidence points at small return reversals after the publication of TA-based recommendations. The effect size is, however, fairly small.

Table 2.3 Abnormal returns after the publication of a recommendation
Panel A: Average abnormal returns (AAR) in the 10 days after the publication of the recommendations

Day	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
	AAR	t-value	AAR	t-value	AAR	t-value	AAR	t-value
1	0.04%	1.08	–0.04%	–0.38	–0.12%	–3.04***	0.04%	0.51
2	0.01%	0.18	–0.15%	–1.91*	–0.03%	–0.72	0.06%	0.89
3	–0.05%	–1.56	–0.09%	–1.22	–0.01%	–0.33	–0.02%	–0.28
4	0.00%	0.03	–0.05%	–0.62	–0.10%	–2.38**	0.05%	0.71
5	0.07%	2.08**	0.05%	0.82	–0.04%	–0.95	0.05%	0.74
6	0.01%	0.11	0.13%	1.96*	–0.04%	–0.92	0.11%	1.64
7	0.01%	0.15	0.08%	1.32	0.02%	0.45	0.13%	2.11**
8	–0.05%	–1.57	–0.04%	–0.37	–0.01%	–0.29	0.07%	0.98
9	–0.04%	–1.25	0.13%	1.82*	–0.02%	–0.50	–0.02%	–0.39
10	–0.02%	–2.49**	–0.08%	–1.05	0.05%	1.06	0.01%	0.20

Panel B: Cumulative average abnormal returns (CAAR) in two 5-day intervals

Period	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
	CAAR	t-value	CAAR	t-value	CAAR	t-value	CAAR	t-value
(1, 5)	0.06%	0.60	−0.27%	−1.59	−0.30%	−3.35***	0.17%	1.17
(6,10)	−0.10%	−1.27	0.22%	1.85*	−0.01%	−0.07	0.29%	2.25**

Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

We further tested our hypothesis by employing a generalized sign test. The results are displayed in Table 2.4. The left-hand side depicts the results for stock recommendations, and the right-hand side shows results for index recommendations. In the estimation period (days −260 to −10) stocks with a buy recommendation outperformed the market in 48.0% of the days. Stocks with a sell recommendation underperformed in 52.1% of this period. In the generalized sign test outperformance (underperformance) is acknowledged when the percentage of stocks achieving positive (negative) abnormal returns is larger than in the estimation period. In the event of a buy recommendation on stocks, consistent outperformance is nonexistent after the day of the recommendation. For sell recommendations a similar pattern emerges; although the table contains some significant test statistics, these findings exhibit no consistency. The results are more pronounced when we consider index recommendations (see the right-hand side of Table 2.4). Panel A shows that the index exhibited negative abnormal returns in five out of the first six days following a buy recommendation. The publication of a sell recommendation was generally not followed by statistically significant abnormal returns.

Table 2.4 Generalized sign test on the returns after the publication of a recommendation
Panel A: Individual days

Day	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
	Out-performance	Test statistic	Under-performance	Test statistic	Out-performance	Test statistic	Under-performance	Test statistic
(−260, −10)	48.0%		52.1%		51.4%		48.6%	
1	47.7%	0.33	51.9%	0.15	46.3%	2.54**	47.9%	0.30
2	48.0%	0.02	52.7%	0.47	50.4%	0.50	46.1%	1.06
3	47.8%	0.21	52.7%	0.41	47.4%	1.97**	46.5%	0.87
4	48.6%	0.60	54.9%	2.04**	45.1%	3.12***	51.2%	1.12
5	48.4%	0.37	51.3%	0.59	46.4%	2.46**	47.9%	0.30
6	48.5%	0.48	49.7%	1.71*	47.4%	1.97**	45.2%	1.44
7	47.2%	0.87	49.6%	1.77*	50.9%	0.26	43.1%	2.31**
8	47.6%	0.40	53.0%	0.64	50.9%	0.26	41.6%	3.00***
9	45.9%	2.19**	51.8%	0.20	47.9%	1.72	48.1%	0.20
10	47.2%	0.87	52.1%	0.02	50.1%	0.66	47.9%	0.30

Panel B: Two 5-day intervals

Day	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
	Out-performance	Test statistic	Under-performance	Test statistic	Out-performance	Test statistic	Under-performance	Test statistic
(−260, −10)	48.0%		52.1%		51.4%		48.6%	
(1,5)	48.1%	0.08	52.7%	0.64	47.1%	2.11**	47.9%	0.28
(6,10)	47.3%	0.77	51.4%	0.65	49.5%	0.97	45.2%	1.44

Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

We conclude from this analysis that technical analysts are no artists, as they did not exhibit particular stock market forecasting skills. The only category with significant results constituted buy recommendations on the index. The index level, however, on average, decreased after such a recommendation had been published. In the next section we aim to explain this finding by investigating the determinants of technical recommendations.

2.4.2 The technical nature of TA-based recommendations

In this section we test whether TA recommendations are consistent with signals from TA trading rules. We start by relating buy and sell recommendations to the average signal value resulting from technical trading rules, as we defined in Table 2.1. For each trading day we calculated for each stock and the AEX index whether these technical trading rules would issue a buy signal or a sell signal (or no signal at all). Next we calculated the average signal value for each rule for three different events: first, days on which analysts published a buy recommendation; second, days on which analysts published a sell recommendation; and third, days on which no recommendation was issued. These average signal values are by definition bounded by the values −1 to +1.

The results are summarized in Table 2.5. The left-hand side represents findings for stock recommendations and the right-hand side for index recommendations. The first and second columns indicate which specific trading rule we have applied. Columns 3 to 5 depict the average signal values for these rules in the case of a buy recommendation, sell recommendation, or no recommendation at all, respectively. For illustrative purposes, we highlight one row in Table 2.5. This row shows that at times of a buy recommendation, the average technical signal value was +0.398 for the 1-200 version of the moving average. At times of a sell recommendation, this MA rule had an average value of −0.348. This implies that buy (sell) recommendations were more often accompanied by MA1-200-based buy (sell) signals than by MA1-200-based sell (buy) signals. Column 5 shows the average value of the signals for all trading days for all stocks when no recommendation had been issued. Column 6 shows the difference in value between buy and sell signals, and is computed as column 3 minus column 4. The t-value for a simple t-test testing whether this difference is significantly different from zero is presented

in column 7.[21] The last column shows the number of buy and sell recommendations included in the tests. The number of recommendations is lower for the on-balance volume (OBV) indicators. This is due to the fact that Datastream omitted trading values for some days for some stocks. The stocks with missing data have been excluded from the OBV analysis.

For stock recommendations, the difference in values between buy and sell recommendations, as shown in Table 2.5, is mostly in accordance with our expectations. The value of each technical trading rule is higher for buy recommendations than for sell recommendations, except for the relative strength index.

A buy signal from the RSI rule is more often associated with a sell recommendation than with a buy recommendation. This reverse pattern for the RSI can be explained by the fact that the RSI may issue buy signals when stock prices have decreased (in other words the stock may be "oversold"). Thus, by nature the RSI is different from the other indicators which generally regard positive momentum as a positive factor.

Although the BB rule is also perceived as a countertrend indicator, we do not identify a similar pattern as that for the RSI.

We find similar results for index recommendations. A difference occurs with respect to the moving average crossover rule, as only two variations are statistically significant.

Table 2.5 The relation between recommendations and trading rules

Technical indicator		Stock recommendations						Index recommendations					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(3)	(4)	(5)	(6)	(7)	(8)
Rule	Variation	Buy	Sell	No recommendation	Difference buy-sell	t-value	# Observations buy&sell	Buy	Sell	No recommendation	Difference buy-sell	t-value	# Observations buy&sell
Moving average	1-200	0.398	–0.348	0.138	0.746	23.78***	3967	0.700	0.191	0.245	0.508	9.70***	1050
	1-150	0.400	–0.444	0.121	0.843	27.27***	3967	0.676	0.173	0.211	0.503	9.46***	1050
	5-150	0.295	–0.309	0.122	0.604	18.65***	3967	0.620	0.191	0.218	0.429	7.85***	1050
	2-200	0.360	–0.308	0.138	0.668	20.93***	3967	0.712	0.187	0.235	0.529	10.11***	1050
Moving average crossover	1-200	0.034	–0.052	0.000	0.087	11.23***	3967	0.008	–0.016	0.004	0.024	1.66*	1050
	1-150	0.032	–0.053	–0.000	0.086	10.67***	3967	–0.003	–0.004	0.010	0.014	1.00	1050
	5-150	0.018	–0.032	0.000	0.050	8.51***	3967	0.000	–0.002	0.001	0.002	0.28	1050
	2-200	0.025	–0.049	0.000	0.074	10.81***	3967	0.007	–0.027	0.005	0.034	2.83***	1050
Bollinger bands		0.233	–0.294	0.015	0.527	32.46***	3967	0.109	–0.072	–0.025	0.181	7.70***	1050
Moving average convergence divergence		0.382	–0.502	0.081	0.884	28.73***	3967	0.521	0.047	0.219	0.473	8.25***	1050
	Signal line	0.294	–0.350	0.083	0.644	19.98***	3967	0.491	0.146	0.185	0.348	5.98***	1050
	Histogram	0.378	–0.495	0.012	0.874	28.34***	3967	0.240	–0.187	0.084	0.526	6.99***	1050

21. We also applied the Wilcoxon-Mann-Whitney test to test for differences; significance levels were in line with the simple t-test.

Relative strength index		−0.152	0.134	0.017	−0.286	−20.86***	3967	−0.060	−0.025	−0.123	−0.035	−1.89*	1050
Rate of change		0.588	−0.316	0.231	0.903	35.14***	3967	0.544	−0.009	0.334	0.553	10.58***	1050
Trading range breakout	50 day	0.261	−0.341	0.023	0.602	35.06***	3967	0.208	0.013	0.080	0.195	7.45***	1050
	150 day	0.140	−0.151	0.021	0.290	21.89***	3967	0.150	0.043	0.081	0.108	4.91***	1050
	200 day	0.127	−0.120	0.021	0.247	19.78***	3967	0.136	0.036	0.064	0.100	4.87***	1050
On-balance volume	1-200	0.335	−0.258	0.239	0.594	16.30***	3211						
	1-150	0.331	−0.330	0.211	0.661	18.25***	3211						
	5-150	0.267	−0.240	0.210	0.507	13.69***	3211						
	2-200	0.317	−0.228	0.238	0.545	14.86***	3211						

Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

We tested the relationship between recommendations and trading signals more formally using a multinomial logistic regression analysis. For each stock and for each trading day, we observed recommendations and we computed trading signals. As a dependent variable we used the published recommendation which could take on the values of "1" (buy), "−1" (sell) and "0" (no recommendation). In Table 2.5 we analyzed different versions for each rule. In the multinomial regression we included for each trading rule only the variable with the highest level of significance as was indicated in Table 2.5. We used the computed values for the trading rules (for which Table 2.5 showed the averages) as independent variables. We estimated the following regression model for stocks, see equation 2.13:

$$\begin{aligned} Recommendation_{i,t} = {} & \alpha_{i,t} + \beta_{1,i,t}(MA1-150)_{i,t} + \beta_{2,i,t}(MA\ crossover\ 1- \\ & 200)_{i,t} + \beta_{3,i,t}(BB)_{i,t} + \beta_{4,i,t}(MACD)_{i,t} + \beta_{5,i,t}(RSI)_{i,t} + \beta_{6,i,t}(ROC)_{i,t} + \\ & \beta_{7,i,t}(TRB50)_{i,t} + \beta_{8,i,t}(OBV1-150)_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{2.13}$$

For the index we replaced MA1-150 by MA2-200, and MA crossover 1-200 by MA crossover 2-200. We further excluded the OBV indicator since this variable could not be computed for the index. Table 2.6 shows the results of this analysis. Panel A considers stock recommendations, while Panel B considers index recommendations. The base scenario of these multinomial logistic regressions is that no new recommendation is issued. The significant variables in Panel A mostly exhibit the expected signs. All trading rules have a negative coefficient when a sell recommendation is published. For buy recommendations a similar pattern emerges, although in this case the MACD is insignificant and the OBV is negatively related.

In contrast to Table 2.5, the RSI has the expected sign for both buy and sell recommendations now that we control for other technical trading rules.

For the index specification, each variable is significantly related to either buy or sell recommendations. The coefficients of the MA and BB are positively and significantly related to buy recommendations, while the moving average crossover, RSI, ROC and TRB are all related

to sell recommendations. The signs of the non-significant variables are as expected. In the index specification the MACD is also statistically insignificant. This indicates that the MACD rule is relatively unimportant to providers of TA-based recommendations.

We tested both specifications for multicollinearity by using the variance-inflation factor (VIF). None of the variables exceed a VIF of 1.94, with a mean VIF of 1.56 for all variables. These values are well below the cut-off level of 10 (Belsley et al., 1980; Studenmund, 1992). We can therefore conclude that multicollinearity is not an issue of concern in these specifications.

Table 2.6 Multinomial logistic regression of TA-based recommendations on the technical trading rules
Panel A: Stock recommendations

Rule	Variation	Buy		Sell	
		Coefficient	z-statistic	Coefficient	z-statistic
Moving average	1-150	0.108	3.27***	−0.090	−1.95*
Moving average crossover	1-200	0.529	4.15***	−0.504	−3.27***
Bollinger bands		0.866	12.36***	−1.014	−10.24***
MACD		−0.039	−1.29	−0.140	−3.04***
Relative strength index		0.316	4.51***	−0.508	−4.93***
Rate of change		0.212	6.36***	−0.242	−5.52***
Trading range breakout	50	0.815	11.47***	−1.278	−11.84***
On-balance volume	1-150	−0.079	−2.77***	−0.253	−6.41***
Intercept		−3.90	−137.35***	−4.760	−114.57***

Notes to Panel A: Number of observations: 88150; Wald chi^2: 2018.30; Prob > chi^2: 0.0000; Pseudo R^2: 0.0653

Panel B: Index recommendations

Signal	Variation	Buy		Sell	
		Coefficient	z-statistic	Coefficient	z-statistic
Moving average	2-200	0.629	8.54***	0.094	1.30
Moving average crossover	2-200	−0.583	−1.32	−1.091	−2.87***
Bollinger bands		1.19	6.18***	−0.051	−0.25
MACD		−0.020	−0.28	−0.038	−0.46
Relative strength index		0.039	0.20	−0.915	−4.19***
Rate of change		0.139	0.18	−0.449	−5.72***
Trading range breakout	50	0.080	0.54	−0.320	−1.79*
Intercept		−1.03	−14.88***	−0.927	−15.18***

Notes to Panel B: Number of observations: 2231; Wald chi^2: 227.71; Prob > chi^2: 0.0000; Pseudo R^2: 0.0616
Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

Given the results in both Table 2.5 and Table 2.6, we confirm the relation between TA-based recommendations and technical trading signals and we conclude for our sample that TA recommendations are associated with TA trading rules.[22] Again we dismiss the notion of artistic

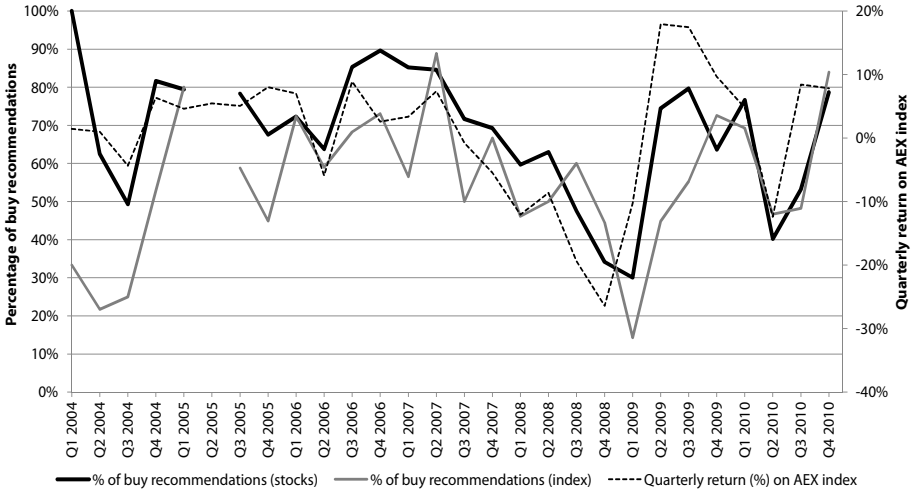
22. Although the model is statistically significant, its R^2 is modest, which suggests that technical recommendations can not entirely be explained by the TA trading rules in our model. The low value of R^2 may be due to the fact that the model incorporates only a limited

abilities among technical analysts; recommendations from technical analysts are largely based on simple technical trading rules. In the next section we explore this finding further, using stock and index returns prior to the publication of a recommendation.

2.4.3 Returns prior to the publication of TA-based recommendations

If recommendations from technical analysts are trend-following to a large extent, then optimism among analysts measured as the percentage of published buy recommendations should be related to stock market sentiment. We therefore start with connecting the average quarterly level of published recommendations (defined as the number of buy recommendations divided by the sum of the number of buy and sell recommendations) to the concurrent stock market sentiment as depicted by quarterly price changes. For each calendar quarter, we present in Figure 2.1 the percentage of buy recommendations on stocks relative to the total number of buy and sell recommendations issued on stocks. We performed the same procedure for index recommendations. We also show the quarterly return for the market index.

Figure 2.1 Percentage of buy recommendations versus stock index returns



Note: Our dataset does not contain recommendations published in Q2 2005.

For the first quarter of 2004, the stock dataset contained only buy recommendations, but as of Q2 2004 the sample gets more balanced. A clear picture emerges; the percentage of buy recommendations in a calendar quarter is positively associated with the return on the stock index in that same quarter.

Although Figure 2.1 suggests some degree of correlation between the average recommendation level and the return on the stock market, it remains inconclusive about the causality

number of rules as compared to the large number of possible trading rules. As an example, Sullivan et al. (1999) considered in total 7846 different trading rules.

between stock market returns and technical recommendations. In the next statistical analysis, we related the publication date of a recommendation to the abnormal returns in the 10-day period preceding it. Panel A of Table 2.7 shows the abnormal returns for this period. Already eight days prior to a buy recommendation, average abnormal returns were significantly positive. As of day −4 all returns were strongly significant. The "run-down" prior to sell recommendations typically only started at day −3. The finding of a run-up (run-down) prior to buy (sell) recommendations also held for index recommendations.

Next we analyzed the cumulative average abnormal return (CAAR) prior to the publication of a recommendation, see Panel B of Table 2.7. In the week leading up to and including the recommendation, both stocks and the index showed significant abnormal returns in the expected direction. In the week prior to a buy (sell) recommendation, stock prices increased on average by 2.16% (−2.83%) and the index level increased by 0.80% (−0.95%). We also detected a significant increase in stock prices in the period (−9, −5) prior to a buy recommendation. The index exhibited significantly negative abnormal returns in days (−9, −5) prior to a sell recommendation.

The return patterns prior to the recommendation indicate that technical analysts are primarily capable of "predicting the past" with their recommendations.

Table 2.7 Abnormal returns prior to publication of recommendations

Panel A: Average abnormal returns (AAR) in the 10 days up to and including the publication of the recommendations

Day	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
	AAR	t-value	AAR	t-value	AAR	t-value	AAR	t-value
−9	0.02%	0.56	0.14%	2.28**	−0.03%	−0.57	−0.06%	−0.86
−8	0.09%	2.37**	0.00%	0.18	−0.05%	−1.04	−0.08%	−1.46
−7	0.07%	1.96*	−0.05%	−0.61	−0.10%	−2.14**	−0.08%	−1.55
−6	0.13%	3.82***	0.07%	1.01	0.03%	0.80	−0.16%	−2.64***
−5	0.03%	0.77	0.05%	0.76	0.03%	0.66	−0.13%	−2.13**
−4	0.16%	4.41***	−0.07%	−0.85	0.11%	2.09**	−0.07%	−1.11
−3	0.18%	5.16***	−0.21%	−2.51**	0.04%	1.01	−0.05%	−0.78
−2	0.20%	4.46***	−0.37%	−4.95***	0.23%	5.21***	−0.19%	−2.82***
−1	0.55%	8.56***	−0.67%	−7.48***	0.19%	4.13***	−0.23%	−3.73***
0	1.07%	25.12***	−1.52%	−17.13***	0.23%	4.74***	−0.41%	−5.94***

Panel B: Cumulative average abnormal returns (CAAR) in two 5-day intervals

Period	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
	CAAR	t-value	CAAR	t-value	CAAR	t-value	CAAR	t-value
(−9,−5)	0.33%	4.28***	0.21%	1.60	−0.11%	−1.07	−0.57%	−3.82***
(−4,0)	2.16%	21.38***	−2.83%	−17.35***	0.80%	7.84***	−0.95%	−6.07***

Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

We further tested our findings by employing a generalized sign test. The results are displayed in Table 2.8, Panel A. In the estimation period (days −260 to −10) stocks with a buy recommendation outperformed the market in 48.0% of the days. Stocks with a sell recommendation underperformed in 52.1% of the days. In the event of a buy recommendation a large proportion of stocks exhibited positive average abnormal returns for each day during the period (−4, 0). The percentage of stocks with positive abnormal returns increased from 52.1% on day −4 to 64.8% on day 0. For sell recommendations a similar pattern emerges. For each day during the period (−3, 0) the percentage of stocks with negative abnormal returns was significantly higher than in the estimation period. Here the percentage of stocks exhibiting negative abnormal returns increased from 55.9% on day −3 to as much as 74.9% on day 0. Index recommendations showed a similar pattern: stock prices increased over the period (−2, 0) prior to a buy recommendation and over the period (−1, 0) prior to a sell recommendation. These results are confirmed by the findings from our 5-day intervals; see Panel B of Table 2.8. The week prior to a recommendation exhibited significant test statistics across both buy and sell recommendations for stocks as well as the index.

Table 2.8 Generalized sign test prior to the publication of stock and index recommendations
Panel A: Individual days

	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
Day	Out-performance	Test statistic	Under-performance	Test statistic	Out-performance	Test statistic	Under-performance	Test statistic
(−260, −10)	48.0%		52.1%		51.4%		48.6%	
−9	48.5%	0.52	50.9%	0.82	51.4%	0.01	47.2%	0.58
−8	50.5%	2.57**	53.0%	0.69	47.8%	1.80*	49.9%	0.56
−7	48.5%	0.52	53.0%	0.69	45.8%	2.79***	51.0%	1.03
−6	49.6%	1.60	51.8%	0.20	48.9%	1.23	53.0%	1.89*
−5	48.4%	0.37	51.5%	0.42	50.9%	0.26	48.5%	0.01
−4	52.1%	4.19***	53.4%	0.98	51.5%	0.01	46.3%	0.96
−3	52.4%	4.58***	55.9%	2.72***	50.2%	0.58	52.1%	1.51
−2	53.4%	5.55***	58.5%	4.67***	58.7%	3.62***	51.5%	1.22
−1	58.1%	10.58***	63.4%	8.38***	58.3%	3.45***	55.1%	2.75***
0	64.8%	18.20***	74.9%	18.86***	57.5%	3.03***	59.8%	4.82***

Panel B: Two 5-day intervals

	Stock recommendations				Index recommendations			
	Buy		Sell		Buy		Sell	
Day	Out-performance	Test statistic	Under-performance	Test statistic	Out-performance	Test statistic	Under-performance	Test statistic
(−260, −10)	48.0%		52.1%		51.4%		48.6%	
(−9,−5)	49.1%	1.11	52.0%	0.03	49.0%	1.22	49.9%	0.57
(−4,0)	56.2%	8.48***	61.2%	6.74***	55.2%	1.88*	52.9%	1.84*

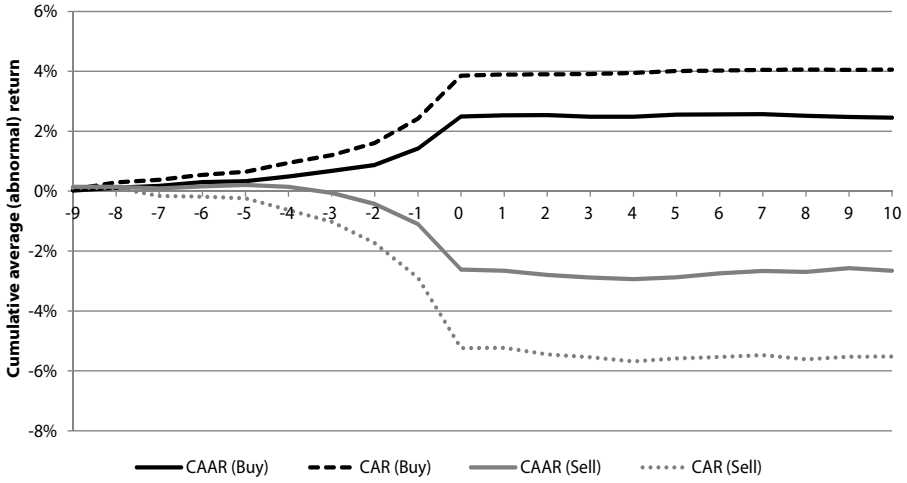
Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

Although we established in section 2.4.2 that analysts based their recommendations partly on countertrend indicators, the evidence presented here indicates that recommendations are mostly trend-following.

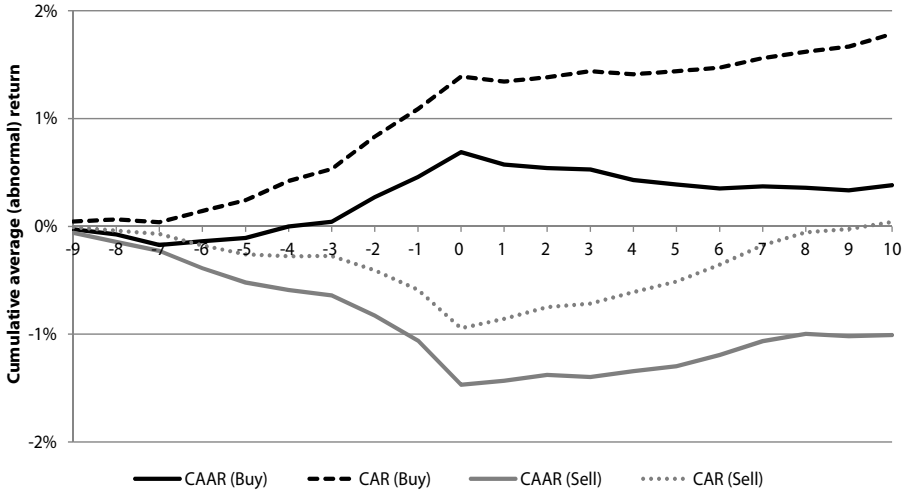
2.4.4 Connecting the evidence

So far we have analyzed the returns prior and subsequent to recommendations in isolation. Figure 2.2 connects both analyses graphically. This figure displays stock returns both before

Figure 2.2 Stock returns in the period surrounding TA-based recommendations
Panel A: Stock recommendations



Panel B: Index recommendations



Note: CAR means Cumulative average raw returns; CAAR means Cumulative average abnormal return

and after a recommendation. We present the returns surrounding the publication of both stock and index recommendations for the period (−9, 10). For illustrative purposes, we show both the cumulative average raw return and the cumulative average abnormal return. Our statistical tests were based on the latter measure of return; in other words, the CAAR graphs are a graphical representation of the findings in Tables 2.3 and 2.7. Panel A of Figure 2.2 shows a pattern of rising (declining) prices up to and including the day of the publication of a buy (sell) recommendation. In general, stock prices do not seem to increase or decrease after the publication of a recommendation. The index level (Panel B) tends to exhibit some degree of mean reversion after a recommendation has been published: an increase in the index level triggered a buy recommendation after which the index level decreased, and vice versa.

2.5 Robustness checks

The TA-based recommendations in our sample have been published by a variety of sources. Some recommendations were automatically generated by professional TA-services; other recommendations were published by individuals who also issued recommendations based on fundamental analysis, and another category consists of recommendations published by analysts with a sole focus on technical analysis. Automatically generated recommendations may be less "arty" than recommendations published by technical analysts of "flesh and blood". We therefore separately tested the performance of the latter group in our first robustness check. Constrained by the size of our sample, we only considered recommendations regarding stocks. We identified 31 different individual technical analysts who had published 1492 buy recommendations and 434 sell recommendations. The maximum number of recommendations per analyst is 443, and the minimum number of recommendations is 1. On average, individual technical analysts have published 62 recommendations.

We analyzed the abnormal returns in the four-week period around the publication of the recommendation. Panel A of Table 2.9 summarizes our findings. For buy recommendations, we detected positive abnormal returns for days as early as days −8 and −6. Furthermore days −4 up to and including day 0 showed positive abnormal returns. Interestingly, the average return on day 3 was negative and statistically significant, but, the magnitude is relatively small. Sell recommendations show a similar abnormal return pattern. Negative abnormal returns lasted for the period (−3, 0). Day 6 showed a positive average abnormal return, but again this return is not economically significant as the effect is very small.

Panel B of Table 2.9 shows cumulative average abnormal returns. We only found significant abnormal returns in the 1-week period leading up to the issue of recommendations. The CAAR prior to buy and sell recommendations was 1.35% and −1.87%, respectively. No

Table 2.9 Abnormal returns around the publication of recommendations by individual analysts
Panel A: Average abnormal returns (AAR) around recommendations

Day	Stock recommendations			
	Buy		Sell	
	AAR	t-value	AAR	t-value
–9	–0.02%	–0.56	–0.07%	–0.73
–8	0.11%	2.39**	0.02%	0.35
–7	–0.01%	–0.33	–0.10%	–0.87
–6	0.13%	2.76***	0.01%	0.18
–5	–0.05%	–1.15	–0.15%	–1.52
–4	0.17%	4.45***	–0.03%	–0.20
–3	0.13%	2.73***	–0.43%	–4.87***
–2	0.16%	3.42***	–0.35%	–2.19**
–1	0.45%	9.52***	–0.65%	–5.02***
0	0.44%	7.68***	–0.41%	–2.56**
1	0.01%	0.06	–0.07%	–0.47
2	–0.04%	–0.99	–0.09%	–0.77
3	–0.11%	–2.65***	–0.05%	–0.40
4	0.00%	0.07	–0.14%	–1.43
5	–0.01%	–0.17	0.02%	0.29
6	0.04%	0.89	0.22%	2.12**
7	–0.02%	–0.49	0.04%	0.42
8	–0.03%	–0.77	–0.06%	–0.49
9	–0.07%	–1.43	–0.02%	–0.11
10	–0.05%	–1.06	–0.07%	–0.58

Panel B: Cumulative average abnormal returns (CAAR) in four 5-day intervals

Period	Stock recommendations			
	Buy		Sell	
	CAAR	t-value	CAAR	t-value
(–9,–5)	0.15%	1.42	–0.29%	–1.09
(–4,0)	1.35%	11.05***	–1.87%	–5.75***
(1, 5)	–0.15%	–1.56	–0.33%	–1.43
(6,10)	–0.13%	–1.19	0.11%	0.73

Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

patterns are detected afterwards. We also performed a generalized sign test (unreported) which confirmed these patterns.

We conclude that we did not find qualitatively different results than those reported in our main tests when we restrict our sample to individual analysts only.

A second robustness test involves a division of our recommendations. So far we have found that both stocks and the index go up (down) prior to buy (sell) recommendations, while there were no meaningful abnormal returns afterwards. The finding that recommenda-

tion publications are not followed by meaningful abnormal returns is in line with our finding that technical analyst recommendations are to a large extent similar to technical trading rules, which are mostly unrelated to future returns on the Dutch stock market (Griffioen, 2003). However, in our sample, not every buy (sell) recommendation was accompanied by a positive (negative) signal from TA trading rules. Some recommendations might therefore be based on aspects other than simple trading rules. To accommodate the possibility that these relatively artistic recommendations outperformed simple trend-following recommendations, we divided both our stock sample and our index sample into several segments. For each published recommendation we calculated the number of TA rules which were in line with the recommendation. In this robustness check, a method was valued at "+1" if the trading rule stemming from a TA method issues a buy signal; its value was "0" if it is neutral, and it is assigned a value of "–1" otherwise. When a TA method consists of several variations (n) we weighted each variation with a factor $1/n$. For example, we used four versions for the MA method. In this case 0.25 point can be awarded for each variation. We subsequently summed the scores for all TA trading rules. For stocks (the index) the maximum value would be 8 (7) since there were eight (seven) different TA rules. For example, when all trading rules for a stock implied a buy signal, the resulting score would be 8. If the MA1-200 and MA5-150 would be neutral, then the score would be 7½.

We divided our sample into trend-following recommendations which were supported by a similar average signal value (i.e., a buy (sell) recommendation accompanied by a positive (negative) aggregate TA value) and artistic recommendations which were not in line with the average signal value. As we are interested in the forecasting skills of analysts we evaluated the returns for five trading days starting on the day after the publication of the recommendation, see Table 2.10.

There are no systematic differences between artistic and trend-following recommendations. For example, stocks exhibiting trend-following recommendations (i.e., a sell recommendation together with an aggregate negative technical signal value), declined with 0.14% on average on the day after the recommendation. Negatively recommended stocks with on average positive technical signals increased by 0.05%. The difference between both values has been tested with a simple t-test and was statistically insignificant. For some days we could find small significant differences but there is no strong evidence that relatively artistic recommendations outperform recommendations which are based on simple trading rules.[23]

23. We have tested this proposition in various forms. An alternative test is to split artistic in "extremely artistic" (buy (sell) recommendation coupled with a TA signal value lower than –3 (+3)) and "modestly artistic" (buy (sell) recommendation together with a TA signal value in between and including –3 (+3) and –1 (+1)). We could similarly split trend-following in two categories. There are signs of positive cumulative abnormal returns during days 1 to 5 when buying after the publication of extremely artistic buy recommendations. However, extremely artistic sell recommendations are also followed by positive abnormal returns in that period. In conclusion, there is no convincing evidence that a more fine-grained division of recommendations is related to significant outperformance.

Table 2.10 Average abnormal returns for recommendations depending on the TA signal value

Day	Stock recommendations							
	Buy				Sell			
	Artistic (A)	Trend-following (TF)	A – TF	t-value	Artistic (A)	Trend-following (TF)	A – TF	t-value
1	0.17%	0.01%	0.17%	1.54	0.05%	–0.14%	0.19%	1.25
2	–0.02%	0.02%	–0.04%	–0.51	–0.07%	–0.22%	0.16%	1.08
3	–0.04%	–0.06%	0.02%	0.24	–0.05%	–0.13%	0.08%	0.61
4	–0.07%	0.02%	–0.09%	–1.01	–0.16%	0.04%	–0.20%	–1.54
5	0.09%	0.07%	0.02%	0.19	0.09%	0.01%	0.08%	0.55
Day	Index recommendations							
	Buy				Sell			
	Artistic (A)	Trend-following (TF)	A – TF	t-value	Artistic (A)	Trend-following (TF)	A – TF	t-value
1	–0.05%	–0.13%	0.08%	0.87	–0.07%	0.15%	–0.21%	–1.58
2	0.13%	–0.07%	0.21%	1.84*	–0.01%	0.13%	–0.14%	–1.08
3	0.14%	–0.05%	0.19%	1.96*	0.00%	–0.05%	0.05%	0.36
4	–0.22%	–0.07%	–0.16%	–1.49	–0.08%	0.20%	–0.29%	–1.82*
5	–0.12%	–0.02%	–0.10%	–0.92	–0.01%	0.11%	–0.12%	–0.98

Note: ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

2.6 Limitations

A limitation of this chapter is the nature of technical recommendations in general. Technical analysts sometimes remain vague in their terminology and we had to rely on the call which has been made by the compiler of the database. It may therefore be possible that sometimes a recommendation has been coded as a buy while the analyst intended a hold or sell recommendation. The dataset, however, is – to the best of our knowledge – the only available dataset containing technical analyst recommendations.

A second limitation is that the dataset did not contain different levels of buy and sell recommendations (e.g., strong buy or strong sell recommendations). It would be helpful for future research when technical analysts themselves submit recommendations to a database. This perhaps also enables analysts to differentiate between different confidence levels of their recommendations.

The third limitation concerns the country of analysis. Given that the recommendations apply to only Dutch stocks and the stock index, conclusions can not be generalized, particularly to less efficient markets.

Lastly, we have studied the abnormal returns during ten trading days after the recommendation. Although unlikely, it is possible that additional abnormal returns are realized at a later stage, considering that Dawson (1985) showed that some technical recommendations were closed after a period of 280 days.

2.7 Conclusion and discussion

Most studies on technical analysis focus on the profitability of single trading rules, while technical analysts stress the importance of constructing indicators based on a combination of trading rules. Yet to date only a small number of publications exist on the potential profitability of recommendations based on technical analysis. The existing literature reports mixed results, and available datasets have been relatively small.

Employing a dataset of 5017 stock and stock index recommendations on the basis of technical analysis, we have tested whether technical analyst recommendations are "artistic" or whether they are not different from simple TA trading rules. We find that the sign of these recommendations (i.e., buy or sell) is consistent with various technical trading rules. In terms of abnormal returns, both stock prices and index levels exhibit abnormal returns prior to the recommendation in accordance with the sign of the TA-based recommendation. In other words, both stocks and the stock index have the tendency to rise (decline) prior to a buy (sell) recommendation. Despite these patterns prior to the publication, we find that these recommendations can not be used by investors to earn positive abnormal returns. The 10-day period after the issue of the buy and sell recommendations on stocks shows that the observed trends do not persist. With regard to index recommendations, we found that buy recommendations are followed by significantly negative abnormal returns in the first week after the publication. The magnitude of these returns is, however, small. In general, the findings indicate that on average, technical analysts just follow simple TA trading rules.

Not all recommendations in our sample are published by individual technical analysts as, among others, recommendations from professional TA websites are also included. In our first robustness check we have repeated our analyses for individual technical analysts only. We did not find qualitatively different results.

In a second robustness check we have tested whether artistic recommendations (i.e., recommendations which are not in line with technical trading rules) exhibit a different performance than trend-following recommendations. We did not find large differences between these types of recommendations and we conclude that recommendations which seem to stem from artistic capabilities do not outperform others.

The evidence presented in this chapter is in line with the literature on weak-form market efficiency. We contribute to the scarce literature on technical recommendations by illustrating that technical analysts are, at best, capable of identifying trends *ex post*. Technical analysts do *not* exhibit any forecasting abilities that enable positive abnormal returns. Our findings are also highly relevant to practitioners, since studies have shown that the use of TA is widespread among private investors (Hoffmann et al., 2010) and professional investors (Van Auken, 1990, and Menkhoff, 2010). Overall, this study indicates that trading on the basis of TA recommendations does not contribute to abnormal investment returns.

Future research may be directed to the relevance of technical recommendations on less efficient markets, such as the Chinese stock market (Tian et al., 2002). If a market is not even weakly efficient, recommendations by technicians may contain relevant information for investment decisions. It would also be interesting to collect and analyze technical recommendations for the foreign exchange market, as a large percentage of foreign exchange dealers use technical analysis when forming decisions (Taylor, 1992).

Chapter 3

Recommendations published by fundamental analysts: short-term returns and portfolio strategies[24]

3.1 Introduction

For decades security market analysts have provided the investment community with security recommendations based on fundamental analysis (FA) which reflect the analysts' opinions about a specific company's future prospects. These recommendations generally range from strong buy to strong sell.

Any investment strategy based on fundamental recommendations which exhibits consistent outperformance violates the assumption that markets are efficient. The Efficient Market Hypothesis (Fama, 1970) is related to the Random Walk theory (Fama, 1965b) which states that stock prices are mainly driven by unanticipated events. Hence, stock prices cannot be predicted, and therefore must follow a random walk. This theory has two implications for the potential value of recommendations. First, as long as analysts only use publicly known information, the publication of a recommendation should not trigger significant stock price movements; and second, creating portfolios based on publicly known recommendations should not be associated with positive abnormal returns over time, because the recommendation levels are publicly known and will therefore already be discounted in the stock price when the recommendation is published.

Most of the research to security recommendations has been conducted using a sample of US stocks. A large body of literature deals with the short-term and long-term stock price effects of the publication of recommendations. Stickel (1995), for example, showed that upgrades (downgrades) were associated with positive (negative) abnormal returns. In addition, Womack (1996) pointed out that the post-event drift after downgrades lasted for as long as six months. Barber et al. (2001) found that a portfolio consisting of highly favored stocks outperformed the least favored stocks. Jegadeesh et al. (2004) created portfolios on the basis of the quarterly change in the average recommendation, showing that recommendation changes were a better predictor of future stock returns than recommendation levels.

24. This chapter is a revised version of the article "The impact of analyst recommendations and revisions on the prices of JSE-listed companies". This paper is co-authored by D.F. Gerritsen and R. Lotter and is accepted for publication at the Investment Analyst Journal. This journal is listed in the Social Sciences Citations Index.

In addition to US stocks, other developed markets have also been considered in the literature, as well as emerging economies. Jegadeesh and Kim (2006) evaluated analyst recommendations for the Group of Seven (G7) countries which are the US, Great Britain, Canada, France, Germany, Italy and Japan. In all countries but Italy, stock prices responded positively (negatively) to recommendation upgrades (downgrades). This holds both for short-term returns and for a trading strategy based on recent revisions. In Italy they did not detect a statistically significant response of stock prices to analyst revisions. Interestingly the abnormal returns were largest for US stocks despite the fact that US analysts faced the largest conflicts of interest. Jegadeesh and Kim (2006) concluded that US analysts are the most skillful in identifying undervalued and overvalued stocks.

The findings for G7 countries are related to analysts' impact in emerging markets (Moshirian et al., 2009). Emerging markets are often considered "*to be too exotic, too risky, too hard to research and too difficult to invest in*" (Moshirian et al., 2009: 74). Hence, emerging markets provide an environment in which security analysts can be of particular value. Moshirian et al. (2009) found that abnormal returns after the publication of recommendations in emerging markets are indeed larger than in G7-countries. Further, analysts issued more positive recommendations for stocks in emerging markets than for G7-countries except for the US.

In this chapter we focus on one particular emerging market: South Africa. Evidence regarding the South African stock market is relatively scarce. We expect that stock recommendations are positively related to future stock returns as Moshirian et al. (2009) found that emerging markets may be relatively less efficient because of an information disadvantage. To the best of our knowledge, only three published papers are purely devoted to recommendations on the South African stock market (Bhana, 1990; Hall and Millard, 2002; and Prayag and Van Rensburg, 2006). These South African papers have several limitations. Firstly, the number of recommendation providers was limited in Bhana (1990) and Hall and Millard (2002) as they used recommendations issued by only four firms and three firms, respectively. Secondly, Hall and Millard (2002) analyzed recommendations for only 16 companies. Thirdly, the number of analyzed recommendations was limited because only 200 recommendations were studied in Bhana (1990) and only 1573 recommendations in Hall and Millard (2002). In contrast to these small sample sizes, influential US studies used 21387 recommendations (Stickel, 1995) or even 378326 recommendations (Barber et al., 2001). Fourthly, the sample period has been small in both Hall and Millard (2002) and Prayag and Van Rensburg (2006) as only three and five years, respectively, have been considered. Fifthly, Prayag and Van Rensburg (2006) relied on average monthly recommendations instead of on daily data, and lastly, Prayag and Van Rensburg (2006) excluded delisted firms.

We aim to overcome these limitations by using the internationally recognized Institutional Brokers' Estimate System (I/B/E/S), which contains daily published recommendations from both South African and international analysts. Using 31363 published recommenda-

tions for stocks listed on the Johannesburg Stock Exchange (JSE), we comprehensively studied short-term returns after the publication of stock recommendations over the period 1995 to 2011. In addition, we formed portfolio strategies to consider potential abnormal returns beyond any initial stock price effects.

We found that the publication of optimistic (pessimistic) stock recommendations by security analysts is associated with positive (negative) short-term abnormal returns. More specifically, upgrades (downgrades) are generally associated with statistically significant positive (negative) abnormal returns. Furthermore, we considered two different portfolio strategies in which stocks were ranked. On the basis of that, the stocks were divided among five different portfolios. The ranking in the first strategy was based on the consensus (i.e., average) recommendation and the ranking in the second strategy depended on the magnitude of the recommendation revision in the past month. Regarding the first strategy, the portfolio containing stocks with the most favorable recommendations achieved a statistically significant market-adjusted (risk-adjusted) return of 0.04% (0.06%) per day. None of the other portfolios exhibited consistently statistically significant abnormal returns. In the second strategy, the two portfolios with the highest consensus upgrades (i.e., portfolios 1 and 2) consistently exhibited significant positive abnormal returns, while portfolio 5 showed significant negative abnormal returns. A long/short strategy in which an investor would have bought portfolio 1 and simultaneously (short-) sold portfolio 5 would have yielded a statistically significant average daily return of 0.14%.

The findings suggest that both the recommendation level and the event of a recommendation revision contain value for investors on the JSE. Both variables should be taken into consideration when creating a stock portfolio. As the information content of analyst recommendations is not immediately reflected in the stock price, these findings are an indication of limited semi-strong efficiency of the South African market.

This chapter proceeds as follows: Section 3.2 describes the literature and the resulting research hypotheses. In section 3.3 the data and methodology are presented, and section 3.4 discusses the results. Section 3.5 contains the limitations, and section 3.6 concludes the chapter.

3.2 Literature and hypotheses

The literature regarding stock returns after the publication of analyst recommendations is broadly divided into studies about short-term returns and portfolio strategies. Empirical findings based on both recommendation levels and revisions are discussed for both fields. The impact of the publication of a recommendation regardless of the previous level of recommendations has been investigated in early studies. Research on recommendation revisions

has generally been published as of the 1990s, while studies on portfolio strategies using recommendations emerged in the 2000s.

For each research angle, we first examine the international evidence, after which we consider findings in a South African context. Finally, we develop several hypotheses.

3.2.1 Short-term returns: recommendation levels

The effects of the publication of buy and sell recommendations on stock price returns were considered in early studies. Diefenbach (1972) considered US recommendations published during the period 1967 to 1969. He documented that only 47% of the stocks receiving buy recommendations outperformed the S&P425 index. The average market-adjusted return for stocks receiving a buy recommendation during the 52-week period after the publication was 2.7%. (This study did not give an indication of statistical significance.) After the publication of a sell recommendation, as much as 74% of stocks underperformed relative to the benchmark. The 52-weeks market-adjusted return after sell recommendations amounted −11.2%. Only 46 sell recommendations were used in Diefenbach's study as buy recommendations outnumbered sell recommendations by about 26 to one. Bidwell (1977) studied US recommendations during the period 1970 to 1973. The ratio between buy and sell recommendations was in line with Diefenbach (1972) and for this reason the performance of sell recommendations was not tested. Bidwell (1977) identified 115 buy recommendations. The risk-adjusted returns after a buy recommendation had been published were not significantly different from the S&P500 index.

To the best of our knowledge, Bhana (1990) conducted the only study regarding the short-term price impact of the publication of buy and sell recommendations in South Africa. In Bhana's study a random sample was used, consisting of 100 buy and 100 sell recommendations from two stockbroking firms and two investment advisory firms over the period 1979 to 1988. Stock returns were compiled on a weekly basis. Bhana (1990) found that not only were buy recommendations preceded by 16 weeks of positive significant abnormal returns, but they were also followed by positive abnormal returns in both the week of the recommendation and the week following it. Sell recommendations were preceded by four weeks of negative abnormal returns. Both the week of publication of the sell recommendation and the subsequent week exhibited a significant negative abnormal return.

While early US evidence is mixed as to the question of the returns after a buy and a sell recommendation, Bhana (1990) concluded for the South African market that buy and sell recommendations have a market impact. This is in line with the notion that the South African stock market may be less efficient than developed markets, as suggested by Moshirian et al. (2009). The South African literature on this aspect has limitations: the recommendations were issued only by South African parties; a limited number of analysts were used; only 200 recommendations were analyzed; and the conclusions were based on weekly stock prices.

In line with the market efficiency argument put forward by Moshirian et al. (2009) and with findings in the only South African study to date on the stock price response to buy and sell recommendations (Bhana, 1990), we expect a positive relationship between the published recommendation and the subsequent stock return. Similar to early studies (e.g., Diefenbach, 1972; Bidwell, 1977; and Bhana, 1990) we first test returns around recommendations regardless of a previous recommendation level. The following first hypothesis will thus be tested in this study:

Hypothesis 1: The publication of a positive (negative) recommendation is associated with a positive (negative) short-term abnormal return.

3.2.2 Short-term returns: recommendation revisions

In addition to the level of the published recommendation, more recent literature considers the impact of the direction of recommendation revisions. Stickel (1995) studied recommendations on US stocks published over the period 1988 to 1991. Buy recommendations were initially defined as all upgrades to either a strong buy or a buy recommendation, while sell recommendations were defined as all downward changes to either neutral, sell or strong sell. These definitions accommodated the fact that sell and strong sell recommendations were relatively scarce (see also Barber et al., 2003 in this regard). Stickel (1995) established that upgrades to buy and strong buy recommendations were associated with significant market-adjusted gains. Stocks that had, on average, already risen by 0.65% in the 10-day period prior to the publication added another 0.90%, 0.30% and 0.25% in the periods (0, 10), (11, 20) and (21, 30) respectively, as measured from the day of the recommendation. Significant negative abnormal returns for downgrades to hold, sell and strong sell were concentrated in the period of (−10, −1) and (0, 10).

Stickel (1995) furthermore made a distinction between categories of upgrades and downgrades. In the 10-day period surrounding the revision, upgrades to strong buy were associated with a larger abnormal return than upgrades to buy. Similarly, downgrades to sell and strong sell exhibited a greater impact on the stock price than downgrades from either strong buy or buy to hold. Recommendation revisions which skipped a rank (e.g., from hold to strong sell as opposed to from sell to strong sell) had a greater effect on the stock price.

Womack (1996) also studied abnormal returns surrounding the publication date of analyst recommendations, but considered only upgrades to the equivalent of strong buy, downgrades from strong buy, upgrades from strong sell, and downgrades to strong sell. His sample period ranged from 1989 to 1991. The event window used started one day prior to the publication of the recommendation and ended on the day after the publication (i.e., the period of (−1, 1) days around the publication of the recommendation). Significant size-adjusted returns for the three-day event window around the publication were +3.0% for upgrades to strong buy, −1.9% for downgrades from strong buy, and −4.7% for downgrades to strong sell.

Short-term returns after recommendation revisions on the South African market have not been studied before.[25] Given that, first, the existing US studies documented positive (negative) returns to recommendation upgrades (downgrades) and, second, a so-called emerging economy may have less efficiently functioning stock markets (Moshirian et al., 2009). We constructed our second hypothesis as follows:

Hypothesis 2a: Recommendation upgrades (downgrades) are associated with positive (negative) short-term abnormal returns.

While firms that are already covered by analysts can receive upgrades and downgrades, previously non-covered firms may experience so-called recommendation initiations (e.g., a recommendation by a broker for a certain stock that does not yet have an outstanding recommendation by this broker). Irvine (2003) found statistically significant positive returns after strong-buy and buy initiations for a sample of US stocks over the period Q2 to Q3 1995. Our expectation for the South African market is similar to Irvine (2003).

Hypothesis 2b: Positive (negative) recommendation initiations are associated with short-term positive (negative) abnormal returns.

In contrast to initiating a recommendation, brokers can also decide to stop coverage of a stock, referred to as 'dropping a recommendation'. McNichols and O'Brien (1997) found that analysts would rather drop a recommendation than issue a sell recommendation, since analysts generally do not want to harm their relationship with the company in question. A drop might thus be interpreted as negative information when the concurrent recommendation is positive. McNichols and O'Brien (1997) thus imply that discontinuing a recommendation is equivalent to issuing a sell recommendation. Dropping a recommendation when the concurrent recommendation is already pessimistic should therefore not reveal additional information.

Hypothesis 2c: A positive recommendation which is dropped is associated with negative short-term abnormal returns.

3.2.3 Portfolio strategy: recommendation levels

For most investors, especially individual investors, the short-term gains associated with recommendation changes are unattainable because for these investors there generally is a time lag until stocks are purchased. Barber et al. (2001: 534) noted in this respect that it is "*impractical for them to engage in the daily portfolio rebalancing that is needed to respond to the changes*". Abnormal returns beyond the initial impact are therefore also relevant for investors. Womack (1996) studied long-term returns occurring after the initial price response. Negative and significant 6-month cumulative returns were found for downgrades from strong

25. Only Prayag and Van Rensburg (2006) have considered revisions in a South African context but they did not consider short-term returns. Their study used end-of-month consensus recommendation data. The exact date of a revision was therefore not known, and consequently short-term returns after revisions could not be computed.

buy, downgrades to strong sell and upgrades from strong sell. The latter finding may seem surprising. However, in case of an upgrade most strong sell recommendations were revised to a hold or a sell recommendation, which was still not a positive signal on the company's future performance. These return drifts suggest that a portfolio strategy based on recently published recommendations could be profitable. It is of particular interest whether a strategy would be profitable in which positively recommended stocks are bought and negatively recommended stocks are (short-) sold.

In this respect, Barber et al. (2001) created five different portfolios based on the average published recommendation, and they rebalanced these portfolios on a daily basis. They used recommendations coded on a five-point scale in which 1 corresponded to strong buy and 5 to strong sell. The first portfolio consisted of stocks with an average rating (also known as a consensus recommendation) between 1 and 1.5, and the fifth portfolio contained all stocks with a consensus rating lower than 3. They established that a strategy in which an investor would buy (short-sell) the most (least) recommended stocks, yielded a significant abnormal annual return, before transaction costs, of 4.1% (4.9%). A decreasing rebalancing frequency and a delay in acting to revisions decreased these abnormal returns. Barber et al. (2001) therefore suggested that investors should act quickly to capture returns from analyst revisions.

Two papers have been published on portfolio strategies based on stock recommendations on the South African stock market. Hall and Millard (2002) analyzed the returns of holding portfolios which were based on recommendations issued by three stockbroking companies for 16 stocks during the period 1994 to 1998. They chose these brokers on the basis of the ranking of the 'Analyst of the year' awards. Hall and Millard (2002) constructed three different portfolios (buy, hold and sell) based on the average recommendation level. The portfolios were updated on a daily basis. Stocks receiving an upgrade or downgrade were added to another portfolio on the next trading day. Hall and Millard (2002) concluded that both the buy and the hold portfolio outperformed the market as measured by both the JSE All Share Index and the Industrial Index, and that the sell portfolio underperformed the market. Prayag and Van Rensburg (2006) also focused on portfolio returns based on the published recommendations of South African stockbrokers, this time for the period 2000 to 2003. Prayag and Van Rensburg (2006) employed monthly consensus recommendations, on the basis of which they grouped stocks into a buy, hold and sell portfolio. They updated the portfolios on a monthly basis. Prayag and Van Rensburg (2006) found that only the buy portfolio yielded statistically significant positive abnormal returns.

The outperformance of buy portfolios in South Africa is in line with US findings (e.g., Womack, 1996 and Barber et al., 2001), although the South African papers have limitations. South African papers used only recommendations issued by South African institutions. Hall and Millard (2002) introduced a selection bias by selecting only four analysts based on awards handed to the analysts. A limited number of stocks were studied, and price returns rather

than total returns were evaluated. Prayag and Van Rensburg (2006) excluded delisted firms. In addition, they used month-end consensus recommendations, while Barber et al. (2001) suggested that a timely response to revisions is crucial for capturing potential stock returns. The present study aims to overcome these limitations. In line with previous findings, we formulated a third hypothesis as follows:

Hypothesis 3: A strategy involving a long position in stocks with the highest consensus recommendation and a short position in stocks with the lowest consensus recommendation is associated with positive abnormal returns.

3.2.4 Portfolio strategy: recommendation revisions

Rather than anticipating the level of consensus recommendations, Jegadeesh et al. (2004) studied quarterly rebalanced portfolios based on recommendation changes. They found that recommendation changes were a more robust predictor of future stock returns than the level of the consensus recommendation. Barber et al. (2010) noted that the relatively infrequent rebalancing of Jegadeesh et al. (2004) (i.e., quarterly instead of daily or monthly) might have contributed to the conclusion that recommendation levels were not a robust return predictor. Barber et al. (2010) conditioned recommendation levels and changes on the revision magnitude and the level, respectively, and found that both recommendation levels and changes were related to abnormal returns.

In the South African context, Prayag and Van Rensburg (2006) constructed portfolios based on the change in recommendation levels. Stocks dropping from either the buy to the hold portfolio or from the hold to the sell portfolio exhibited negative abnormal returns in the next period. Other portfolios were constructed on the basis of reiterations, reappearances and discontinuations, but these portfolios generally had small sample sizes. Based on the findings in related studies, we formulated the fourth hypothesis.

Hypothesis 4: A strategy involving a long position in stocks with the largest increase in consensus recommendation and a short position in stocks with the largest decrease in consensus recommendation is associated with positive abnormal returns.

3.3 Data and methodology

In this section we discuss the dataset with regard to the security recommendations, after which we consider price data.

3.3.1 Recommendations

We retrieved analyst recommendations from I/B/E/S. This database records fundamental recommendations published by a wide variety of banks and research firms. The benefit of this

database compared to previously used data sources in South Africa is that it covers also non-South African research firms. I/B/E/S categorizes published recommendations on a 5-point scale from 1 to 5, where 1 represents a strong buy, 2 a buy, 3 a hold, 4 a sell and 5 a strong sell. The I/B/E/S Detail File, which contains recommendations on a day-to-day basis, was used for the entire study. Consequently, a consensus recommendation was calculated for every listed company on each day. The database does not contain recommendation reiterations; in other words, we could not study the impact of published recommendations which had the same level as the previously issued recommendation for the same stock by the same broker.

The first recorded recommendation on I/B/E/S for a South African stock dated from November 1993. The number of stocks covered in 1994 was modest, and posed problems for the construction of quintile portfolios.[26] For that reason, January 1, 1995 was treated as the starting day of our dataset for all tests. I/B/E/S keeps delisted firms in their database and the analysis therefore does not suffer from survivorship bias. All recommendations published until December 31, 2011 were analyzed. For the purpose of the calculation of abnormal returns (ARs) around recommendations, the underlying stocks needed to be listed for at least one year in order to be included in the analyses. Table 3.1 describes the summary statistics.

Table 3.1 Summary statistics

Year	Average number of covered stocks	Average number of analysts per firm	Maximum number of analysts per firm	Consensus recommendation level	Standard deviation of the average level
1995	147	1.9	8	2.24	1.04
1996	220	2.7	9	2.50	1.03
1997	278	3.4	13	2.49	0.97
1998	300	3.6	14	2.34	0.89
1999	340	4.3	17	2.26	0.86
2000	306	4.2	17	2.35	0.86
2001	276	4.2	17	2.59	0.89
2002	249	3.9	15	2.58	0.89
2003	170	4.2	19	2.78	0.82
2004	147	3.9	15	2.81	0.83
2005	150	4.6	18	2.74	0.80
2006	162	4.3	18	2.72	0.74
2007	161	3.9	14	2.61	0.75
2008	175	3.9	18	2.49	0.73
2009	183	4.3	19	2.63	0.79
2010	176	4.7	25	2.60	0.80
2011	168	4.8	22	2.54	0.76

Note: 1 stands for strong buy and 5 for strong sell.

26. In 1994 120 stocks were covered with on average less than 2 recommendations per share. In contrast in 1995 147 stocks were covered with on average 2.68 recommendations per stock.

As Table 3.1 shows, analysts covered, on average, 147 stocks during 1995, and this number increased sharply to 340 in 1999. In the years thereafter the number fluctuated between 150 and 200 stocks. This decline is in line with the decrease in the number of listed South African companies as reported by the World Bank in the World Development Indicators. The average number of analysts per company has increased since 1995. Each firm has on average been covered by around 4 analysts, with a maximum of 25 analysts for some firms. The consensus recommendation for each year is defined as the average of the consensus recommendation across all stocks. On average, analysts issue a recommendation between buy and hold for the whole period under analysis. Interestingly the standard deviation of the average recommendation level decreases over time.

Table 3.2 shows the dynamics of the recommendations from the sample. It provides a transition matrix in which the number of recommendation revisions across all categories is depicted. An 'Initiation' is the first recommendation published by a certain analyst for a certain stock. A revision from 'Drop' means that an analyst who previously dropped coverage starts to cover the company again.

Relatively many revisions took place from hold to buy, hold to strong buy, strong buy to buy and strong buy to hold. The bottom row shows the distribution of recommendations in the five different categories. In line with the consensus recommendation in Table 3.1, Table 3.2 shows that hold recommendations were published most often, followed by strong buy and buy recommendations.

Table 3.2 Recommendation revision matrix

From recommendation	To recommendation of					
	Strong buy	Buy	Hold	Sell	Strong sell	Drop
Strong buy		624	2531	207	321	1388
Buy	648		2614	277	79	1309
Hold	2345	2540		1565	1026	2201
Sell	183	261	1491		246	516
Strong sell	285	85	1007	264		465
Drop	753	846	1172	317	281	
Initiation	1021	767	1263	222	243	
Total	5235	5123	10078	2852	2196	5879

Note: "from Drop" means the continuation of a previously dropped recommendation.

From Table 3.2 can be inferred that the sample contains 9992 one-step changes, 7447 two-step changes, 554 three-step changes and 606 four-step changes. The total number of revisions considered is 18599. In addition to this, 5879 cases are also considered in which a recommendation has been dropped, as well as 3516 new recommendations (i.e., initiations). The total number of recommendations considered in this study is 31363.

3.3.2 Price and return

To test the hypotheses, we used two different forms of abnormal returns. Market-adjusted returns are presented as these returns are relatively straightforward to calculate and easy to understand. This model, however, fails to account for risk factors which are known to be related to returns. We acknowledge the importance of these factors by applying the Fama and French 3-factor model to calculate risk-adjusted returns. This model explains roughly 90% of portfolio returns (Fama and French, 1993).

We obtained total return stock price indices (including reinvested dividends) from Thomson Reuters Datastream. We computed stock returns on a daily basis as defined in equation 3.1. In this equation, $r_{i,t}$ denotes the raw return including dividends for firm i on day t.

$$(3.1)\quad r_{i,t} = \frac{P_{i,t}}{P_{i,t-1}} - 1$$

We also collected total return data for the FTSE/JSE All share index. This index is considered as the market index. Although the total return index was only launched in 2003, index data was restated to July 1, 1995 (see also Ward and Muller, 2012). For 1994 and the first six months of 1995 we used the JSE Overall index as benchmark. We calculated the return for the market index ($r_{m,t}$) in a similar fashion to equation 3.1, except that we replaced the stock price by the index level. We then calculated the market-adjusted return (MAR) as follows:

$$(3.2)\quad MAR_{i,t} = r_{i,t} - r_{m,t}$$

For the calculation of the risk-adjusted return, we first calculated the daily realized excess return by subtracting the risk-free rate at day t ($r_{f,t}$) from the stock return. As risk-free rate, we used the South African three-month Treasury bill rate.

$$(3.3)\quad R_{i,t} = r_{i,t} - r_{f,t}$$

In line with the South African asset pricing literature, we estimated the expected return for stock i on day t using an adjusted version of the Fama and French (1993) model, as specified in equation 3.4:

$$(3.4)\quad E(R_{i,t}) = \alpha_{i,t} + \beta_{m_{i,t}} R_{m,t} + \beta_{SMB_{i,t}} SMB_t + \beta_{HML_{i,t}} HML_t$$

Where $E(R_{i,t}) = E(r_{i,t}) - r_{f,t}$ is the expected excess return for stock i at day t. $R_{m,t} = r_{m,t} - r_{f,t}$ is the excess return on the market index at day t. SMB_t and HML_t are the Fama and French (1993) factors at day t. These factors were computed on a daily basis where SMB_t represents the return on a portfolio consisting of the 30% smallest stocks less the return on a portfolio consisting of the 30% largest stocks. HML_t is the return on a portfolio that is long in the 50% stocks with the highest earnings-price (E/P) ratio and short in the 50% lowest E/P-stocks. Originally Fama and French (1993) proposed that book-to-market values should be used

to derive the HML-factor. We followed South African studies (such as Van Rensburg and Robertson, 2003) by using the earnings-price ratio. All three factors were estimated on a daily basis with an estimation period of 260 trading days prior to the event day.[27]

Following equations 3.3 and 3.4, the risk-adjusted return (RAR) was estimated for stock *i* on day *t* as follows:

$$(3.5)\ RAR_{i,t} = R_{i,t} - E(R_{i,t})$$

For our short-term return analyses we also calculated the cumulative abnormal returns for a two-day event window as the publication of a recommendation can be any time during the day, given the inclusion of international analysts in the dataset. Abnormal returns are therefore analyzed for both the day of the publication and the next trading day, to account for the possibility that recommendations are issued before the opening of the JSE or at the end of a trading day. The computation of two-day returns is given by equations 3.6 and 3.7. Equation 3.6 documents the equation for the Cumulative Market-Adjusted Return (CMAR) and equation 3.7 displays the equation for the Cumulative Risk-Adjusted Return.

$$(3.6)\ CMAR_i = (1 + MAR_{i,0}) \times (1 + MAR_{i,1}) - 1$$

$$(3.7)\ CRAR_i = (1 + RAR_{i,0}) \times (1 + RAR_{i,1}) - 1$$

For the portfolio strategies we define the market-adjusted return as the difference between portfolio returns and market returns. For the calculation of the risk-adjusted return, we applied a similar method as Barber et al. (2001) who used this model to "*assess whether any superior returns that are documented are due to analysts' stock-picking ability or to their choosing stocks with characteristics known to produce positive returns*" (Barber et al., 2001: 543). Risk-adjusted returns were calculated by regressing daily portfolio excess returns (i.e., $r_p - r_f$) on daily market excess returns, SMB and HML factors. The intercept of this regression is the daily risk-adjusted return of a portfolio.

27. For this purpose, domestic Fama and French factors were calculated based on South African stocks because Griffin (2002) noted that a domestic model has a higher explanatory power than a world model. The smallest 5% listed stocks in terms of market capitalisation on a given day were excluded because smaller stocks are more prone to extreme price swings, possibly due to the thin trading phenomenon. In this respect, we found that the smallest 5% stocks were not traded during 71% of the trading days in this study's sample period. Further, stock returns of the last five trading days prior to a delisting were excluded since this period is sometimes characterized by large price swings (see Eisdorfer, 2008).

3.4 Results

3.4.1 Short-term returns: recommendation levels

To test the first hypothesis, we analyzed daily abnormal returns during a two-day window measured as of the date of the publication of a recommendation; we refer to this window as the period (0, 1). This two-day event window takes account of the possibility that recommendations are published after the daily close of the JSE for stocks which are dual-listed on international exchanges. The new information in this scenario still has to be disseminated, and will be reflected in the stock price on the next day. We calculated the abnormal returns for this two-day period for all 31363 recommendations listed in Table 3.2.

Table 3.3 reports the results of the publication of a new recommendation, regardless of the level of the preceding recommendation. The table presents both market-adjusted and risk-adjusted returns.

Table 3.3 Abnormal returns in the two-day period surrounding the publication of a recommendation

Recommendation	Market-adjusted returns			Risk-adjusted returns			Number of recommendations
	(0)	(1)	CMAR (0,1)	(0)	(1)	CRAR (0,1)	
Strong buy	0.18%*** (4.07)	0.15%*** (3.63)	0.32%*** (5.49)	0.16%*** (3.80)	0.11%*** (2.95)	0.28%*** (4.81)	5235
Buy	0.12%*** (3.26)	0.09%** (2.36)	0.21%*** (3.82)	0.12%*** (3.37)	0.09%** (2.48)	0.22%*** (4.01)	5123
Hold	−0.02% (−0.76)	−0.02% (−0.85)	−0.04% (−1.11)	−0.04% (−1.41)	−0.04% (−1.34)	−0.08%* (−0.92)	10078
Sell	−0.07% (−1.29)	−0.11%* (−1.85)	−0.19%** (−2.26)	−0.09% (−1.57)	−0.16%*** (−2.79)	−0.25%*** (−3.16)	2852
Strong sell	−0.23%*** (−3.40)	−0.03% (−0.49)	−0.26%*** (−2.71)	−0.23%*** (−3.50)	−0.04% (−0.61)	−0.27%*** (−2.90)	2196

Notes: The t-statistics are given in the second line of each cell; ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

As can be observed from Table 3.3, strong buy and buy recommendations are associated with positive market-adjusted (risk-adjusted) returns on the day of the recommendation of 0.18% (0.16%) and 0.12% (0.12%), respectively. The stocks for which strong sell recommendations have been published exhibit a negative abnormal return of –0.23% (–0.23%). Furthermore on the day after the recommendation has been published, we found statistically significant returns for strong buy, buy, and sell recommendations. The publication of a hold recommendation is associated with a negative cumulative risk-adjusted return of 0.08%. This observation is in line with Malmendier and Shantikumar (2007) who suggested that institutional investors perceive a hold recommendation to be a negative signal.

3.4.2 Short-term returns: recommendation revisions

The second hypothesis considers recommendation initiations, revisions and coverage dropping. Similar to the testing of the first hypothesis, we studied abnormal returns for a two-day period. Table 3.4 depicts the abnormal returns while taking into account the direction of the recommendation change. Given the significance of the cumulative returns for both days as reported in Table 3.3, Table 3.4 depicts only two-day cumulative abnormal returns.

The general finding from Table 3.4 is that upgrades are associated with positive abnormal returns. The majority of the upgrades show statistically significant returns. The upgrade from strong sell to sell is noteworthy: although stocks receive an upgrade they still experience a negative risk-adjusted return.

Downgrades are generally associated with stock price decreases. This decrease is significant in five of the cases, using risk-adjusted returns as a measure of performance.

Dropping a recommendation is not associated with significant returns. Note, however, that the magnitude of the returns after dropping a pessimistic recommendation is higher than after the discontinuation a positive recommendation. This is in line with our expectations.

The returns after initiating previously dropped stock recommendations are associated with the level of the recommendation: strong buy (strong sell) recommendations are associated with significant positive (negative) abnormal returns. Pure initiations (i.e., initiations by brokers which have never covered the respective stock before) are associated with significant negative market-adjusted returns in the case of a strong sell recommendation. Ceasing coverage is not associated with significant abnormal returns. All in all, in the short run, the stock returns are mostly in line with the change in recommendation. The next sections investigate whether analyst recommendations have value on a longer term as well.

Table 3.4 Cumulative abnormal returns surrounding a recommendation revision, initiation or discontinuation
Panel A: Market-adjusted returns

From recommendation	To recommendation of					
	Strong buy	Buy	Hold	Sell	Strong sell	Drop
Strong buy		−0.17% (−1.12)	−0.29%*** (−3.48)	0.49% (1.24)	−0.54%* (−1.84)	0.01% (0.07)
Buy	0.74%*** (4.07)		−0.08% (−1.00)	−0.45%* (−1.72)	0.26% (0.42)	0.15% (1.41)
Hold	0.27%*** (3.32)	0.37%*** (4.80)		−0.15% (−1.45)	−0.20% (−1.44)	0.00% (0.02)
Sell	0.30% (0.64)	0.25% (0.83)	0.06% (0.54)		0.21% (0.74)	0.96% (1.15)
Strong sell	0.79%*** (3.01)	1.28%*** (2.91)	0.40%*** (3.12)	−0.23% (−0.84)		0.36% (1.54)
Drop	0.37%** (2.51)	0.16% (1.20)	−0.05% (−0.49)	−0.46%* (−1.70)	−0.54%** (−2.27)	
Initiation	0.02% (0.13)	−0.07% (−0.46)	0.05% (0.43)	−0.29% (−1.09)	−0.46%** (−2.11)	

Panel B: Risk-adjusted abnormal returns

From recommendation	To recommendation of					
	Strong buy	Buy	Hold	Sell	Strong sell	Drop
Strong buy		–0.08% (–0.55)	–0.38%*** (–4.64)	0.17% (0.45)	–0.42% (–1.50)	–0.07% (–0.60)
Buy	0.61%*** (3.49)		–0.13%* (–1.65)	–0.55%** (–2.24)	0.09% (0.15)	–0.10% (–1.05)
Hold	0.24%*** (3.04)	0.35%*** (4.66)		–0.21%** (–2.11)	–0.26%* (–1.90)	–0.10% (–1.17)
Sell	0.08% (0.16)	0.18% (0.69)	0.06% (0.59)		0.10% (0.37)	0.75% (0.90)
Strong sell	0.42%* (1.70)	1.41%*** (3.17)	0.40%*** (3.29)	–0.54%** (–2.05)		0.30% (1.32)
Drop	0.35%** (2.43)	0.22% (1.64)	–0.01% (–0.10)	–0.36% (–1.45)	–0.52%** (–2.35)	
Initiation	0.08% (0.62)	–0.10% (–0.74)	0.04% (0.43)	–0.01% (–0.04)	–0.30% (–1.41)	

Notes: The t-statistics are given in the second line of each cell; ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

3.4.3 Portfolio strategy: recommendation levels

Hypothesis 3 considers consensus recommendations for a portfolio strategy. We evaluated all recommendations for JSE-listed stocks on a daily basis. We calculated a new consensus recommendation for a stock whenever an analyst revised an existing recommendation, initiated the coverage, or dropped a recommendation. Based on that, we divided all stocks into five different equally-sized portfolios which were rebalanced on a daily basis. Given the fact that certain average recommendations (such as a buy) occurred more frequently than others, the five portfolios did not always contain exactly the same number of stocks. Similar to Jegadeesh et al. (2004), we set the cut-offs for portfolios 1, 2, 3, and 4 equal to the 20th, 40th, 60th, and 80th percentiles, respectively, of the distribution of the recommendations two days earlier.[28] In other words, if the rebalancing day is called day *t*, then stocks were rebalanced on the basis of the consensus recommendation on day *t-2*. We incorporated this delay of two trading days before a stock was eligible for changing portfolios, to accommodate the facts that (1) some recommendations might be published at the end of a trading day, (2) not all investors reacted promptly to the publication of new recommendations, and (3) liquidity constraints for the smaller stocks might be present on the JSE. Portfolio 1 represents the stocks with the most positive consensus recommendation (closer to recommendation level 1) and portfolio 5 contains stocks on which the analysts are relatively bearish. In line with Prayag and Van

28. The average number of stocks per portfolio is not exactly equal owing to the strong buy to strong sell measuring scale, often leaving several stocks with the same consensus recommendation. For example, the consensus recommendation for stocks with just one recommendation is per definition a whole number ranging from 1 to 5. Given the overrepresentation of whole-number recommendations (or fractions ending at .5 for stocks with two recommendations), we could not exactly create equally-sized portfolios at all times, as stocks with identical consensus recommendation were always included in the same portfolio.

Rensburg (2006), the daily returns of all portfolio constituents were equally weighted. Table 3.5 presents descriptive statistics regarding the portfolios.

Table 3.5 Descriptives for the portfolios based on recommendation levels

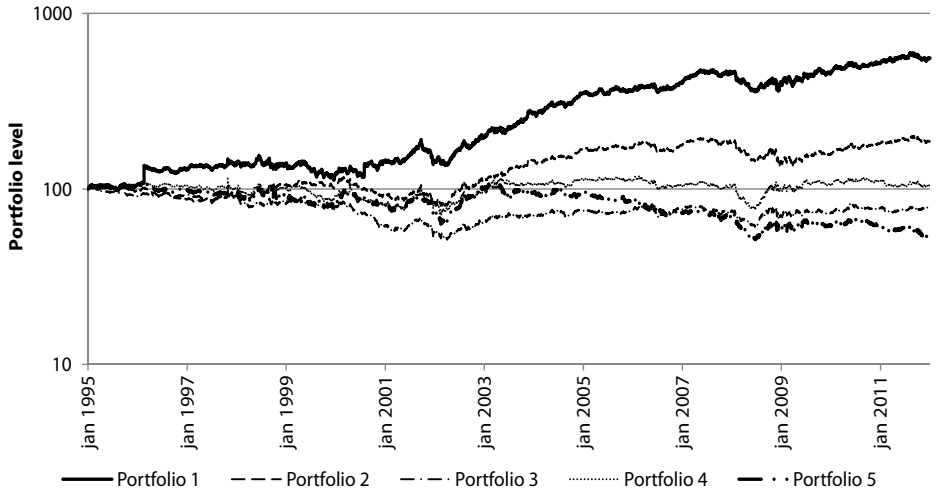
	Portfolio				
	1	2	3	4	5
Average number of stocks	53.5	36.7	45.0	40.6	34.2
Average consensus recommendation*	1.5	2.0	2.5	3.0	3.6

Note: * 1 stands for strong buy, 2 for buy, 3 for hold, 4 for sell, and 5 for strong sell.

By design, the consensus recommendation is lower for each next portfolio. Note that portfolio 4, or the fourth quintile, had a consensus recommendation of 3, again supporting the hypothesis that analysts prefer to issue a positive recommendation rather than a negative one.

Next, the results of the portfolio strategy are presented. All portfolios started at a value of 100 and this value is multiplied by 1 plus the average of the market-adjusted returns of its constituents on a daily basis. Figure 3.1 depicts the results of this strategy for each portfolio.

Figure 3.1 Performance of portfolios based on consensus recommendations



Note: All portfolios started at a value of 100 at January 1, 1995.

Portfolio 1 contained the stocks which had the most favorable recommendations while portfolio 5 contained stocks eliciting pessimistic analyst viewpoints. Portfolio 1 outperformed all other portfolios and ends the sample period at a value of 556.[29] Portfolio 2 finished in

29. The graph clearly shows a high return for portfolio 1 in the beginning of 1996 (more specifically February 19, 2006). The statistical tests in the remainder of this chapter have also been performed ignoring this outlier. In that case the abnormal returns of this portfolio remain statistically significant at the 5%-level.

the second position, and portfolio 5 ended up with the lowest market-adjusted return at a portfolio level of 55. Portfolios 3 and 4 were not in sequence as portfolio 4 outperformed portfolio 3. Portfolios 2 to 5 all ended rather close to the starting level of 100. Thus, judging by Figure 3.1, it seems that buying stocks with a favorable consensus recommendations paid off, while it is less clear whether (short-) selling stocks with the lowest consensus recommendation generated a positive abnormal return.

While Figure 3.1 provided a graphical illustration of the cumulative market-adjusted return of the different portfolios, Table 3.6 shows the corresponding values of the statistical t-tests of the average daily abnormal returns for each portfolio. We first evaluated the market-adjusted returns which were used in Figure 3.1. Here, only portfolio 1 generated significant abnormal returns. The bottom row shows the results of a long/short portfolio in which a long position would be taken in portfolio 1 and a short position in portfolio 5.

Table 3.6 Abnormal returns for portfolios based on recommendation levels

Portfolio	Mean market-adjusted return	Risk-adjusted return				
		Intercept	Coefficients			R^2
			$r_m - r_f$	HML	SMB	
1	0.04%***	0.06%***	0.45***	−0.04**	0.00	0.37
	(2.88)	(5.36)	(41.83)	(−2.18)	(0.11)	
2	0.02%	0.03%***	0.52***	−0.03**	−0.03***	0.64
	(1.46)	(4.14)	(69.31)	(−2.33)	(−2.71)	
3	−0.00%	0.02%**	0.54***	−0.05***	−0.07***	0.68
	(−0.26)	(2.18)	(74.72)	(−3.81)	(−7.44)	
4	0.01%	0.01%	0.46***	0.01	0.04***	0.48
	(0.39)	(1.51)	(52.93)	(0.75)	(3.41)	
5	−0.01%	0.00%	0.43***	0.03*	0.08***	0.40
	(−0.58)	(−0.41)	(47.5)	(1.92)	(6.91)	
1 – 5	0.05%***	0.06%***	0.03**	−0.08***	−0.08***	0.01
	(4.06)	(4.89)	(2.14)	(−3.24)	(−4.81)	

Notes: The t-statistics are given in the second line of each cell; ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

Table 3.6 shows that the long/short portfolio strategy based on recommendation levels would have yielded a statistically significant daily market-adjusted return of 0.05%. So far, risks were not taken into consideration. Daily risk-adjusted returns were computed by regressing the portfolio excess returns on the three Fama and French factors. These results are also depicted in Table 3.6.

The intercept from the regressions represents the alphas for the various portfolios. The alphas are in line with the reported average market-adjusted returns. Interestingly, the risk-adjusted alphas for portfolios 1, 2 and 3 are significantly positive. The factor loadings with

respect to the market risk premium are highly significant for all portfolios. The coefficients vary from 0.43 to 0.54 for the portfolios. A long/short strategy based on a long position in portfolio 1 and a short position in portfolio 5 would have yielded a daily risk-adjusted return of 0.06%. This portfolio would have a relatively low level of market risk, given its factor loading on the market risk premium of only 0.03.

It can thus be concluded from both Figure 3.1 and Table 3.6 that a portfolio consisting of the 20% stocks with the highest consensus recommendation outperformed the South African securities market over the period 1995 to 2011. A long/short strategy involving the purchase of portfolio 1 and the short-sale of portfolio 5 yields positive abnormal returns, while diminishing the level of market risk at the same time.

3.4.4 Portfolio strategy: recommendation revisions

Hypothesis 4 focuses on recommendation revisions and was also tested using a dynamic portfolio strategy which incorporated the practice of daily rebalancing. The procedure was similar to that of the testing of hypothesis 3, but in this case the portfolios were based on the increase in the consensus recommendation during a period of 21 trading days. Stocks without a recommendation change in this period were excluded from this analysis. Portfolio 1 contained the stocks with the largest increase in consensus recommendation and portfolio 5 contained the stocks with the smallest increase in the consensus recommendations (i.e., the largest decrease). The rebalancing process depended on the change in consensus recommendation in the period (−22, −2), with t=0 being the day of rebalancing. Table 3.7 depicts the descriptive statistics for each portfolio.

Table 3.7 Descriptives for the portfolios based on recommendation revisions

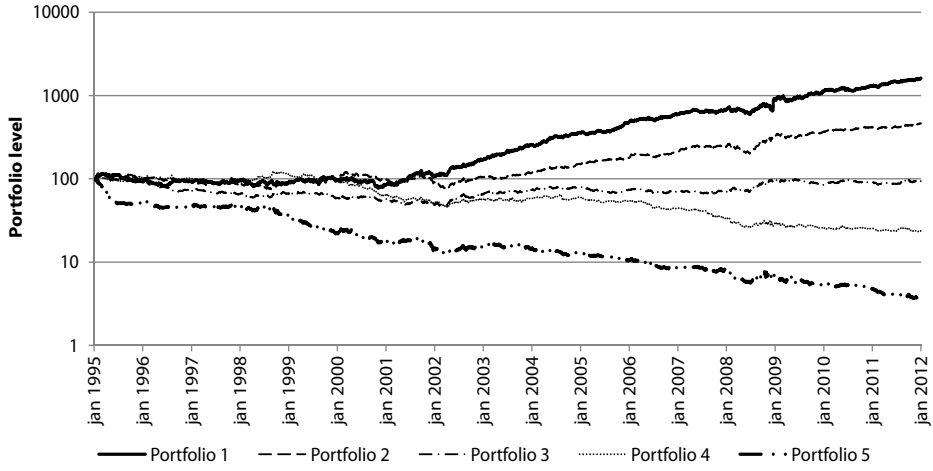
	Portfolio				
	1	2	3	4	5
Average number of stocks	14.5	15.8	15.2	14.9	16.8
Average recommendation increase	0.8	0.2	0.0	−0.2	−0.6

Note: An increase in this case means that the consensus recommendation comes closer to the level of 1 which stands for a strong buy recommendations.

Just as in the previous approach, the portfolios are not identical in size as several stocks exhibited the same change in recommendation level. The recommendation increase is not symmetrical for the five portfolios. Note that only stocks with a consensus recommendation change in the period (−22, −2) were included in this analysis. Figure 3.2 graphically shows the outcome of this trading strategy.

All portfolios started again at a level of 100. In this strategy, portfolio 1 again outperforms all other portfolios as it ends at a value of 1613. This time, the results of portfolios 2 to 5 are in line with expectations: the lower the increase in recommendation, the more negative the

Figure 3.2 Performance of portfolios based on recommendation revisions



Note: All portfolios started at a value of 100 at January 1, 1995.

average market-adjusted return becomes. The values for portfolio 2 to 5 are, respectively, 463, 93, 24, and 4. The findings depicted in Figure 3.2 suggest that a trading strategy based on the change of the consensus recommendation could be pursued to generate abnormal returns.

Table 3.8 indicates the statistical significance (as found by using a t-test) of the findings. Portfolios 1 and 2 showed a daily significant market-adjusted outperformance of 0.07% and

Table 3.8 Abnormal return for portfolios based on recommendation revisions

Portfolio	Mean market-adjusted return	Risk-adjusted return				R^2
		Intercept	Coefficients			
			$r_m - r_f$	HML	SMB	
1	0.07%***	0.09%***	0.53***	−0.05*	−0.04**	0.36
	(4.21)	(6.11)	(38.94)	(−1.92)	(−2.06)	
2	0.04%***	0.06%***	0.60***	−0.06***	−0.12***	0.60
	(3.12)	(5.77)	(60.24)	(−3.30)	(−9.11)	
3	0.00%	0.02%**	0.68***	−0.06***	−0.11***	0.65
	(0.11)	(2.03)	(67.65)	(−3.38)	(−8.66)	
4	−0.03%**	−0.01%	0.60***	−0.07***	−0.11***	0.53
	(−2.14)	(−0.52)	(52.91)	(−3.53)	(−7.40)	
5	−0.07%***	−0.05%***	0.45***	−0.05**	−0.00	0.32
	(−4.16)	(−3.90)	(36.68)	(−2.21)	(−0.27)	
1 – 5	0.14%***	0.14%***	0.08**	0.00	−0.03	0.01
	(7.86)	(7.67)	(4.41)	(0.06)	(−1.43)	

Notes: The t-statistics are given in the second line of each cell; ***, **, and * denote significance levels of 1%, 5% and 10%, respectively, for the test statistic.

0.04%, respectively. In contrast, portfolios 4 and 5 significantly underperformed with roughly the same percentages. A long/short strategy in which investors would buy portfolio 1 and short-sell portfolio 5 yielded a daily abnormal return of 0.14%. Risk-adjusted returns are in line with the market-adjusted returns. A long/short strategy would have yielded a similar 0.14% daily risk-adjusted return. The conclusions based on the market-adjusted figures are thus supported by the findings from the three-factor analysis.

3.5 Limitations

A limitation of the study is that it does not document a direct causal relation between recommendations and stock prices as they may both be caused by an external factor such as a corporate press release. Both Kerl et al. (2012) and Livnat and Zhang (2012) showed that analyst reports are often triggered by the publication of annual reports or other corporate disclosures.

Another limitation is that not all recommendations may be strictly fundamental recommendations. Although I/B/E/S belongs to the most frequently used databases for fundamental analyst research (next to Zacks and First Call), fundamental analysts may also use technical factors in their analysis (e.g., Jegadeesh et al., 2004).

A fourth limitation applies to the portfolio strategies. Although some reported abnormal returns in these strategies are fairly large, all strategies come with daily portfolio rebalancing. Transaction costs may make a profitable trading strategy impossible. Liquidity constraints may further adversely impact the profitability of such a strategy.

A final limitation is that our results are based on the South African market. The results can not be generalized to other countries, given that the level of market efficiency differs around the world (Bris et al., 2007).

3.6 Conclusions

In this chapter, the relationship between security analyst recommendations and subsequent stock returns was analyzed for the South African stock market. Existing South African analyses of analyst recommendations suffered from several limitations, ranging from small sample sizes to relatively infrequently published recommendation data. To contribute to the body of knowledge on South African market efficiency in general and the value of analyst recommendations in particular, this study was carried out using a large dataset of analyst recommendations on JSE-listed stocks over the period 1995 to 2011.

In semi-strong efficient markets all public information is already incorporated in stock prices, and security analyst opinions should not make a difference. However, this study documents that both buy and strong buy recommendations are associated with significant abnormal returns on the day of publication as well as the day after it. Strong sell recommendations are associated with significant negative returns on the day of publication, while sell recommendations are associated with significant negative abnormal returns on the next day. Considering the direction of the recommendation revision, we conclude that upgrades (downgrades) are generally associated with positive (negative) abnormal returns. Interestingly, an upgrade from strong sell to sell is still perceived to be bad news for shareholders even though it represents an upgrade. Womack (1996) observed a similar pattern. Given that sell recommendations are relatively scarce, Womack (1996) suggested that these recommendations exhibit a greater visibility of in the market. Incorrect sell recommendations will thus be associated with greater reputational costs than incorrect buy recommendations, which implies that sell recommendations (even though they may represent an upgrade) are still considered as bad news. Francis and Soffer (1994) attributed such findings to the incentive structure of analysts: given potential conflicts of interest, analysts can be encouraged to issue positive recommendations. If analysts, despite these pressures, issue a sell recommendation, it is expected that great effort has been invested in the report leading to lower valuation errors as compared to buy recommendations.

Given the short-term market impact, analysts apparently disseminate information which is unknown until the publication of the recommendation. This may be an indication that analysts have an edge in processing information, and hence contribute to the efficiency of the South African stock market.

Next, we analyzed two different portfolio strategies in which five different portfolios were created. The composition of the portfolios in the first strategy depended on the level of the consensus recommendation on day *t-2*. Stocks with the highest recommendation level showed significant outperformance while the other portfolios exhibited mixed results. The second strategy considered portfolios based on the change in the recommendation level during the period (−22, −2). Five different portfolios were created, which were rebalanced on a daily basis. The two portfolios containing stocks with the most positive recommendation revisions showed positive abnormal returns, while the two portfolios with negative changes exhibited negative abnormal returns.

It can be concluded that the magnitude of the recommendation revision matters more for future stock returns than the absolute level of the recommendation. The results of the portfolio analyses indicate that the information content in analyst recommendations is not fully incorporated into stock prices at the moment of publication. Transaction costs will lower the magnitude of the findings. However, investors incur these costs in any case when they are

considering the purchase or sale of a stock. The conclusion thus remains that investors should consider recommendations when they face an investment decision.

Future research could be directed towards the disentanglement of stock returns when analyst recommendations coincide with corporate press releases. In this way, the additional role of analysts at times of company statements could be illustrated. Another avenue of future research could be directed at the integration of fundamental recommendations with technical recommendations[30]. A recent stream of literature (Bettman et al., 2009; Bonenkamp et al., 2011) demonstrates that a combination of these approaches may contribute to investment performance.

30. See the previous chapter for a study to technical recommendations.

Chapter 4

Security analysts' price forecasts and takeover premiums[31]

4.1 Introduction

The majority of the studies on analyst opinions address analyst recommendations (e.g., Barber et al., 2001) and earnings per share forecasts (e.g., O'Brien, 1988). Less academic attention has been devoted to the accuracy of target prices which, are generally published simultaneously. A target price reflects an analyst's opinion on a potential stock price level within a given time frame. Analysts usually forecast over a 12-month horizon.

While target price publications generally have a short-term impact on the stock price (e.g., Brav and Lehavy, 2003), their medium to long run accuracy is limited (Asquith et al., 2005; Bradshaw et al., 2012; and Bonini et al., 2010). For this reason target prices have been called "*arbitrary and baseless*" (Thomsett, 2010: 350). However, forecasts are computed using, among others, standard text-book valuation methodologies, such as the discounted cash flow valuation method (Demirakos et al., 2004; and Imam et al., 2008). This suggests that target prices include intrinsic value estimates to a certain extent.

We argue that the limited precision of target prices may be caused by three different reasons. First, accuracy is usually inspected by comparing the target price to the market price at the end of the horizon. A target price represents, at least to some extent, an estimate of the intrinsic value. Intrinsic values, however, do not necessarily equal stock prices (DeBondt and Thaler, 1987; and Lakonishok et al., 1994). Second, analysts publish their target price for a given time horizon. The adjustment process of price to intrinsic value may take longer than this time period (Lee et al., 1991; and Lee et al., 1999). Hence, the evaluation horizon of target prices may have been too rigid in existing studies. Third, stock returns are inherently related to market returns. Inaccuracy of a target price may therefore also be caused by an erroneous forecast of the market return.

These findings suggest that we should evaluate analysts' valuation accuracy against a benchmark of instant valuations, so that the evaluation is independent of both the time horizon and the intermediate market movements. Mergers and acquisitions (M&A) can

31. This chapter is a modified version of a similarly titled paper. This paper was presented at a research seminar at the Utrecht University School of Economics on January 24, 2011.

provide such a benchmark. In a takeover, the potential acquirer generally offers a price per share for which this party is willing to acquire control over the target company. A takeover bid thereby provides an instant valuation of the target company. Hence, comparing target prices to takeover bids can help us in evaluating the quality of target prices. In our analyses we normalized both the target price and the bid price by the same stock price, ending up at a forecasted return (i.e., a target price implied expected return) and a takeover "premium", respectively. A comparison between these two variables requires that the price forecast of the analyst may not be impacted by privileged information from analysts about upcoming M&A activity. In our analysis we show that forecasted returns do not exhibit specific patterns which are different from non-target companies prior to the announcement of a takeover bid.

Our results show that the forecasted return and the takeover premium were positively and significantly related, indicating that a target price contains relevant information about the value of a company. Depending on the specification of the model, a 5 percent higher forecasted return is roughly associated with a 1 percent higher takeover premium.

The literature suggests that a merger bid may not necessarily reflect the stand-alone value of the target company, as it may also contain compensation for the estimated synergy gains (e.g., Bradley et al., 1983). We applied various methods in which we accounted for synergies (e.g., Houston et al., 2001; and Devos et al., 2009). The incorporation of synergy estimates increased the economic significance of the relation between the forecasted return and the takeover premium. The target price might be impacted by the market risk premium as suggested by Da and Schaumburg (2011). When we controlled the forecasted return for the level of systematic risk, however, the results remained generally unchanged.

Our findings imply that the average target price as published by security analysts contains information about the value of a company. Short-term investor reaction to target price revisions may therefore be rational. In this chapter we seek to contribute to the literature on security analysts by applying a new perspective to the accuracy of target prices. This approach provides the takeover literature with a new measure which may predict takeover premiums.

This chapter proceeds as follows. Section 4.2 contains a literature review and the development of hypotheses. Our data and methodology are presented in section 4.3, after which section 4.4 contains the empirical results. Section 4.5 contains robustness checks. Section 4.6 discusses the limitations, and section 4.7 concludes the chapter.

4.2 Literature and theoretical background

Research on target prices is a relatively new phenomenon. Brav and Lehavy (2003) were among the first to study the impact of target price announcements on stock returns in the US

over the period 1997 to 1999. They showed that the level of stock returns over the 5-day period surrounding the publication of the target price was positively associated with the level of the forecasted return. For the same time period Asquith et al. (2005) also found that stock returns were affected by the publication of a target price. Other authors focused on the revision of the outstanding target price. Huang et al. (2009) documented a potentially higher abnormal return to investors if they relied on both recommendation and target price revisions instead of on recommendation data only. In fact, Kerl and Walter (2008) and Asquith et al. (2005) found that investors put more weight on a revision of the target price than on the recommendation change. In cases where the recommendation was reiterated, shares followed the direction of the target price revision (Gell et al., 2010).

Investors (especially smaller ones) typically react with a delay to news events (e.g., Barber et al., 2001). For a large number of investors, the relevance of price forecasts over a longer horizon is therefore more important than the short-term impact. Asquith et al. (2005) investigated the difference between the target price and the realized stock price, and found that – at the end of the forecasting horizon – approximately 46 percent of the target prices had not been met. Bradshaw et al. (2012) also evaluated stock prices within the 12-month horizon and found for their sample period (1997 to 2002) that 55 percent of the forecasts were not met at any time during the period, whereas 76 percent of the forecasts were not met at the end of the horizon. In line with these findings, Bonini et al. (2010) established for target prices of Italian stocks over the period 2000 to 2006, that 67 percent (80 percent) of the forecasts had not been met during (at the end of) the forecasting horizon.

Despite the fact that absolute levels of target prices are not frequently met, price forecasts may still be relevant when the forecasted return is positively related to the *ex post* realized return. Bonini et al. (2010) made a first attempt by dividing their sample into recommendation categories (from strong buy to strong sell) and by simultaneously looking at the forecasted returns as calculated by dividing the average target price by the concurrent stock price. They found that the forecasted return was positively related to the level of the recommendation. The 12-month realized returns for the categories strong buy, buy and hold, were similar to each other, and were higher than the realized returns for the categories sell and strong sell.[32] In this study, forecasted and realized returns were only indirectly compared via the recommendation level. Da and Schaumburg (2011) provided the first and – to the best of our knowledge – only study which considered the relative value of price forecasts over a longer time window. They studied US stocks over the period 1997 to 2004. On a per-industry basis, they sorted stocks at the end of each month on the basis of recently published forecasted returns. As they considered only recent target price publications, a requirement for a stock to be included in their analysis was that at least one analyst had published a target price

32. Please refer to chapter 3 for an in-depth analysis of the relevance of recommendations.

announcement in that month. They subsequently created a portfolio strategy which involved a long position in stocks with the highest forecasted return and a short position in stocks with the lowest forecasted return. Portfolios were updated on a monthly basis. Such a strategy yielded a statistically significant monthly outperformance of around two percent over the sample period. The creation of a long/short portfolio across the market instead of per-industry was not associated with abnormal returns.

The existing literature showed that *(i)* target price publications are associated with short-term abnormal returns, *(ii)* the long-term precision is limited, and *(iii)* that an investment strategy based on the average forecasted return based on target prices may yield abnormal returns, but the latter conclusion holds only for recently published forecasts and may thus not be generalized to the mean target price level. Current studies thus show a mixed picture; while short-term returns and trading strategy returns are positive, long-term relevance is limited. As a result, target prices have sometimes been called "*arbitrary and baseless*" (Thomsett, 2010: 350). Contrary to this description, Demirakos et al. (2004) found that a considerable part of the analyst community base their forecasts on standard valuation methodologies such as the discounted cash flow (DCF) model. Although Asquith et al. (2005: 248) noted that "*most analysts use a simple earnings multiple valuation model*", Imam et al. (2008) documented that the DCF method is gaining popularity as compared to previous studies. Under the assumption that these valuation models are meaningful, this suggests that target prices are not arbitrary, but do include estimates of the intrinsic value of the firm.

We argue that target prices may be inaccurate for three different reasons. First, analysts make an estimate of the stock price by estimating the intrinsic value (on a per-share basis), while DeBondt and Thaler (1987) and Lakonishok et al. (1994) have stated that intrinsic values can deviate from market prices. The accuracy of target prices therefore depends partly on the extent to which the intrinsic value equals the market price at the end of the forecasting horizon.

Second, to add to this, Lee et al. (1999) noted that the adjustment process of price to intrinsic value can take a long time. While target prices are published for a 12-month period, the market may take even longer than expected to value a company's growth potential in accordance with analysts' expectations. For example, for closed-end funds, it is shown that discounts to net asset values can exist for several years (Lee et al., 1991). Hence, the market price may eventually only meet the target price at a later point in time than suggested by analysts.

A third reason concerns the general market movements over the forecast horizon. In making an estimate of a stock price 12 months from now, analysts need to make an assessment not only of the potential value of a stock, but also of the exposure to future market movements, since stock returns are inherently correlated with the stock market as a whole. Inaccuracy of target prices may therefore, in addition to inferior forecasting skills, be caused

by an erroneous estimate of the stock market performance over the next 12 months. This is further illustrated by Da and Schaumburg (2011: 167) who stated that "*analysts cannot forecast market return*".

These difficulties suggest that we should evaluate target prices against a different benchmark. Rather than focusing on market prices, we propose to compare analyst forecasts to bids made in M&A transactions. In such a transaction, an acquirer bids for the outstanding shares of a target company. Usually the bid price lies substantially higher than the concurrent stock price because the bid should be high enough to persuade target shareholders to sell their shares.

A first reason for the fact that a bid usually exceeds the concurrent stock price is that the acquirer's perception of the stand-alone value (i.e., the value in the absence of a merger) is higher than the market price. The information hypothesis posits that a bid can signal previously unidentified information regarding the stand-alone target firm (Bradley, 1983), also referred to as the revaluation effect. This effect implies that target prices are relevant price forecasts if they are significantly related to the bid price in takeovers. A second reason is that a bid premium can contain synergies. Synergy is defined by Bradley et al. (1988: 4) as the created value through a combination of firms which may have resulted from *"more efficient management, economies of scale, improved production techniques, the combination of complementary resources, the redeployment of assets to more profitable uses, the exploitation of market power, or any number of value-creating mechanisms that fall under the general rubric of corporate strategy"*. These operational synergies are often used as a motivation for a merger, but financial synergies, such as tax shields, can also contribute to total merger gains (Devos et al., 2009). Most of the value of the synergies is being appropriated by target shareholders (Sudarsanam and Sorwar, 2010). For merger attempts which are (partly) driven by synergy considerations, we hypothesize that the analysts' target price is related to the bid price minus the estimated synergy gains.

In short, the stand-alone value of the target company through the eyes of the acquirer is equal to the takeover bid minus potentially projected synergy gains. For analysts' forecasted returns to reflect a relevant estimate of the value of a company, these forecasts have to be in line with the stand-alone value of the target as assessed by the acquirer.

4.3 Data, methodology, variables and descriptive statistics

4.3.1 Data

To assess the research question empirically, we used Thomson Reuters SDC to construct a sample to identify acquired companies and the corresponding takeover bids. Since we were interested in the ultimate valuation of acquired companies we focused on completed mergers

only.[33] In line with the takeover literature, a few restrictions were: (1) both bidder and target must originate from the United States; (2) the deal must be denominated in US dollars; (3) the acquirer was the only bidder; (4) the acquirer bought 100 percent of target shares in the transaction; and (5) the target company was not a penny stock (i.e., the stock price four weeks prior to the announcement must not be smaller than $1). The resulting dataset was matched with target prices obtained from the Institutional Brokers' Estimates System (I/B/E/S). Target companies should have at least one available price forecast by analysts. As a final step, we verified the data from SDC and I/B/E/S for inconsistencies by using Datastream, and we excluded cases with conflicting price data.[34]

Several studies (see for example Agrawal and Chen, 2008) have documented that analysts suffered from conflicts of interest during the dot-com bubble, and as a result issued overly optimistic target prices. After an investigation by regulators, penalties were imposed on ten large Wall Street firms in April 2003. In addition, structural changes to their research departments were enforced. To ensure that our results are not driven by an overly optimistic analyst bias, our M&A sample began at May 1, 2004, corresponding to the starting date of our target price history of May 1, 2003. This guaranteed that target prices in our analysis were issued after the penalization of analyst firms. Our main sample includes announced mergers – and published target prices – up to and including 2010, resulting in a sample of 592 mergers.

We also composed a second, so-called 'restricted' sample consisting of deals for which we could collect synergy estimates. The disclosure of these estimates occurred less frequently for deals where the acquirer was a private company; hence we limited our synergy estimates to deals where both target and bidder were publicly listed. Analogously to Houston et al. (2001) and Bernile (2004) we used management forecasts of expected synergies.[35] Contrary to Bernile (2004), we did not confine our search for estimates to articles available on Factiva, but we used internet search engines to identify press releases, conference call transcripts, and investor presentations held around the announcement of the takeover. We also collected the expected duration of the merger process in months before the synergy gains would accrue as this had an impact on the present value of the synergy gains. We identified 167 management forecasts which represented 41.6% of the deals involving a public bidder in our original sample. We also collected leverage ratios which were used for the calculation of the discount rate of future synergy gains.[36] Restricted by the availability of leverage ratios, we calculated present values of

33. In our reported tests we only consider completed mergers. In unreported tests we included withdrawn merger attempts as well. In those tests we employed the initial price offered rather than the final price. All results remained highly significant.

34. The results in this paper do not change qualitatively when we include observations with conflicting price data across SDC and Datastream.

35. Management forecasts can be overly optimistic (Houston et al., 2001). Accordingly, Bernile (2004) found that the market discounts the insider's estimates of synergy gains. Nevertheless, synergy estimates are significantly and positively related to target abnormal returns, acquirer abnormal returns and combined abnormal returns, indicating that management estimates can be used as indication for the actual synergy gains.

36. The next section discusses these steps in more detail.

the synergy estimates for 107 deals. Given some extreme estimates of synergies of up to 469% of the target's market value, we excluded deals with estimated synergy estimates exceeding the target company's market value. Our final restricted sample comprised 94 mergers.

4.3.2 Methodology

We used regression analysis (ordinary least squares) in which we related forecasted returns by analysts to takeover premiums paid. In separate tests we subtracted the estimated synergy per share from the takeover premium to arrive at a "stand-alone" takeover premium. We know from the literature that the level of the bid could be influenced by several other acquirer- and target characteristics. We therefore added some well-known control variables to the regressions. All regressions are run with heteroskedasticity-consistent estimators of variance (also known as 'robust' estimations). We tested the econometric specifications (as described below) for multi-collinearity by using the variance-inflation factor (VIF). None of the variables exceeded a VIF of 1.26, well below the cut-off level of 10 (Belsley et al., 1980; Studenmund, 1992). We could therefore conclude that multi-collinearity was not an issue of concern in this study.

Variables

Dependent variables

We made use of two different samples in this chapter. The main sample consisted of deals for which a takeover premium was available in the dataset. The restricted sample contained all deals for which we could also find synergy estimates as communicated by the acquiring management. Hence, we used two different dependent variables.

(i) Final takeover premium (*FTP*): The takeover premium was calculated by dividing the offered price per share by the closing price of the target shares four weeks prior to the announcement.[37] We used the final takeover bid and no initial or intermediate offer prices. The announcement date was taken from SDC.

$$(4.1)\quad FTP_i = \frac{Final\ takeover\ bid\ for\ company\ i}{Share\ price\ of\ company\ i\ four\ weeks\ prior\ to\ announcement} - 1$$

(ii) Stand-alone final takeover premium (*Stand-alone FTP*): For a subsample of public acquisitions we also calculated the stand-alone FTP which refers to the value assigned to a target

37. We acknowledge the finding by Schwert (1996) that the markup (i.e., the bid price relative to the stock price one day prior to the announcement) is independent of the price run-up during the four weeks prior to the takeover announcement. Schwert (1996) concluded that the run-up is not part of the takeover premium but represents just an additional cost to the bidder. For our sample we find that the markup is negatively correlated ($p<0.01$) to the run-up, in other words, the run-up partly substitutes for the markup. Hence, for the calculation of the takeover premium, we relate the bid price to the stock price four weeks prior to the announcement. Additional tests (unreported) document that our findings do not change qualitatively when we define our variables in terms of the stock price one day before the announcement.

company excluding synergies. We computed synergy gains in a similar fashion to Houston et al. (2001) and Bernile (2004). We took the time to completion into consideration, since the longer it takes before synergies are accrued, the lower the present value of the gains will be. This delay was recorded in months.

While some companies were very detailed about both the value of synergies and the timing when they were expected to occur, for other takeovers we had to make assumptions similar to those of Houston et al. (2001) and Bernile (2004).

It was possible that the management disclosed a certain value of annual synergy gains accruing as of a certain year *n* after completion of the merger. We assumed that synergies increase in the years before the steady-state is reached. If we denote the steady-state value of annual synergies by *x*, then we assumed that the merged entity would realize synergies of $\frac{x}{2}$ in year *n-1*, $\frac{x}{4}$ in year *n-2*, et cetera, until the first year after the completion was reached. Furthermore, some companies announced the synergy estimates net-of-tax. As in Bernile (2004) a marginal tax rate of 36% is applied to the estimates which were published gross-of-tax. Equation 4.2 specifies the calculation of the present value of the synergy gains. In line with Bernile (2004) this equation assumes that synergy gains are realized in perpetuity with zero expected growth. Further it assumes that there is no inflation.

$$(4.2)\ PV(Synergy\ forecasts) = \sum_{t=i}^{i+n} \frac{S_t}{(1+r)^t} + \frac{S_{i+n+1}}{r(1+r)^{i+n}};$$

$$i = \left(\frac{Time\ to\ completion\ in\ months}{12} + 1\right)$$

In this equation *S* denotes the annual synergy estimates and *r* stands for the discount rate. As discount rate we used the WACC of the combined firm as described in Brealey and Myers (2003). The weighted average WACC of the new merged entity was determined by the relative market values of the merging firms four weeks prior to the announcement. The debt-equity ratio as reported by Worldscope was used for the calculation of the individual WACCs. For the calculation of the cost of equity we applied a 5.3% market risk premium for all cases as this was the expected risk premium for the US found by Dimson et al. (2003). For the risk-free rate we used the yield on the ten-year US government bond. Betas were calculated using the market model; the estimation period was 260 days up to the day prior to the announcement. Similar to Bernile (2004) we applied a fixed 10% yield as the expected return on corporate bonds and we further assumed a 36% marginal tax rate. Following the calculation of the present value of the synergy forecasts for each merger (equation 4.2), we could calculate the value which the acquirer attached to the stand-alone target firm, see equation 4.3.

$$(4.3)\ Stand-alone\ FTP_i = FTP_i - \frac{PV(Synergy\ forecasts)_i / Number\ of\ shares_i}{Share\ price\ of\ company\ i\ four\ weeks\ before\ announcement}$$

Independent variable

Target price implied expected return (*TPER*): Analogous to the definition of the *FTP*, we used the share price four weeks prior to the announcement in the denominator. The *TPER* is defined as the average target price at that time divided by the share price of the target company.

$$(4.4)\ TPER_i = \frac{Mean\ target\ price\ of\ company\ i\ four\ weeks\ prior\ to\ announcement}{Share\ price\ of\ company\ i\ four\ weeks\ prior\ to\ announcement} - 1$$

After calculating the *TPER* for all firms in the sample, we follow Brav and Lehavy (2003) in winsorizing this variable at the 1% and the 99% level.[38]

Control variables

Research in the past decades has resulted in commonly cited variables which partially explain bid premiums. We briefly discuss these variables below. We extracted all variables from the SDC database.

Size of the target company (*LNSIZE*): Generally a negative relation is found between the bid premium and the target size (see for example Betton et al., 2008). We included the natural logarithm of the market value of the target company four weeks prior to the merger announcement.

Cash payment (*CASH*): A cash offer is associated with higher premiums. US target shareholders have to pay capital gains tax in all-cash offers. Cash offers are therefore higher than other offers to make up for this difference. Empirical support was found by Chatterjee et al. (2012) and Betton et al. (2008). We included a dummy variable *CASH* which equals "1" if the deal was fully financed with cash and "0" otherwise.

Tender offer (*TENDER*): Often a distinction is made between tender offers and mergers. Empirical results are mixed. Chatterjee et al. (2012) documented a higher takeover premium in tender offers while Betton et al. (2008) found a negative impact of tender offers on the takeover premium. We included a dummy variable which takes on the value of "1" if the deal was a tender offer and "0" otherwise.

Bidder status (*PUBLICACQ*): We included both public and non-public bidders. Bargeron et al. (2008) showed that public bidders pay relatively high takeover premiums. A dummy variable is included which equals "1" if the acquirer was publicly listed and "0" otherwise.

Horizontal mergers (*SAMESIC*): We used the Standard Industry Classification (SIC) system for identifying mergers occurring within the same industry. Empirical studies regarding the relation between takeover premiums and within-industry deals report mixed results. An

38. Winsorizing is a technique in which the values of outliers are replaced by less extreme values. In this case the lowest (highest) *TPERs* are replaced by the value of the 1st (99th) percentile. Though relatively uncommon, winsorization at the 5% and 95% level is also considered given the level of the *TPER* at the tails of the distribution. Such a winsorization would increase both the economic and statistical significance of our findings.

early study by Walkling and Edmister (1985) reported higher takeover premiums in intra-industry deals. Chatterjee et al. (2012) on the other hand found higher premiums for diversifying deals. Betton et al. (2008) documented that the premium is unaffected by relatedness. Following the SIC division, we included a dummy variable which takes on the value of "1" in case both the acquirer and the target shared the same four-digit-SIC code and "0" otherwise.

Nathan and O'Keefe (1989) observed that premiums vary over time. We included year dummies to control for this effect. Lastly we controlled for possible industry effects by correcting for intra-group correlation (cluster) within the primary SIC-code of the target company.

4.3.3 Are target prices independent from future takeovers?

Before we could conduct our analyses, we needed to rule out potential endogeneity present in target prices; if security analysts have privileged information about upcoming M&A deals, their price forecasts may not be an estimate of the stand-alone value of a target firm, but may include the expectation of a takeover bid.[39] Bradley et al. (2007) considered quarterly recommendation levels surrounding takeover announcements and they hypothesized that analysts, in case they possessed privileged information, would increase the recommendation level prior to a bid, to maximize the return for their shareholders. They found, however, that analysts became more *negative* in the quarter before the announcement relative to the previous three quarters. Bradley et al. (2007: 10) concluded that *"securities analysts do not do a good job of identifying takeover targets."*

Analysts may, however, on purpose decrease recommendation levels as they may align their interest with the M&A department of the same institution (Becher and Juergens, 2007). A lower target recommendation level may lead to a depressed stock price, which in turn leads to a cheaper acquisition. This process may positively affect both the likelihood of deal completion and the collection of deal closing fees by the associated investment bank. Becher and Juergens (2007), however, only compared pre- to post-announcement recommendation levels and did not consider a potential pattern in recommendations prior to the announcement.

To investigate the possibility of privileged information among analysts, we compared the average *TPER* of merger targets to the average *TPER* of non-merger targets. We considered all public US merger targets involved in a domestic deal over the period May 2004 to December 2010. Since we were primarily interested in a stand-alone valuation for merger targets, we excluded deal announcements for targets which had been approached by an acquirer before, or which had been rumored (as reported by SDC) to be involved in a deal before, as target prices for these targets might include specific deal-related price components. We matched these cases with stock prices and monthly consensus (i.e., average) target prices. In addition,

39. The more general literature regarding the prediction of takeover targets dismisses this notion. Palepu (1986) and Powell (1997) stated that it is difficult, if not impossible, to successfully predict takeover targets.

we collected stock price and target price data for all US listed firms which had not become a merger target over this sample period.[40]

For each company, both targets and non-targets, we computed the *TPER* for each calendar month. Next we considered event months (−12, −1) where month 0 was the month in which a bid was announced. For each target firm *i* and event month *t* we computed $TPER_{i,t}$. For each target firm we also calculated the average *TPER* for all non-target companies for the event months (−12, −1).[41] For both groups we equal-weighted the *TPERs* of their constituents to graphically depict our results for the months (−12, −1) prior to the merger announcement, see Figure 4.1.

Figure 4.1 Average *TPERs* for M&A targets and non-targets in period (−12, −1)

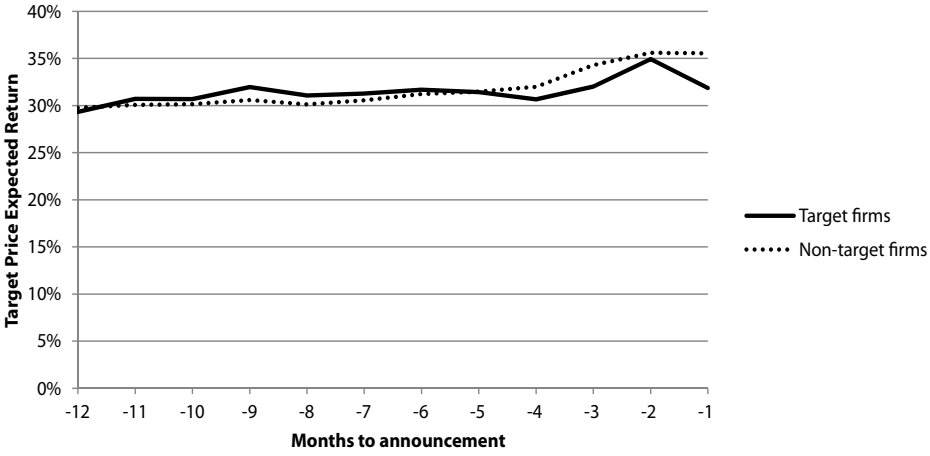


Figure 4.1 illustrates that the average *TPER* fluctuated between 30% and 35% for both target firms and non-target firms. This number is in line with the average *TPER* of 32.9% in Asquith et al. (2005) and close to 28% in Brav and Lehavy (2003). We investigated possible differences between the two groups (target firms vs. non-target firms) in more detail using simple OLS regression analyses. We first estimated the following regression model:

$$(4.5)\ TPER_{i,t} = \alpha_i + \beta_{1,i} TARGET_i + \varepsilon_{i,t}$$

In this model we related the *TPER* to a dummy variable (*TARGET*) which takes on the value of "1" when the observation applies to a target company and "0" if it applies to the average *TPER* across non-target companies.

40. See the Data section for an explanation of our sample period. In total, 900 target firms and 4211 non-target firms have been identified for this analysis.

41. This sample thus exists of 900 target firm observations for each month together with 900 *TPER* averages for non-target firms. The latter are based on the total of 4211 non-target companies in the sample.

Second, we also controlled for the event month to which the *TPER* observation applied. We could therefore test whether the general *TPER* level increased in times when mergers frequently occurred. In this second model, additional dummy variables were included for each event-month in the analysis whereby month −12 is the reference month. The second model becomes:

$$(4.6)\ TPER_{i,t} = \alpha_i + \beta_{1,i} TARGET_i + \beta_{2,i} MONTH_{i,-1} + \cdots + \beta_{12,i} MONTH_{i,-11} + \varepsilon_{i,t}$$

Third, we included an interaction effect between *MONTH* and *TARGET*. We could now test whether the *TPER* differed between target companies and non-target companies in particular event months. The third model is constructed as follows:

$$(4.7)\ TPER_{i,t} = \alpha_i + \beta_{1,i} TARGET_i + \beta_{2,i} MONTH_{i,-1} + \cdots + \beta_{12,i} MONTH_{i,-11} + (\beta_{13,i} MONTH_{i,-1} \times TARGET_{i,t}) + \cdots + (\beta_{23,i} MONTH_{i,-11} \times TARGET_{i,t}) + \varepsilon_{i,t}$$

Table 4.1 depicts the regression results of these three models. To keep the table comprehensible, we refrained from showing the coefficients for months −4 to −11 as they were not statistically significant.

Table 4.1 Testing *TPER* differences between M&A targets and non-targets in the period (−12, −1)

	Dependent variable: TPER		
	Model 1	Model 2	Model 3
Intercept	0.3177***	0.2970***	0.2976***
	(85.56)	(31.38)	(23.14)
TARGET	−0.0031	−0.0031	−0.0043
	(−0.59)	(−0.59)	(−0.23)
MONTH −1		0.0415***	0.0577***
		(3.22)	(3.18)
MONTH −2		0.0571***	0.0583***
		(4.44)	(3.21)
MONTH −3		0.0361***	0.0453**
		(2.80)	(2.49)
TARGET * MONTH −1			−0.0326
			(−1.27)
TARGET * MONTH −2			−0.0024
			(−0.09)
TARGET * MONTH −3			−0.0184
			(−0.72)
Number of observations	21600	21600	21600
Adjusted R^2	0.00	0.00	0.00

Note: The dummy variables ***MONTH-4*** to ***MONTH-11*** are not shown in the table. The same applies to the interaction effects of ***TARGET*MONTH- 4*** to ***TARGET*MONTH-11***. The second line of each cell provides t-values in parentheses. Statistical significance is indicated as follows: * p<0.10, ** p<0.05, *** p<0.01

The first model of Table 4.1 shows the relation between the *TPER* and the target-dummy. The target-dummy is insignificantly different from zero, meaning that on average over the period (−12, −1) there was no difference in *TPER* between targets and non-targets. Model 2 additionally incorporated the month-dummies and documents that the average *TPER* started to rise for both groups as of month (−3). This can be attributed to the general level of market optimism present during merger waves (Gugler et al., 2012). Analyst opinions are generally more optimistic in times of positive investor sentiment (Corredor et al., 2013). The third model included interaction variables between the month-dummies and the target-dummy. Given that all interaction variables are statistically insignificant we conclude that the *TPERs* for target firms prior to deal announcements were not affected by privileged information and can therefore be interpreted as stand-alone estimates.

4.3.4 Descriptive statistics

Main sample

Table 4.2 depicts our summary statistics for the main sample (i.e., the sample in which potential synergy gains are not considered). Panel A shows the distribution of target prices among companies. On average 5.0 target prices per company were published. The minimum number of target prices for a company is 1 while the maximum is 28. Panel B shows summary statistics for all variables across the full sample. The average *TPER* in our sample is 25.3 percent. Furthermore we found a positive difference between the takeover offer and the average analyst's target price, as the takeover premium equaled on average 33.0 percent. A two-sample t-test (unreported) confirmed that this difference is highly significant. The Pearson correlation coefficient between *FTP* and *TPER* is equal to 0.28 and is statistically significant at the 1%-level.

Table 4.2 Descriptive statistics

Panel A: Distribution of target prices among companies

Mean number of outstanding target prices	5.0
Standard deviation	4.3
Median	4
Minimum number of target prices	1
Maximum number of target prices	28

Panel B: Selected summary statistics

Variable	Mean	Standard deviation	Median	Min	Max	# of observations
FTP	0.330	0.304	0.278	−0.879	3.01	592
TPER	0.253	0.346	0.169	−0.183	2.01	592
SIZE (in $ mln)	1677	4271	538	13	53018	592
LNSIZE	6.32	1.42	6.29	2.56	10.88	592
CASH (dum)	0.85	0.36				592
TENDER (dum)	0.16	0.36				592
PUBLICACQ (dum)	0.69	0.46				592
SAMESIC (dum)	0.33	0.47				592

Panel C: Summary statistics per year

Year	Final Takeover Premium (FTP)	Target Price Expected Return (TPER)	# of observations
2004	0.267	0.177	60
2005	0.271	0.244	101
2006	0.277	0.219	133
2007	0.288	0.156	125
2008	0.424	0.480	59
2009	0.541	0.326	36
2010	0.441	0.334	78
Total	0.330	0.253	592

Panel D: Industry division according to SIC code

Industry	Acquirer	Target
Agriculture, Forestry and Fishing	1	1
Mining	19	23
Construction	2	2
Manufacturing	186	200
Transportation, Communications, Electric, Gas and Sanitary service	27	28
Wholesale trade	9	14
Retail trade	14	23
Finance, Insurance and Real estate	228	138
Services	106	163
Total	592	592

Panel C of Table 4.2 illustrates that 2008 was the only year in which the average *TPER* exceeded the takeover premium. The relatively high *TPER* in that year can possibly be attributed to passive target price updating while stock prices rapidly decreased in 2008. Panel D shows the industry subdivision according to the SIC codes. A large portion of the mergers took place in the manufacturing industry as well as among finance, insurance and real estate companies.

Table 4.3 sheds more light on the relation between *FTP* and *TPER*. Both variables were divided into quintiles. The lowest quintile (1) comprises the 20 percent lowest values for each variable; quintile (2) contains the next 20 percent values, etc. The table shows the number of takeovers which are included in each quintile. For example, 44 merger targets in the first

Table 4.3 A cross tabulation of *FTP* and *TPER*

5 quintiles of TPERs	5 quintiles of final takeover premiums (FTP)					
	Lowest FTP (1)	(2)	(3)	(4)	Highest FTP (5)	Total
Lowest TPER (1)	44	37	16	12	10	119
(2)	29	28	30	21	10	118
(3)	16	30	30	24	19	119
(4)	17	13	27	36	25	118
Highest TPER (5)	14	9	16	25	54	118
Total	120	117	119	118	118	592

TPER quintile belonged to the twenty percent companies that received the lowest *FTP* from the acquirer. Table 4.3 confirms the positive association between *FTP* and *TPER*.

Restricted sample

The descriptives so far indicated a positive relation between *FTP* and *TPER*. The remainder of this section focuses on deals for which synergy estimates could be collected. The so-called stand-alone final takeover premium is the takeover premium as defined in equation 4.1 minus the present value of the synergy forecasts per share, divided by the share price, see equation 4.3. Table 4.4 presents summary statistics for this sample.

Table 4.4 Descriptives for synergy subsample

Variable	Mean	Standard deviation	Median	Min	Max	# of observations
TPER	0.154	0.175	0.112	–0.183	0.700	94
FTP	0.280	0.187	0.286	–0.162	0.866	94
PV(Synergy)	0.356	0.253	0.315	0.029	0.985	94
Stand-alone FTP	–0.076	0.286	–0.065	–1.04	0.429	94

Note: The numbers are defined as a percentage of the stock price one trading day prior to the takeover announcement.

Table 4.4 illustrates that the mean bid premium and the mean *TPER* were 28.0% and 15.4%, respectively. These values are considerably lower than in the main sample, which can be attributed to the fact that the firms in the restricted sample are larger: the average target company's market value is $3.8 bln versus $1.7 bln in the original sample (see Table 4.2). Accordingly, Brav et al. (2005) found that the *TPER* is negatively related to firm size. The average present value of the synergy estimate per share equaled 35.6% of the stock price, hence the projected synergies per share exceeded the bid premium by an average 7.6%.

4.4 Empirical results

4.4.1 Main sample

Table 4.5 presents the results of our first regression analysis in which we related takeover premiums to analysts' forecasted returns. With model 1 we tried to explain the takeover premium by incorporating control variables only. The signs of the statistical significant control variables have all been widely documented in the existing literature.

Model 2 takes the *TPER* into account as explanatory variable. In model 2 we regressed the target valuation as assessed by the acquirer on the valuation estimated by analysts plus control variables. It is, however, possible that acquirers include analyst target prices in their model not because of the analysts' applied valuation methodology but because acquirers view the aver-

Table 4.5 Regression results

	Dependent variable: FTP			
	Model 1	Model 2	Model 3	Model 4
Intercept	0.631***	0.203**	−0.178	−0.082
	(4.67)	(2.58)	(−1.11)	(−0.65)
TPER		0.208***	0.210***	0.211***
		(4.86)	(3.12)	(3.51)
LNSIZE	−0.043***	−0.022**	0.006	0.014
	(−4.37)	(−2.17)	(0.45)	(1.11)
CASH	0.110***	0.115***	0.314***	0.178***
	(3.63)	(3.74)	(3.16)	(4.01)
TENDER	0.104**	0.106***	0.114	0.029
	(2.55)	(2.76)	(1.51)	(0.40)
PUBLICACQ	0.076***	0.075***	0.081*	0.108*
	(2.73)	(2.90)	(1.98)	(1.68)
SAMESIC	0.011	0.009		
	(0.40)	(0.32)		
Number of observations	592	592	166	93
R^2	0.16	0.20	0.27	0.31

Notes: Year-dummies have been included. Clustering takes place around 4-digit SIC codes. The model is estimated using robust standard errors, with clustering at the 4-digit-SIC level. Year-dummies are included (unreported); t-statistics in parentheses; * p<0.10, ** p<0.05, *** p<0.01

age target price as an important reference price among shareholders of the target company. Analogously, Baker et al. (2012) showed that merger bids are biased towards anchors such as the recent 52-weeks highest stock price. The average target price as communicated by analysts may also function as such a reference price. We have tested for this potential endogeneity by using the recommendation level as instrumental variable. Two requirements need to be met for a variable in order to be a suitable instrumental variable: *(i)* the variable should be significantly related to the *TPER*, and *(ii)* the variable should not be related to the error term of the regression. With regard to *(i)*: both a two-way correlation and a regression analysis (including control variables) revealed that the recommendation level was positively and significantly related to the *TPER*. Regarding *(ii)*: while analyst recommendations generally vary across target firms, an acquirer is likely to be optimistic on the prospects of a target company, otherwise he would refrain from buying it. The acquirer opinion is therefore likely to be unrelated to the analyst recommendation, hence the observed takeover premium will be independent of the average level of analyst recommendations. This argument implies that the recommendation level is uncorrelated to the regression's error term. A *pro forma* correlation analysis between *FTP* and the recommendation level confirmed this postulation. Our resulting endogeneity test involved three steps. Firstly, we regressed the *TPER* on the recommendation level plus control variables. Secondly, we predicted the residuals. Finally, we regressed *FTP* on *TPER*,

control variables, and the predicted residuals. The low t-value of the residuals (t=1.08, unreported) implied that we could not reject the null hypothesis of no endogeneity. Therefore, our OLS-estimates of the *TPER* coefficient are unbiased and consistent and, hence, endogeneity does not play a role in our analysis.

Model 2 shows that the *TPER* is positively related to the takeover premium. A 5 percent higher *TPER* is roughly associated with a 1 percent higher *FTP*. This finding is highly significant at the 1% level.

The signs of the control variables are unaltered after the inclusion of *TPER*. The addition of the forecasted return raises the R-squared of the regression from 0.16 to 0.20, indicating an improvement of the explanatory power of the model. A partial F-test shows that the improvement is statistically significant.

We ran two additional tests on mergers which are less likely driven by synergy considerations. Hence, in these cases the *FTP* was likely to be a proxy for the stand-alone target value through the eyes of the acquirer. Devos et al. (2009) made a distinction between focused and diversifying deals. The realization of economies of scale, a combination of complementary resources, and an increase in market power are much harder to realize through diversifying mergers. To identify diversifying deals we only included deals where the target and the acquiring company did not share the same industry according to the general SIC classification (see also Table 4.1). Model 3 of Table 4.5 depicts our results. As we included only diversifying deals, the total number of observations dropped to 166. The relation between the takeover premium and the *TPER* stayed highly significant.

In the next test we defined diversifying deals in an alternative fashion. We focused on acquisitions by so-called "holdings and other investment offices" (i.e., companies with 67 as the first two digits according to the SIC classification) which acquired target companies active in a different sector. Diversifying financial investors are more likely to acquire companies due to perceived undervaluation than due to identified synergies. Model 4 of Table 4.5 shows our results. The number of deals which qualified for this test was 93. The coefficient of the *TPER* stayed highly significant in this specification.

To summarize Table 4.5, we found support for our hypothesis. Higher price forecasts are associated with higher takeover premiums. This finding indicates that target prices are relevant in estimating a firm's value. The literature suggests that takeover bids can not in all instances be perceived as a stand-alone firm valuation (Bradley, Desai and Kim, 1988). Therefore, we considered two subsamples in which synergy creation played only a modest role. The relation between *TPER* and *FTP* remained highly significant.

4.4.2 Restricted sample incorporating synergy estimates

We identified synergy estimates for 94 public acquisitions. For these acquisitions we related the stand-alone takeover premium to the *TPER* as communicated by analysts; see Table 4.6.

For this set of mergers, model 1 considers the relation between the takeover premium (for now ignoring any synergy estimates) and the *TPER*. The coefficient of *TPER* is also highly significant in this restricted sample, and its effect size is twice as large as in our previous estimations. Model 2 introduces the relation between the stand-alone takeover premium and the *TPER*. From model 1 to model 2, the *TPER* remains significant and its coefficient increases from 0.40 to 0.54, indicating a stronger relation between target price and takeover premium once the takeover premium is adjusted for estimated synergy gains.

Table 4.6 Regression results

	Dependent variable:	
	FTP	Stand-alone FTP
	Model 1	Model 2
Intercept	0.150	–0.901***
	(1.20)	(–5.07)
TPER	0.400***	0.539***
	(2.78)	(2.79)
LNSIZE	0.002	0.058**
	(0.22)	(2.61)
CASH	0.145***	0.165**
	(4.42)	(2.12)
TENDER	–0.039	–0.086
	(–0.75)	(–1.15)
SAMESIC	0.041	0.076
	(1.00)	(1.40)
Number of observations	94	94
R^2	0.34	0.31

4.5 Robustness checks

Our findings are robust to different model specifications as reported in Table 4.7. Although several studies (Demirakos et al., 2004; Imam et al., 2008) showed that analysts base their opinions – at least partly – on intrinsic value calculations, others found that the *TPER* is significantly related to the systematic risk of the respective stock (Brav et al., 2005). These considerations suggest that the *TPER* should be adjusted for this risk factor in order to find the firm-specific value potential of a firm. We therefore first calculated the expected return for stock *i* (k_i) based on the single-factor Capital Asset Pricing Model (Sharpe, 1964; Lintner, 1965; and Black, 1972), see equation 4.8.

$$(4.8)\ k_i = r_f + \beta_i * (r_m - r_f)$$

To compute the beta we used an estimation window of 260 trading days prior to the announcement date. For the market risk premium we used 5.3% (Dimson et al., 2003). We used the yield on the ten-year US government bond as a proxy for the risk-free rate. A total of thirteen companies did not have a price history for the full 260 trading days, and these companies were excluded from our analysis. The resulting average required rate of return across all target firms equaled 9.8%.

The adjusted *TPER* for firm *i* could then be computed by subtracting the required rate of return from the forecasted return, see equation 4.9.

(4.9) $Adjusted\ TPER_i = TPER_i - k_i$

Model 1 shows the relation between the takeover premium and the adjusted *TPER* for the main sample, while the results for the restricted sample are shown in model 2. The relation remained highly significant in both models.

Next, we checked whether our findings were driven by influential outliers. We applied three different procedures. In models 3 and 4 we replaced the average *TPER* by the median *TPER*. Relative to our original models, the coefficients remained statistically significant. As a third robustness test, we dealt with outliers differently. For this purpose we censored the *TPER* so that the maximum forecasted return was 100%. We further excluded deals where the takeover premium was lower than 0%. This procedure increased the significance of the relation between *TPER* and *FTP*; the coefficient of *TPER* rose to 0.308 in the main sample and to 0.611 in the restricted sample, see, respectively, models 5 and 6. Both the increased coefficient and the increased significance are signs that the relation between an analyst's forecasted return and the takeover premium is particularly strong for a sample with censored outliers. In a last robustness check, we relaxed the sampling criteria. We dropped the restriction that there could be only one bidder in the process. The dummy variable *MBIDDERS* equaled 1 if there were more bidders involved. As a result, the number of cases increased to 647. Model 7 shows that the coefficient of the *TPER* became 0.212 and was again significant at the 1% level. The restricted sample did not contain deals with multiple bidders.

Table 4.7 Robustness tests

	Dependent variable:						
	FTP	Stand-alone FTP	FTP	Stand-alone FTP	FTP	Stand-alone FTP	FTP
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	0.412***	−0.83***	0.198**	−0.871***	0.408***	−0.896***	0.405***
	(2.88)	(4.78)	(2.60)	(−4.97)	(3.16)	(−5.07)	(3.19)
TPER					0.308***	0.611***	0.178***
					(6.46)	(3.22)	(4.21)
Adjusted TPER	0.203***	0.508**					
	(4.71)	(2.64)					
Median TPER			0.217***	0.497**			
			(4.97)	(2.40)			
LNSIZE	−0.018*	0.057**	−0.022**	0.057**	−0.018**	0.046**	−0.020**
	(−1.74)	(2.48)	(−2.20)	(2.46)	(−2.17)	(2.07)	(−2.18)
CASH	0.123***	0.174**	0.116***	0.172**	0.087***	0.087	0.125***
	(4.75)	(2.29)	(3.88)	(2.17)	(3.19)	(1.17)	(4.27)
TENDER	0.108***	−0.104	0.108***	−0.083	0.104***	−0.104	0.112***
	(2.72)	(−1.45)	(2.71)	(−1.20)	(2.68)	(−1.44)	(2.94)
PUBLICACQ	0.081***		0.076***		0.073***		0.088***
	(3.10)		(2.97)		(2.94)		(3.11)
SAMESIC	−0.002	0.068	0.009	0.069	−0.002	0.023	0.002
	(−0.06)	(1.25)	(0.34)	(1.27)	(−0.07)	(0.45)	(0.09)
MBIDDERS							0.183*
							(1.66)
Number of observations	579	94	592	94	592	88	657
R^2	0.20	0.30	0.21	0.31	0.24	0.28	0.21

Notes: Year-dummies have been included. Clustering takes place around 4-digit SIC codes. The model is estimated using robust standard errors, with clustering at the 4-digit-SIC level. Year-dummies are included (unreported). The t-statistics are given in the second line of each cell; ***, **, and * denote significance levels. of 1%, 5% and 10%, respectively, for the test statistic.

4.6 Limitations

This study comes with some limitations. A first limitation is the reliance on management estimates of synergy gains in our restricted sample, since Houston et al. (2001) and Bernile (2004) documented that these estimates are generally too high when compared to market-based estimates. Houston et al. (2001) stated that overoptimism originates from different sources. One of them is that integration costs are often ignored. We specifically searched for mentions of integration costs, but we could only find documents stating these costs for 21 companies. An analysis on these 21 cases confirmed all findings, but we did not report any results, given the extremely small sample size.

The calculation of the synergy estimates also came with limitations; we assumed a 10% bond yield and a marginal tax rate of 36%, as we lacked data on both aspects. The assumptions are, however, similar to the ones made by Bernile (2004). We further assumed a market risk premium of 5.3% in our analyses. This number is based on Dimson et al. (2003) but the risk premium may have fluctuated throughout the sample period.

4.7 Conclusion

Employing a dataset of target prices and takeover bids in the US, we examined the relevance of target prices using a new perspective. Takeover bids exceeded the forecasted return as implied by the average target price on average by 7.7 percent. The target price implied expected return (*TPER*) was positively related to the takeover premiums of acquisitions. As takeover premiums are usually impacted by potential synergy gains as estimated by the acquirer, we constructed several subsamples in which we controlled for synergy gains. The relation between the variables of interest remained intact. Our findings support the informational value of target prices as suggested by Da and Schaumburg (2011). Various robustness checks were performed, which showed that the results were robust to many different specifications.

Our findings contribute to the understanding of short-term investor reaction to target price publications. Since target prices are significantly related to takeover premiums, these target prices may contain information on the fundamental value of companies, hence target prices can be a relevant source of information to investors.

Avenues for future research are the following. Baker et al. (2012) showed that the highest stock price over the 52 trading weeks prior to a merger bid served as a reference price for the bidder. In contrast, our research shows that a forward-looking measure is strongly related to the bid price. Future research can be aimed at the disentanglement of these effects. In addition, Devos et al. (2009) discussed a variety of methods to calculate deal synergies. A different computation of synergy gains can lead to a more accurate relation between target prices and takeover bids.

Chapter 5

Security analyst opinions and takeover completion[42]

5.1 Introduction

In corporate mergers and acquisitions, the acquiring company usually offers a premium on top of the target company's latest share price, because target shareholders are unlikely to accept a bid for their shares which is lower than or equal to the prevailing market price. Even with such a takeover premium, not all attempted takeovers lead to consummated deals (i.e., successfully completed acquisitions). Estimates of non-completed merger attempts vary from 18 to 25 percent of all announced takeover bids (Holl and Kyriazis, 1996; O'Sullivan and Wong, 1998). Takeover attempts may fail for several reasons. A frequently reported reason is the rejection of the takeover bid by the target company's shareholders. When the offered price is perceived to be too low, shareholders may refuse to sell their holdings to the acquirer. An example is a $16.4 bln takeover bid by US-based Kraft for the UK company Cadbury in November 2009. Cadbury's chairman stated in his recommendation to the targeted shareholders that *"Kraft's offer fails to recognize the value we have built in your company"*.[43] The initial offer was rejected by the management.[44]

Rejected takeover offers can be costly for the acquiring company as the preparation has been expensive and failed bids give competitors additional time to prepare a competing offer. Investment banks that are involved in the deal can also be adversely affected because they do not receive their deal-closing fees. Given the costs of failed attempts, indicators for the chances of success of a takeover bid can be important to the parties involved in the merger process. In this chapter, we show that information from security analysts could provide an indicator for the likelihood of completion of a deal.

Security analysts evaluate companies and estimate future earnings. Sudarsanam et al. (2002) analyzed the earnings forecast revision in response to a takeover bid. They suggested that the shareholders of the target company *"can then use this valuation as a benchmark in their decision to accept or reject a bid"* (Sudarsanam et al, 2002: 154). A bidder, however, is

42. This chapter is a modified version of a similarly titled paper. This paper is co-authored by D.F. Gerritsen and U. Weitzel. A draft version of the paper was presented at the Annual Meeting of the Midwest Finance Association, Chicago on March 15, 2013.

43. http://online.wsj.com/public/resources/documents/CadburyDefenceDocument2009-part1.pdf

44. A subsequent offer of $18.9 bln was finally accepted in January 2010.

more likely to be interested in an available benchmark prior to the publication of a takeover bid. Earnings estimates alone are unlikely to provide this benchmark since a company valuation involves several more inputs in addition to the estimated earnings. Jegadeesh et al. (2004) showed that security analysts take into account several factors before they disseminate their findings to stock market investors via the announcement of a recommendation accompanied by an expected future share price, the so-called target price.[45] Both variables are expressions of the analysts' investment opinion regarding a stock. Hence, in this study, both elements of an opinion will be related to takeover completion.

Notwithstanding their interrelatedness, recommendations and target prices differ in many aspects. Recommendations can only be issued on a predetermined scale (usually 1 to 5) where the lowest number stands for strong buy, and the highest number for strong sell. This obviously limits the analysts' flexibility for expressing minor changes in opinion (Asquith et al., 2005). Target prices are more flexible. A target price is an analyst's estimate of the price level that a stock is expected to reach in – usually – 12 months. Target prices can be of additional value to recommendations, because they can range from $0 to infinity in small increments, which enables analysts to express even small changes in opinion.

Analyst opinions have been subject to a vast amount of research. The overall conclusion on short- and long-term returns after recommendation announcements (e.g., Stickel, 1995; Womack, 1996; Barber et al., 2001) and target price announcements (e.g., Asquith et al., 2005; Kerl and Walter, 2008; and Huang et al., 2009) is that they can contain relevant information for investors.[46] This literature implies that high recommendation levels and high target prices not only signal analyst expectations of stock price increases, but also translate into investors' expectations of higher rates of return. If analyst recommendations are published in the absence of a specific takeover announcement, they apply to the stand-alone value of a potential takeover target (i.e., the value as an independent entity).[47] Hence, if shareholders have high growth expectations for the stand-alone target company, a given takeover bid is more likely to fall short of these expectations. Any given bid has therefore a higher chance to be rejected. Consequently, we expect that attempted mergers will less frequently be consummated when analysts are bullish about the target as a stand-alone entity. Conversely, when a stock is subject to sell recommendations, investors expect a lower stand-alone growth potential and, for a given price, will thus be more eager to sell the shares to an acquirer.

This argument analogously applies to analysts' target prices for the stand-alone stock price of a company. Target prices may be an even better indicator of merger completion, be-

45. Throughout this paper the term 'target price' always refers to security analysts' price forecast and not to the price paid by the acquiring company for the target company.

46. Please refer to chapters 3 and 4 for more evidence on the relevance of recommendations and target prices.

47. Chapter 4 contains a test for this assumption.

cause they are price-denominated and they can therefore be directly compared with takeover bids, which are also announced in terms of a price per share.[48]

Next to the average level of analyst opinions, the divergence of these opinions may also play an important role. We constructed a measure of opinion divergence for both recommendations and target prices. Strong divergence of analyst opinions may indicate that at least some shareholders of the target company expect high stand-alone growth for the target company.[49] A potential acquirer therefore has to pay a higher bid price in order to convince the majority of shareholders to sell their holdings. Indeed, Chatterjee et al. (2012) reported a positive relationship between takeover premiums, defined as bid prices over stand-alone values, and analysts' opinion divergence. We extend this argument to takeover completion and expect that deal consummation will be higher for lower levels of opinion divergence, because a given bid is more likely to be acceptable for the majority of shareholders of the target company to give up their shares.

Our results showed a negative relation between the average target price and the probability of merger completion. The likelihood of merger consummation was lower when the average target price was relatively high compared with the share price prior to the takeover announcement – also when we controlled for the takeover premium. This suggests that investors are less willing to sell their shares to an acquirer when analysts forecast substantial growth. This also implies that analysts' target prices can be interpreted as a benchmark that needs to be surpassed for a bid to be successful. Furthermore, consistent with our expectations, a high measure of divergence between analysts' forecasts about the future share price was associated with lower takeover completion rates.

Our findings suggest that target prices have a higher information value for takeover completion than recommendation levels, as we found that neither the recommendation level, nor the recommendation dispersion was related to takeover completion rates. This observation is in line with Asquith et al. (2005) and Kerl and Walter (2008) who reported that investors target price revisions had a bigger impact on stock prices than recommendation levels. Gell et al. (2010) suggested that target price estimates might suffer less from analysts' conflicts of interest, and that they therefore contained rather more relevant information.

Our study complements the literature regarding analyst forecasts on takeover targets. Existing studies have predominantly focused on the relevance of analyst opinions which were published *after* a bid was announced. Pound (1988), Brous and Kini (1993) and Sudarsanam et al. (2002) all evaluated the revised earnings forecasts regarding the stand-alone target

48. This logic assumes that acquirers do not fully include analyst opinions in their premium. Although we found in chapter 4 that analysts' target prices and takeover premiums were related, we also showed that this relation was not 1:1. Even if a (higher) premium takes account of high analyst estimates, this is only partial. Thus the likelihood that a higher premium is insufficient to convince all target shareholders increases in analysts' target prices. We also controlled for takeover premiums in our estimations.

49. In support of this rationale, we found a strong positive correlation between *(i)* the median recommendation and the opinion divergence based on recommendations and *(ii)* the median target price and the opinion divergence of the target price.

company in response to a takeover announcement. The latter two studies found evidence of increased stand-alone earnings estimates following a takeover bid. Analyst recommendations after merger announcements were related to takeover completion by Becher and Juergens (2010). They observed that increased analyst pessimism regarding target companies decreased the target cost and thereby increased the chance of merger completion. Bradley et al. (2007) studied *ex ante* recommendation levels of acquired companies and compared these to a broader universe of stocks. They found that analysts a priori did not publish higher recommendation levels for companies that were to be acquired, and thus seemed to be unable to predict future takeovers. Our study is different from Bradley et al. (2007) in that we solely focus on the subsample of targeted companies with announced takeover bids. Within this subsample, we relate analyst opinions to eventual merger consummation.

A very recent study has related analysts' opinion divergence regarding the target company to takeover premiums. Chatterjee et al. (2012) showed that if there is high opinion divergence among analysts prior to the merger announcement, shareholders expect and receive higher takeover offers from interested parties. Our study complements and advances Chatterjee et al.'s (2012) insights into takeover likelihood and premiums by focusing on the effects of analyst opinions on takeover completion.

This chapter contributes to the current literature in several areas. First, it advances the empirical evidence on the value of analyst predictions of future stock prices. Second, it increases our understanding of why some takeover attempts fail while others are successful. Third, it provides support for the notion that target prices may contain more value than recommendation levels. For the practitioner, the chapter provides novel indicators for completion likelihood, which may be useful in structuring future takeover offers.

The chapter proceeds as follows. After the development of hypotheses in the next section, the third section describes the data and methodology. Section 5.4 presents the tests and results. Section 5.5 concludes the chapter.

5.2 Development of hypotheses

5.2.1 Recommendations and target prices

Security analysts analyze public companies with respect to current and future profitability. They compare the resulting theoretical stock value with the current market valuation and publish both a recommendation and a so-called target price. The literature has shown that the publication recommendations (e.g., Barber et al., 2001) and target prices (e.g., Asquith et al., 2005) have an impact on stock prices. In this chapter we therefore analyze both *(i)* recommendations and *(ii)* target prices.

(i) For recommendations, Stickel (1995) showed that upgrades (downgrades) are followed by positive (negative) abnormal returns. While the post-event drift for recommendation upgrades is short-lived, the drift for downgrades extends for as long as six months (Womack, 1996). For longer time windows, Barber et al. (2001) found that a calendar time strategy involving the purchase (short sale) of stocks with the highest (lowest) recommendations generates positive abnormal returns.

(ii) With regard to target prices, Brav and Lehavy (2003) documented short-term abnormal returns around target price revisions. The magnitude of these returns is positively associated with the favorableness of the revision. The accuracy of forecasts over a longer time horizon is inconclusive. Although target prices are often inaccurate and too high (Brav and Lehavy, 2003; Asquith et al., 2005; Bradshaw and Brown, 2006; Bonini, 2010), Da and Schaumburg (2011) showed that a long-short strategy on the basis of target prices is able to generate abnormal returns. They sorted stocks on the basis of recently published forecasted return and found that – within industries – buying (selling) stocks with the highest (lowest) forecasted returns generates positive abnormal returns.

In summarizing the empirical findings on analyst opinions, investors seem to be able to benefit from analyst opinions at least in the short run and perhaps even in the longer run via portfolio rebalancing strategies.[50] Hence, in developing our hypotheses, it is reasonable to assume that high recommendation levels or price forecasts not only signal growth potential in the eyes of the analyst, but partially also for investors.

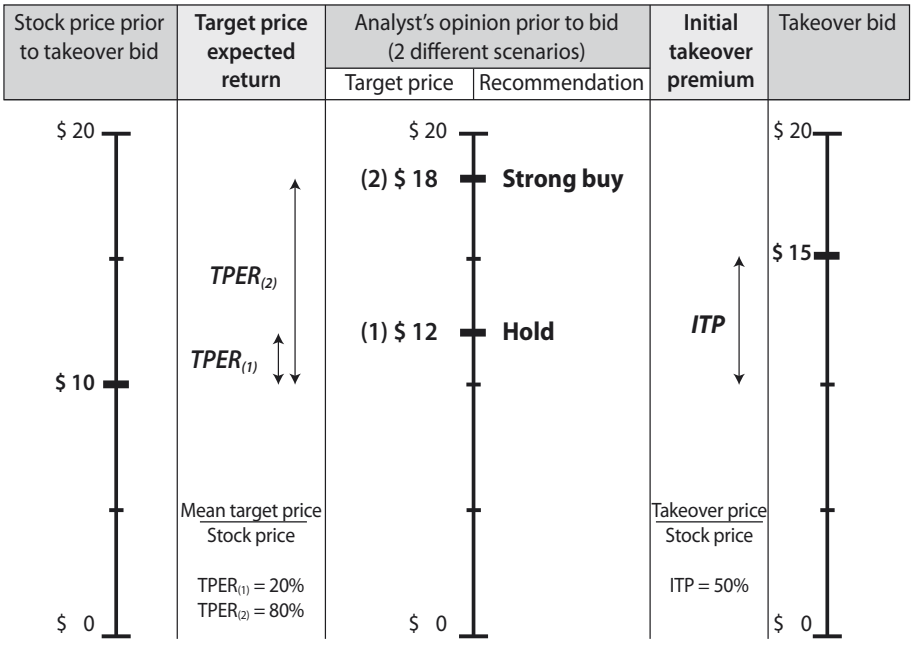
When a company is a takeover target, its shareholders are offered a fixed price for which they can sell their holdings to an acquiring company. When analysts have bullish forecasts for the target company, it is likely that at least some of the shareholders of the target company expect a higher stand-alone return. As shown in chapter 4, the bid of an acquirer may confirm the growth expectations of the target's shareholders and thereby increase their stand-alone valuations. However, as also shown in the previous chapter, this increase of the target premium is only partial.[51] The target's shareholders will, for a given takeover price, be less likely to sell their shares to the acquirer. In other words, a given takeover bid is less likely to induce target shareholders to sell their holdings if analysts are relatively optimistic on the stand-alone stock potential of the takeover target.

The main rationale and terminology is summarized in Figure 5.1. The left panel shows the stand-alone value of an exemplary target company prior to a takeover announcement. Here, the stand-alone, pre-announcement stock price is $10. The right panel illustrates an initial takeover bid of $15 per share, resulting in an initial takeover premium (ITP) of 50 percent. The central panel depicts two scenarios for analyst opinions. In Scenario 1 analysts

50. This is confirmed for recommendation levels in chapter 3 of this thesis.

51. We also controlled for takeover premiums in our estimations.

Figure 5.1 Main rationale and terminology



have published a mean stand-alone, pre-announcement target price of $12 and, on average, a hold-recommendation. In Scenario 2, analysts are more bullish about the company and have published, on average, a strong buy-recommendation together with a mean target price of $18. As the current stock price is $10, it does not fully converge to either of the forecasted target prices. The forecasted return, also called the target price expected returns (*TPERs*) for Scenario 1 and 2 are 20 percent and 80 percent, respectively.

Given that analysts estimate a high stand-alone return with a *TPER* of 80 percent in Scenario 2, we expect that the takeover offer of only 50 percent will be rejected. Target company shareholders are more likely to accept the takeover bid in Scenario 1 as the offer exceeds the stand-alone growth potential of only 20 percent. This rationale can also be applied to recommendation levels. We therefore expect:

H1: The likelihood of takeover completion is negatively associated with the average recommendation level issued by analysts.

H2: The likelihood of takeover completion is negatively associated with the average target price issued by analysts.

5.2.2 Divergence of opinion

Divergent opinions of analysts may express uncertainty among them and consequently among investors about a company's value. Contradictory evidence exists on how asset prices

are influenced by opinion dispersion. On the one hand, security returns are positively associated with opinion dispersion because investors require higher returns under increased uncertainty (see Doukas et al., 2006, for a detailed overview). On the other hand, Diether et al. (2002) reported that stocks exhibiting high opinion divergence realized lower future returns. According to Diether et al. (2002), security prices are driven up by positive investors, while negative investors are limited in their arbitrage possibilities by short-sale constraints.

Chatterjee et al. (2012) connected opinion dispersion concerning target companies to takeover bids.[52] They found that takeover premiums and opinion divergence are positively related. The underlying logic is that a higher level of heterogeneous beliefs about the value of the target company is associated with a higher dispersion among target shareholders about a justified level of the share price. Hence, if acquirers strive for control, they need to pay a higher takeover premium to induce the majority of the current shareholders to sell their holdings.

Chatterjee et al. (2012) tested their hypothesis on a sample of completed mergers and did not address any factors which might explain differences between completed and non-completed takeover attempts. For a given bid, the underlying logic can be extended to takeover completion. In times of high opinion divergence, a given bid is less likely to convince the majority of shareholders of the target company to give up their shares. We therefore expect that opinion divergence (measured as the standard deviation of the average published analyst opinion) is negatively related to merger completion. This applies to divergence in recommendations as well as in target prices.

H3: The dispersion rate of security analyst recommendations is negatively related to the probability of takeover completion.

H4: The dispersion rate of security analyst target prices is negatively related to the probability of takeover completion.

5.3 Data and methodology

5.3.1 Data and sample selection

We used the Thomson Reuters SDC database to identify acquisition announcements which we subsequently matched with recommendations and target prices obtained from the Institutional Brokers' Estimate System (I/B/E/S). Our sample period starts in March 1999 as that is the starting date of the I/B/E/S target price database. We included mergers announced up to and including 2010 in which the bidder strove for full ownership (i.e., 100% of the target company's shares). To avoid currency problems, we considered US dollar-denominated deals

52. Alexandridis et al. (2007) and Moeller et al. (2007) related acquirer returns to opinion divergence regarding the acquiring company. Alexandridis et al. (2007) found that acquirers subject to high opinion divergence underperform after acquisitions. Moeller et al. (2007) documented that this underperformance only holds for equity offers in which the acquirer faces high divergence of opinion.

only, and we further required both bidder and target to originate from the United States. Moreover, the target must be publicly listed and must have an available share price and available recommendation and target price data. We excluded penny stocks and deals where the market value of the target company was smaller than $100 mln. We identified 1384 deals in our sample with complete information on the initial takeover premium, and either a completed or a withdrawn deal status. In addition, announced deals had to satisfy the following criteria to be included in our sample:

1. Each case was required to have at least two recommendations as well as two target prices, as we needed to be able to measure dispersion of opinions.
2. We manually verified the price data from the two sources for inconsistencies by using Thomson Reuters Datastream and removing 80 cases with conflicting prices that could not be resolved.[53]

Our resulting final sample consists of 860 mergers.

5.3.2 Variables

Dependent variable

The dependent variable for all our hypotheses is the completion of an announced merger. Thomson Reuters SDC keeps a record of the status of each announced deal and whether it was completed or withdrawn. We computed a dummy variable (*COMPLETED*) that took the value of "1" when a merger was completed and "0" when a merger was withdrawn.

Independent variables

In all our analyses we employed analyst opinions which were issued four weeks prior to the takeover announcement.[54] Bradley et al. (2007) did not find that analyst recommendation levels increased prior to takeover announcements. In our sample, consistent with Bradley et al. (2007), we also did not find any significant increase of recommendations or target prices prior to our measurement date (i.e., four weeks before to the announcement). We are therefore confident that published recommendations and target prices were not driven by privileged information on potential takeovers. Hence, we interpreted the analyst opinions in our sample as expected future share prices of the stand-alone entity in the absence of takeover bids.

Average recommendation level (*REC*): I/B/E/S publishes recommendations on a 1 to 5 scale. This scale is inverse, meaning that the lowest number corresponds to the highest recommendation, which means 1 is a strong buy and 5 a strong sell. To allow for an easier

53. As explained in the robustness section, this exclusion does not qualitatively change our results.

54. We refer to chapter 4 for the explanation of the reference date (i.e., four weeks prior to the announcement). Also in this chapter's sample the run-up was negatively correlated to the markup ($p<0.10$). For this reason we related both the target price and the bid price to the stock price four weeks prior to the bid.

interpretation, following Jegadeesh et al. (2004), we reversed the scale so that the most favorable recommendation corresponds to the highest score.

Target price expected return (*TPER*): I/B/E/S also publishes target prices issued by analysts. We calculated the average target price four weeks prior to the merger announcement. To correct for possible scale effects, we divided the average target price four weeks prior to the announcement by the share price at that time. This gave us the target price expected return (*TPER*), see equation 5.1.

$$(5.1)\ TPER_i = \frac{mean\ target\ price\ of\ company\ i\ four\ weeks\ prior\ to\ announcement}{share\ price\ of\ company\ i\ four\ weeks\ prior\ to\ announcement}$$

After calculating the TPER for all firms, we winsorized this variable at the 1st and the 99th percentile (e.g., Brav et al., 2005).

Divergence of opinion: Past studies have employed various measures for opinion divergence which are based on analyst opinions. For example, Diether et al. (2002) used the standard deviation of analyst earnings forecasts, and Moeller et al. (2007) employed the standard deviation of analysts' long-term growth forecasts. Both the earnings and the long-term growth forecasts are separate factors in a more complex framework leading to the investment opinion, and therefore they cover only a part of the opinion divergence. To measure investors' opinion divergence regarding stock prices, we therefore computed the standard deviation of both recommendations and target prices. For opinion divergence in recommendations, we computed the standard deviation of the recommendation levels of a target company four weeks prior to the announcement (*DIVOP_REC*). For opinion divergence in target prices, we computed the coefficient of variation, which equals the standard deviation of all target prices of a target company four weeks prior to the announcement normalized with the average target price of the company (*DIVOP_TP*), see equation 5.2. Analogous to the *TPER,* we winsorized *DIVOP_TP* across the sample at the 1st and the 99th percentile.

$$(5.2)\ DIVOP\_TP_i = \frac{standard\ deviation\ of\ target\ prices\ for\ company\ i}{mean\ target\ price\ for\ company\ i}$$

Control variables

Research suggests several, other, determinants of merger completion rates which we will use as control variables.

(a) Target-related control variable: Prior studies have indicated that larger target companies are less likely to be successfully acquired than small target companies (Hoffmeister and Dyl, 1981 and Raad and Ryan, 1995). In our analysis we included *LNSIZE* which is defined as the natural logarithm of the target market value four weeks prior to the deal announcement.

(b) Acquirer-related control variables: Our sample includes both public and non-public bidders. Bargeron et al. (2008) showed that public bidders pay relatively higher takeover premiums. We therefore expect that announced deals involving a public bidder exhibit higher completion rates. We included a dummy variable *PUBLICACQ* which takes on the value "1" if a bidder is publicly listed and "0" otherwise.

(c) Deal-related control variables: Walkling (1985), as well as Holl and Kyriazis (1996), reported a positive association between merger completion and the bid premium. We therefore included the initial takeover premium (*ITP*) that was offered to target shareholders in our regression analysis. The *ITP* was computed as the initial offer price for a share of the target company, divided by the stand-alone share price of the target company four weeks prior to the takeover announcement. Sometimes several offers were announced consecutively by either the same or other bidders. To exclude confounding effects of this bidding process, we restricted ourselves to the very first bid in a takeover process when computing the *ITP*. We used *ITP* and *TPER* to compute the Relative Initial Takeover Premium (*RITP*). This variable measures the difference between the takeover premium and the return forecasted by analysts. *RITP* is defined as in equation 5.3:

(5.3) *Relative Initial Takeover Premium = ITP − TPER*

Based on the *RITP* we also create a dummy variable *RITP_dum* which takes on the value of "1" when the *ITP* exceeds the *TPER* and "0" otherwise.

Wong and O'Sullivan (2001) suggested that equity financing introduces a greater level of ambiguity than cash financing. When paid with acquirer's stock, target shareholders participate in the risk of the merger. This increases the probability that the target company will reject an offer. We computed the variable *CASH*, which is the percentage of the consideration that is paid in cash, measured on a scale from 0 to 1.

Competition from other potential acquirers decreases the chance of takeover completion (Walkling, 1985). We included a dummy *MBIDDERS* that took the value "1" in case more than one company attempted to acquire the target and "0" if there was just one bidder.

Bates et al. (2006) showed that tender offers can increase the chances of completion. We therefore computed a dummy variable *TENDER* that took the value "1" for tender offers and "0" otherwise.

An offer is referred to as a 'hostile offer' when the target management does not recommend the current offer to its shareholders. Holl and Kyriazis (1997) discussed various studies, all of which found a lower probability of takeover success for hostile bids. We incorporated a dummy *HOSTILE* which was coded as "1" for offers that were recorded as 'hostile' by SDC and as "0" otherwise.

The businesses of acquirers and targets can be closely related, which may generate more friction between target and acquirer, e.g., because of higher cost cutting of redundancies. This

can decrease the chances of completion (Aguilera and Dencker, 2011). Antitrust measures may also decrease the completion rate in intra-industry deals. Conversely, a higher degree of relatedness may decrease chances of discovering a misfit at a later stage of the pre-deal process, which ultimately increases the chances of completion. To control for these possible effects, we included a dummy variable *SAMESIC* that took the value "1" when both the acquirer and the target shared the same 4-digit-SIC code.

In addition, we included year dummies (unreported) to control for seasonal fixed effects and we controlled for possible industry effects by correcting for intra-group correlation (cluster) within the primary SIC code of the target company. All regressions were run with heteroskedasticity-consistent estimators of variance (a.k.a. 'robust' estimations).

5.3.3 Descriptive statistics

Table 5.1 reports information regarding the average number of recommendations and target prices available per company. All cases have at least two recommendations and two target prices, as we need to be able to calculate opinion dispersion. As noted by Asquith et al. (2005) not every report containing a recommendation also contains a target price. On average we found 8.3 published recommendations and 5.7 published target prices per company. The mean number of target prices is somewhat higher than in Lipson and Mortal (2007). We found that this difference could be mainly attributed to our exclusion of firms with only one target price.

Table 5.1 Information on the number of recommendations and target prices

	Recommendations	Target prices
Mean number of published opinions per company	8.3	5.7
Standard deviation	5.4	4.0
Median	7	4
Minimum number	2	2
Maximum number	33	28
Total number of companies	860	860

Table 5.2 displays some summary statistics. Panel A describes the complete sample. The average target price expected return *(TPER)* was 29 percent. This is in line with Brav and Lehavy (2003), who reported an average premium of 28 percent. The average initial takeover premium exceeded the *TPER* with three percentage points.

Panel B reports the annual distribution of selected variables. The period from 2000 to 2002 is the only interval where analysts' *TPERs* exceeded the initial takeover premiums (*ITP*). This largely corresponds with studies of Agrawal and Chen (2008) as well as Cowen et al. (2006), both of whom identified analyst optimism during the dot-com bubble.

Table 5.2 Summary statistics

Panel A: Selected summary statistics

Variable	Mean	Standard deviation	Median	Min	Max	# of obs
REC	3.73	0.56	3.75	2.1	5	860
TPER	0.29	0.46	0.17	–0.19	2.92	860
DIVOP_REC	0.75	0.31	0.78	0	2.12	860
DIVOP_TP	0.22	0.27	0.14	0	1.80	860
ITP	0.32	0.29	0.27	–0.98	3.01	860
SIZE	2116	5077	745	100	53018	860
LNSIZE	6.41	1.26	6.19	4.61	10.88	860
CASH	0.57	0.44	0.71	0	1	860
COMPLETED (dum)	0.87	0.33		0	1	860
HOSTILE (dum)	0.02	0.13		0	1	860
TENDER (dum)	0.14	0.35		0	1	860
MBIDDERS (dum)	0.06	0.24		0	1	860
PUBLICACQ (dum)	0.75	0.43		0	1	860
SAMESIC (dum)	0.35	0.48		0	1	860

Panel B: Summary statistics per year

Year	REC	TPER	RITP	DIVOP_REC	DIVOP_TPER	COMPLETED	# of obs
1999	4.0	0.45	0.02	0.70	0.24	0.88	43
2000	4.1	0.66	–0.23	0.64	0.37	0.81	91
2001	4.0	0.71	–0.40	0.63	0.48	0.86	56
2002	3.8	0.49	–0.24	0.72	0.36	0.88	40
2003	3.4	0.14	0.16	0.82	0.19	0.90	58
2004	3.6	0.14	0.15	0.73	0.17	0.92	77
2005	3.7	0.15	0.10	0.79	0.14	0.92	86
2006	3.6	0.19	0.07	0.78	0.14	0.89	122
2007	3.6	0.14	0.13	0.79	0.13	0.86	128
2008	3.6	0.30	0.05	0.80	0.23	0.70	57
2009	3.6	0.22	0.27	0.87	0.24	0.97	39
2010	3.9	0.27	0.13	0.76	0.18	0.91	66
Total	3.7	0.29	0.03	0.75	0.22	0.87	860

Table 5.3 reports the pair-wise correlations of the variables in our model. We tested all econometric specifications (as described below) for multi-collinearity by using the variance-inflation factor (VIF). None of the variables were seen to exceed a VIF of 2.92, with a mean VIF of 1.45 for all variables. These values are well below the cut-off level of 10 (Belsley et al., 1980; Studenmund, 1992). We could therefore conclude that multi-collinearity was not an issue of concern in this study.

Table 5.3 Pairwise correlation table of selected variables

	REC	TPER	DIVOP_ REC	DIVOP_ TP	ITP	LN-SIZE	CASH	COM-PLETED	HOS-TILE	TEN-DER	MBID-DERS	PUBLIC-ACQ	SAME-SIC
TPER	0.28	1.00											
	(0.00)												
DIVOP_REC	−0.10	−0.11	1.00										
	(0.00)	(0.00)											
DIVOP_TP	0.04	0.76	0.00	1.00									
	(0.30)	(0.00)	(0.89)										
ITP	0.06	0.18	0.00	0.16	1.00								
	(0.08)	(0.00)	(0.91)	(0.00)									
LNSIZE	−0.08	−0.27	0.11	−0.21	−0.15	1.00							
	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)								
CASH	−0.04	−0.16	0.10	−0.19	0.08	−0.12	1.00						
	(0.24)	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)							
COMPLETED	0.06	−0.10	−0.01	−0.07	0.07	−0.03	−0.04	1.00					
	(0.10)	(0.00)	(0.81)	(0.03)	(0.04)	(0.41)	(0.24)						
HOSTILE	−0.05	0.00	0.03	−0.01	−0.02	0.10	0.03	−0.17	1.00				
	(0.11)	(0.89)	(0.44)	(0.83)	(0.47)	(0.00)	(0.39)	(0.00)					
TENDER	0.03	0.07	0.08	0.04	0.25	−0.05	0.31	0.04	0.16	1.00			
	(0.33)	(0.05)	(0.02)	(0.19)	(0.00)	(0.11)	(0.00)	(0.20)	(0.00)				
MBIDDERS	−0.10	−0.05	0.02	−0.01	−0.06	0.08	0.10	−0.38	0.12	0.05	1.00		
	(0.00)	(0.11)	(0.49)	(0.76)	(0.10)	(0.03)	(0.00)	(0.00)	(0.00)	(0.15)			
PUBLICACQ	0.08	0.09	−0.07	0.12	0.08	0.02	−0.43	0.11	0.05	0.01	−0.13	1.00	
	(0.03)	(0.01)	(0.05)	(0.00)	(0.02)	(0.59)	(0.00)	(0.00)	(0.13)	(0.85)	(0.00)		
SAMESIC	−0.01	−0.04	−0.04	0.00	0.00	0.05	−0.19	0.05	0.02	−0.03	−0.01	0.20	1.00
	(0.84)	(0.19)	(0.24)	(0.95)	(0.92)	(0.13)	(0.00)	(0.16)	(0.55)	(0.44)	(0.83)	(0.00)	

Note: Variable definitions are discussed in section 5.3. P-values in parentheses.

5.4 Results

5.4.1 Recommendation level and target price expected return

In Hypotheses 1 and 2 we relate takeover completion (*COMPLETED*) to the recommendation level *(REC)* and the target price expected return (*TPER*). We controlled in all specifications for the initial takeover premium (*ITP*) offered. As the dependent variable was a dummy variable, we estimated all models using a linear probit regression. We estimated all specifications with year fixed effects (unreported), robust standard errors and corrected for intra-group correlation within industries by clustering around four-digit SIC codes.

Table 5.4 reports the results of this estimation. We estimated six different models. The baseline model, model 1, only incorporates the control variables. The statistical significant

Table 5.4 Estimation results for Hypotheses 1 and 2

	Dependent variable: COMPLETED					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
REC		0.020		0.028		
		(1.08)		(1.53)		
TPER			−0.062***	−0.066***		
			(−3.62)	(−3.88)		
RITP					0.059***	
					(4.07)	
RITP_dum						0.057***
						(2.83)
ITP	0.042	0.044	0.047	0.050		
	(1.22)	(1.28)	(1.42)	(1.51)		
LNSIZE	0.003	0.003	−0.004	−0.005	−0.004	−0.000
	(0.40)	(0.41)	(−0.52)	(−0.56)	(−0.44)	(−0.05)
CASH	−0.011	−0.014	−0.020	−0.025	−0.021	−0.014
	(−0.35)	(−0.43)	(−0.63)	(−0.76)	(−0.66)	(−0.67)
HOSTILE	−0.412***	−0.393***	−0.415***	−0.389***	−0.411***	−0.418***
	(−3.88)	(−3.72)	(−3.93)	(−3.70)	(−3.88)	(−3.72)
TENDER	0.072**	0.071**	0.072**	0.072**	0.071**	0.073**
	(2.26)	(2.28)	(2.34)	(2.39)	(2.28)	(2.32)
MBIDDERS	−0.562***	−0.554***	−0.562***	−0.551***	−0.561***	−0.554***
	(−9.39)	(−9.24)	(−9.26)	(−9.10)	(−9.25)	(−9.14)
PUBLICACQ	0.041	0.038	0.042	0.038	0.041	0.040
	(1.52)	(1.39)	(1.56)	(1.38)	(1.52)	(1.47)
SAMESIC	0.032*	0.032*	0.024	0.025	0.025	0.029
	(1.71)	(1.79)	(1.30)	(1.35)	(1.34)	(1.55)
Number of obs.	860	860	860	860	860	860
Pseudo R^2	0.22	0.22	0.23	0.23	0.23	0.23

Note: Coefficients represent the marginal effects on the dependent variable. The model is estimated using robust standard errors, with clustering at the 4-digit-SIC industry level. Year-dummies are included (unreported). z-statistics in parentheses: * p<0.10, ** p<0.05, *** p<0.01.

variables all show the expected signs: *MBIDDERS* and *HOSTILE* both affect the completion rate negatively, while *TENDER* has a positive and significant coefficient. As mentioned in the preceding section, these effects have been documented in the existing literature. The takeover premium (*ITP*) is positively related to merger completion although this relation is statistically insignificant.

The second model shows the estimation results for Hypothesis 1. The completion rate is not associated with the recommendation level (*REC*). The signs of the other variables are unaltered after the inclusion of *REC*.

With the third model we tested Hypothesis 2. We found that the target price expected return (*TPER*) was strongly negatively related to the completion rate of mergers, which implies that a relatively higher target price is associated with a lower probability of completion. The reported coefficients represent the marginal effects on the dependent variable. They show that the economic significance of this relationship is not trivial: a one percent increase in the target price expected return is associated with a six percent decline in the probability of completing the merger.[55] The reported results did not meaningfully change when we included both *REC* and *TPER* in the regression specification (see Table 5.4, model 4).

In models 2, 3, and 4 we regressed the completion rate on different facets of the analyst opinion while controlling for the initial takeover premium. To make the notion of analyst target prices as a benchmark more explicit, we replaced both *TPER* and *ITP* by the Relative Initial Target Price (*RITP*) in model 5. The result is equivalent to the outcome of Model 3. In model 6 we included *RITP_dum*. The results indicate that a merger in which the *ITP* exceeds the *TPER* has a 5.4% higher likelihood of completion.

To summarize Table 5.4, we found support for Hypothesis 2, but not for Hypothesis 1. Analyst opinions do have value in estimating the probability of takeover success. Although the average recommendation level does not turn out to be a good predictor, the target price seems to be an effective indicator for investors to evaluate the chances of takeover completion: the higher the target price, the smaller the likelihood of takeover completion.

5.4.2 Opinion divergence

Table 5.5 reports the effects of opinion dispersion. Again, the baseline model includes only control variables. The tests of Hypotheses 3 and 4 are displayed in model 2 and 3, respectively. The results of model 2 show that the sign of *DIVOP_REC* is negative, as expected, but statistically not significant. *DIVOP_TP*, however, is statistically significantly associated with the completion rate of mergers. When we include both variables together (model 4), again, only *DIVOP_TP* is statistically significant.

Table 5.5 indicates that, as in Table 5.4, only information from target prices seems to be a reliable predictor for takeover completion probabilities. The higher the divergence in target prices, the lower the completion rate. This finding is in line with our expectations in Hypothesis 4.

55. Although *TPER* is both economically and statistically significant, the increase in the model's R^2 is very modest. This implies that the variable does not add greatly to the explanatory power of the model.

Table 5.5 Estimation results for Hypotheses 3 and 4

	Dependent variable: COMPLETED			
	Model 1	Model 2	Model 3	Model 4
DIVOP_REC		−0.019		−0.012
		(−0.54)		(−0.34)
DIVOP_TP			−0.071**	−0.069***
			(−2.06)	(−2.00)
ITP	0.042	0. 043	0.045**	0.046**
	(1.22)	(1.23)	(1.40)	(1.40)
LNSIZE	0.003	0.004	−0.001	−0.001
	(0.40)	(0.46)	(−0.10)	(0.05)
CASH	−0.011	−0.011	−0.019	−0.019
	(−0.35)	(−0.35)	(−0.57)	(−0.56)
HOSTILE	−0.412***	−0.409***	−0.414***	−0.412***
	(−3.88)	(−3.83)	(−3.89)	(−3.86)
TENDER	0.072**	0.072**	0.072**	0.072**
	(2.26)	(2.33)	(2.35)	(2.40)
MBIDDERS	−0.562***	−0.531***	−0.554***	−0.555***
	(−9.39)	(−9.45)	(−9.25)	(−9.20)
PUBLICACQ	0.041	0.040	0.043	0.042
	(1.52)	(1.48)	(1.57)	(1.54)
SAMESIC	0.032*	0.032*	0.028	0.029
	(1.71)	(1.71)	(1.54)	(1.54)
Number of obs.	860	860	860	860
Pseudo R^2	0.22	0.22	0.22	0.22

Note: Coefficients represent the marginal effects on the dependent variable. The model is estimated using robust standard errors, with clustering at the 4-digit-SIC industry level. Year-dummies are included (unreported). z-statistics in parentheses: * p<0.10, ** p<0.05, *** p<0.01

5.4.3 Combining the results

Summarizing, we found support for Hypotheses 2 and 4, which relate takeover completion to analysts' target prices. After controlling for the takeover premium, our results show that target price expected returns can predict the probability of takeover completion. This is in line with our expectation that investors are more willing to sell their shares when they are positively surprised by the offer, as indicated by relatively low target prices and *TPER*s. Opinion divergence is negatively related to merger success, when measured by the coefficient of variation of the average target price. As expectations about future growth are more dispersed, more investors will – everything else being equal – be inclined to reject a given takeover offer.

In contrast, we found no support for Hypothesis 1 and 3. Analyst recommendations do not seem to contain information about takeover completion, neither pertaining to recommendation levels, nor to divergence in recommendations.

5.4.4 Robustness of the results

Target price expected return

(i) In addition to the average published level of analyst opinions, Jegadeesh et al. (2004) also studied the quarterly revision in analyst recommendations. They found that the quarterly change in the level of analyst opinions is positively associated with three-to-twelve month future returns. We applied these insights to target prices and expect that investors who anticipated a higher rate of return as analysts became more bullish in the previous quarter would be less willing to give up their shares for a given price. We constructed a measure which captured the change in the *TPER* (in percentage points) over a 13-weeks period prior to our measurement date (four weeks prior to takeover announcement):[56]

(5.4) $TPER\_INC_i$ = *mean TPER of company i four weeks prior to announcement – mean TPER of company i seventeen weeks prior to announcement*

The number of observations dropped to 830 as 30 observations lacked sufficient target price data. Model 1 of Table 5.6 shows the results of the inclusion *TPER_INC*. In line with our previous results on the *TPER* the increase in the target price expected return (*TPER_INC*) is negatively related to eventual merger completion.

(ii) Analysts may have inside information about upcoming takeover announcements, and this information may already be incorporated into the *TPER* four weeks prior to the actual announcement. Although we did not find a statistically significant increase in analyst opinions prior to our point of measurement, we nevertheless modified our specifications and replaced *TPER* by a new variable, for which we used both the average target price and the share price eight weeks prior to the announcement of the takeover offer. The sample size decreased with four mergers since these target companies did not have eight weeks of target price history. All reported relations remain highly significant (not reported in Table 5.6).

(iii) Table 5.2 illustrated a 12 percentage point difference between the average and the median *TPER*. Model 2 of Table 5.6 shows the effect of the inclusion of the median *TPER* instead of the average *TPER*. Again, all significant results reported in this chapter remain intact.

56. Thirteen weeks is equivalent to the timespan of one quarter which is used by Jegadeesh et al. (2004).

Table 5.6 Estimation results for robustness tests

	Dependent variable: COMPLETED						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
TPER_INC	−0.057**						
	(−2.38)						
TPER				−0.049***		−0.075***	
				(−3.55)		(−4.59)	
DIVOP_TP					−0.083***		−0.102***
					(−2.77)		(−2.94)
Median TPER		−0.054***					
		(−3.14)					
DIVOP_DIF_TP			−0.118**				
			(−2.06)				
ITP	0.047	0.045	0.053	0.071**	0. 073**	0.049	0.052
	(1.35)	(1.32)	(1.60)	(2.46)	(2.55)	(1.41)	(1.56)
LNSIZE	0.002	−0.003	0.003	−0.001	0.002	−0.002	0.003
	(0.30)	(−0.31)	(0.45)	(−0.18)	(0.25)	(−0.33)	(0.40)
CASH	−0.014	−0.017	−0.022	−0.012	−0.011	−0.019	−0.012
	(−0.44)	(−0.52)	(−0.66)	(−0.42)	(−0.39)	(−0.61)	(−0.38)
HOSTILE	−0.405***	−0.416***	−0.402***	−0.521***	−0.526***	−0.404***	−0.407***
	(−3.79)	(−3.97)	(−3.73)	(−4.74)	(−4.64)	(−4.03)	(−4.02)
TENDER	0.070**	0.072**	0.072**	0.079***	0.079***	0.075**	0.075**
	(2.21)	(2.30)	(2.41)	(2.98)	(2.99)	(2.47)	(2.47)
MBIDDERS	−0.556***	−0.562***	−0.557***	−0.548***	−0.539***	−0.567***	−0.555***
	(−9.13)	(−9.30)	(−9.33)	(−10.51)	(−10.49)	(−9.94)	(−9.83)
PUBLICACQ	0.037	0.042	0.041	0.044*	0.046*	0.044*	0.045*
	(1.37)	(1.56)	(1.51)	(1.83)	(1.93)	(1.68)	(1.69)
SAMESIC	0.032*	0.026	0.031*	0.029*	0.032*	0.025	0.033*
	(1.69)	(1.41)	(1.68)	(1.80)	(1.96)	(1.32)	(1.75)
Number of obs.	830	860	860	1084	1084	940	940
Pseudo R^2	0.22	0.23	0.23	0.24	0.24	0.24	0.23

Note: Coefficients represent the marginal effects on the dependent variable. The model is estimated using robust standard errors, with clustering at the 4-digit-SIC industry level. Year-dummies are included (unreported). z-statistics in parentheses: * p<0.10, ** p<0.05, *** p<0.01

Opinion divergence

We have shown that the level of disagreement regarding a future stock price is negatively related to the completion rate of announced mergers. This is consistent with our expectations, since a higher divergence will deter more investors from agreeing to a given offer. Although the *TPER* and its dispersion are positively correlated (as noted in footnote 37) the established

relation effect may still be caused by the existence of low target prices instead of high target prices. We therefore constructed two different variables. The first measured the difference between the highest published target price and the mean published target price, and the second measured the difference between the mean target price and the lowest published target price. Only the first variable was statistically significant and negative when we included it in the estimation as presented in model 3 of Table 5.6. The difference between the mean target price and the lowest target price was not significantly related to merger completion (not reported).

Sampling and controls

(i) Our results on the *TPER* are robust to various data selection specifications. When we included all mergers with at least one target price or recommendation available our sample increased to 1084 observations. The measures for opinion divergence in these cases equaled zero. Models 4 and 5 of Table 5.6 show the results with respect to the *TPER* and the *DIVOP_TP*. Both variables remained highly significant. Results for the recommendation level and dispersion did not change (not reported in table).
(ii) Because of conflicting price data in our data sources, we removed 80 cases. Rerunning regressions including these cases with inconsistent price data across SDC and Datastream did not alter our results qualitatively, see models 6 and 7 of Table 5.6.
(iii) Furthermore, we verified that the inclusion of the absolute number of bidders (instead of the dummy variable *MBIDDERS*) did not qualitatively change the reported results. The same holds for the inclusion of a dummy variable if a deal was fully financed with cash (instead of the continuous variable *CASH*).

5.5 Limitations

A limitation of our study is that the relation between target prices and target completion may be an endogenous one. The previous chapter showed that the level of a takeover bid is related to the average target price. It is possible that the target price impacts the takeover price and thereby the merger completion. Chapter 4, however, showed that the relation between the target price and the takeover bid was not one-to-one. Further, we controlled for the takeover premium in our analysis.

A second limitation is the use of average target prices. Prior research has shown that investors place different weights on different analysts; some analysts may suffer from a conflict of interest (see for example Agrawal and Chen, 2008) and may therefore be less relevant to investors. Moreover, Bae et al. (2008) showed that local analysts are more knowledgeable than foreign analysts. Future research may be directed to incorporating these differences between analysts.

A last limitation concerns the sample period. We pointed out in the previous chapter that there is a greater likelihood that analyst opinions suffered from conflicts of interest in the pre-2004 period. We nevertheless opted for inclusion of this period in our sample, to increase the statistical power of our tests. The dependent variable (completion) is fairly often equal to "1", hence, a sample limitation would go at the cost of data variation.

5.6 Discussion and conclusion

In this chapter we examined the relationship between the completion rate of takeovers and analyst opinions about the target companies.

We predicted that the level of analyst recommendations and target price expected returns is negatively related to the probability of completion. Investors who expect high growth potential of target shares in the absence of an acquirer are – all else being equal – less willing to sell their shares to an acquirer. This hypothesized relation appears to be both economically and statistically significant if judged by analysts' target prices. Analyst opinions that are measured by recommendation levels are, however, unrelated to takeover completion.

A second angle of the chapter was the opinion divergence among investors, proxied by the divergence of analyst opinions. We hypothesized that the completion rate is negatively associated with the degree of opinion divergence. The rationale for this expectation is that – everything else being held constant – the wider the divergence of opinions among target shareholders, the higher the likelihood that some shareholders will reject a given offer. We indeed found a negative and statistically significant relation using target price data. Divergence in recommendation levels was not significantly related to completion.

The overall finding that target prices can help to predict completion rates while recommendation levels are of less importance is consistent with recent findings. Gell et al. (2010) suggested that target price changes are issued by analysts when outside pressures prevent them from changing recommendation levels. In other words, analysts who do not wish to put the relationship with companies at stake, can keep recommendation levels intact while decreasing the target price. This suggests that target prices may contain more information than recommendations, a finding which is also illustrated by Asquith et al. (2005), Kerl and Walter (2008) and Huang et al. (2009). Furthermore, the denomination of target prices may increase the use of target prices over the use of recommendations.

In this chapter we have identified analyst target prices as a significant predictor for merger completion. This may suggest that target prices are considered to be an important benchmark which needs to be met or surpassed in order to get approval by target shareholders. Such a benchmark could also be relevant for practitioners in the field of mergers and acquisitions. This study provides the acquiring company and its advisors with an indicator that can be used

in deal-structuring and in assessing the likelihood of takeover completion before the actual announcement of a deal.

A recommendation for future research is to find the reason why only target prices are related to merger completion. Some possible explanations have been given in this chapter, such as the limitations in expressing extreme recommendations and conflicts of interest which may be more apparent in recommendation levels. However, future research can be used to pinpoint the most likely reason.

Chapter 6

Testing the fire-sale FDI hypothesis for the European financial crisis[57]

6.1 Introduction

The most recent financial crisis triggered tectonic shifts in the economic, social and political landscape, particularly in the European Union (EU). Countries like Greece, Portugal, Italy, Ireland, and Spain experienced a sudden hike in their sovereign bond spreads, reflecting the market's perception of increased economic, financial and political risk. Other EU countries such as Germany saw their bond spreads reach historic lows together with a strong economic outlook. These developments created the opportunity to study determinants of foreign direct investment (FDI) and cross-border merger and acquisition (M&A) before and during the crisis, since economic differences between countries widened, while formal institutional relations between countries did not change fundamentally. Only a few studies on FDI have focused explicitly on such macroeconomic shocks. These studies primarily investigated the effects of the 1997-1998 East Asian financial crisis (Acharya et al., 2010; Aguiar and Gopinath, 2005; Krugman, 2000) and, to a lesser extent, the 1995 Latin American financial crisis (Krugman, 2000). Alquist et al. (2013) provided the most recent empirical evidence from 1990 to 2007; however, their study used empirical data from only sixteen emerging markets, and not from European countries. To the best of our knowledge, there is no study that focuses on the current European crisis.

This chapter investigates how the financial crisis affected the selling and buying of corporate assets between EU countries. In particular, we test Krugman's (2000) 'fire-sale FDI' hypothesis that describes a surge in foreign acquisitions of target firms from crisis countries during a financial crisis. According to this concept, firms from crisis countries are sold at prices below their fundamental value to companies from countries that are less affected by the crisis. Krugman (2000) noticed that the capital flight out of East Asian countries during the 1997-1998 crisis went together with a substantial increase of inward FDI.[58] He observed

57. This chapter is a revised version of a similarly titled article. This article is co-authored by D.F. Gerritsen, G. Kling, and U. Weitzel. A draft version of this article has been presented at the International Conference on the Global Financial Crisis, Southampton, April 26, 2013. The article is accepted for publication at the Journal of International Money and Finance. This journal is listed in the Social Sciences Citations Index.

58. The term 'FDI' might be confusing in this context. In FDI, the alternative to M&A is greenfield investment. However, greenfield FDI is, by definition, not an acquisition of existing businesses and thereby does not lend itself to the purchase or sale of targets in a

a similar pattern in Mexico and Argentina during the Latin American crisis of 1995. Krugman (2000) suggested that corporate assets in crisis countries are sold to foreign investors at discounted prices due to tightening credit conditions and a rapid deterioration in macroeconomic stability.[59]

Several important policy questions in the EU, ranging from a more integrated financial market to the desirability of more intra-European FDI, hinge crucially on the existence of fire-sale FDI during the financial crisis (e.g., Coeurdacier et al., 2009). We therefore focus on fire-sale FDI and three of its key implications: *(i)* more cross-border sales of corporate assets from countries that were hit hardest in the crisis; *(ii)* lower prices for corporate assets in crisis countries; and *(iii)* more cross-border sales and lower prices when credit conditions tighten and macroeconomic conditions deteriorate.

Establishing evidence of fire-sales in European crisis countries is challenging. First, we had to identify whether fire-sale prices of corporate assets were below their fundamental value. It is difficult, if not impossible, to predict fair values of corporate assets under normal conditions, let alone during a financial crisis. We sidestepped this issue by comparing the prices of corporate assets from crisis countries that were sold during the crisis with prices before the crisis and with prices from non-crisis countries. Second, FDI in Europe during the past 20 years clustered over time because of two merger waves; these waves represented up to 80% of global FDI flows (Stiebale and Reize, 2011). A surge in FDI in crisis countries may seem considerable in relation to pre-crisis levels of the same country, but it may not be significant when viewed against the overall increase of merger activity in Europe. We tackled this issue by 'de-cycling' country-specific cross-border activity with the European merger cycle. Finally, the match between home and host countries in cross-border mergers is not random. Particularly during a crisis, many country-pair combinations of acquirers and targets may be avoided consistently. The literature on FDI and cross-border M&A suggests a number of antecedents that play an important role in the (non-random) determination of foreign investment flows. Hence, if we analyzed observed FDI flows at face value, we ran the risk of a selection bias. To correct for this potential bias, we used a Heckman approach as a start of the analysis that estimates the propensity of an acquirer country to be part of the sample, before considering the determinants for selecting target countries.

We analyzed a large panel dataset of corporate transactions in 27 EU countries from 1999 to 2012. The cross-section and the time line of the sample allowed us to compare cross-border

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fire-sale operation. This is the reason why other fire-sale FDI studies also use M&A data (e.g. Aguiar and Gopinath, 2005; Alquist et al., 2013). Despite the focus on cross-border M&A, the pertinent literature refers to 'fire-sale FDI' since the term was first coined by Krugman (2000). To relate to this line of literature we stay within the same terminology, i.e. 'fire-sale FDI' and not 'fire-sale M&A'. Moreover, other studies that use M&A data also refer to fire-sale FDI in their title (Aguiar and Gopinath, 2005; Alquist et al., 2013). In this tradition, we therefore also refer to fire-sale FDI in the title.

59. Krugman (2000) cites anecdotal evidence from the financial media, which often expresses this idea, especially in the context of financial crises. His approach is related to earlier work from Shleifer and Vishny (1992).

transactions in crisis countries with non-crisis countries both before and during the crisis. As mentioned above, we focus on three distinct implications of fire-sales. We started with the question whether cross-border sales of corporate assets from the crisis countries Greece, Portugal, Italy, Ireland, and Spain did change during the crisis. Despite some weak indications for more sales to foreign firms, we did not reliably detect a higher share of cross-border merger activity in these countries, neither over the whole sampling period, nor in the crisis period. We found that cross-border activity generally declined in the crisis, which also applied to crisis countries. We then reconsidered our definition of crisis countries and used sovereign risk measurements, macroeconomic demand conditions and credit conditions to identify countries in distress. Using this approach, we did find evidence consistent with the fire-sale hypothesis for countries with higher default risk and lower economic demand during the crisis. However, for countries with lower domestic credit, which provided the most important 'test bed' for the fire-sale hypothesis, the results were in conflict with the concept of a sell-out of corporate assets in times of a liquidity shortage. To assess whether corporate assets were traded at a discount, we investigated the premiums paid for targets. Our results show that premiums were generally lower in crisis countries, but they did not decline any further during the crisis. When using sovereign risk measurements, macroeconomic demand conditions, and credit conditions, we found evidence for depressed prices if access to credit was low in the target country. This effect, however, was not stronger in the crisis period, which, again, was not consistent with fire-sale FDI. Instead, it indicated that fire-sales are "*business as usual*" (Alquist et al., 2013: 20) and not particularly driven by financial crises.

To summarize these considerations, we found little evidence for the view of fire-sales of companies in crisis countries to supposedly wealthier non-crisis countries, as sometimes expressed in the business press. Our results for Europe are very similar to recent studies of Chari et al. (2010) and of Alquist et al. (2013) for emerging markets, both of whom found little evidence for (more) fire-sale FDI in periods of crisis. The evidence of this chapter rather points to cross-border capital arbitrage by multinationals (Baker et al., 2009). In fact, we found that acquirers came from countries with relatively easy access to financial capital as witnessed by high market-to-book ratios and currency appreciation. Acquirers seemed to invest their capital in target countries with lower market-to-book ratios by paying lower premiums in countries with domestic credit constraints. Crucially, acquirers followed this investment pattern not only during a crisis.

Our study contributes to the empirical FDI literature that investigates the effects of financial crises. Aguiar and Gopinath (2005) provided the first large-scale empirical evidence for fire-sale FDI and M&As during a financial crisis. Despite a decrease in domestic M&A activity, they found a 92% increase of FDI into East Asia during the 1997-1998 crisis. Particularly companies with liquidity constraints were purchased, which supports the notion of fire-sales. Acharya et al. (2010) developed a theoretical model and provided empirical tests

which showed a similar pattern of increased inbound FDI and foreign ownership to the findings of Aguiar and Gopinath (2005). Both studies, however, focused on the East Asian crisis. Baker et al. (2009) empirically compared the fire-sale hypothesis, "*under which FDI flows reflect the purchase of undervalued host-country assets*" (p.339) with the 'cheap financial capital' hypothesis, "*in which FDI flows are an opportunistic use of the relatively low-cost financial capital available to overvalued source-country firms*" (p.338). The authors limited their direct comparison to a preliminary analysis of FDI data (1975 to 2001) in which they found that FDI flows were positively related (unrelated) to the average market-to-book ratios of the acquirer (target) countries, consistent with the cheap financial capital hypothesis and contrary to the fire-sale hypothesis. In their sample, one of the countries involved was always the US, and as the authors' primary focus was on mispricing, they did not analyze financial crises. Alquist et al. (2013) used M&A data from the Thomson Reuters SDC database (1990 to 2007) to analyze fire-sale FDI in sixteen emerging economies during banking crises. They analyzed several aspects of foreign acquisitions, including the percentage, duration and reselling rate of foreign holdings, the role of external finance, and the identity of foreign buyers. Similar to our results, the authors found little evidence for fire-sale FDI in a crisis when compared to non-crisis levels. They concluded that "*contrary to the conventional wisdom, fire-sale FDI [...] seems to be 'business as usual' rather than characteristic features of FDI undertaken during financial crises in emerging market economies*" (Asquith et al., 2013: 20).

We have add to this literature by focusing on a different region, namely, Europe, and on the most recent financial crisis. Moreover, methodologically, we correct both for a possible sample selection bias using a Heckman procedure and for the clustering of FDI over time due to merger waves. As a more general contribution, this chapter also adds to our understanding of cross-border M&As, particularly in Europe. The importance of cross-border M&As is reflected in a burgeoning literature on their antecedents and consequences (e.g., Erel et al., 2012; Rossi and Volpin, 2004). Our analysis contributes to several antecedents that the literature has shown to play an important role in cross-border M&As. The first is a difference in capital supply and valuation between the acquirer and target country, which typically grants the acquirer easier access to relatively low-cost capital. A number of studies support this motivation theoretically and empirically (Baker et al., 2009; Erel et al., 2012). Our results also show that easy (difficult) access to domestic credit and high (low) valuations of equity markets are important determinants for acquirers (targets). A second antecedent is the relative difference in market development and growth prospects. Di Giovanni (2005) showed that the ratio of financial market capitalization to GDP in the acquirer country is positively related to the likelihood of firms investing abroad. Target countries with lower GDP per capita coupled with higher GDP growth rates (both in relative terms) also attracted more cross-border M&As (e.g., Norden and Posch, 2012). Our analyses confirm these findings. Differences in corporate governance and related institutions are a third possible determinant for cross-border M&As.

Rossi and Volpin (2004) showed that cross-border M&As often involved a target operating in an environment with less shareholder protection, and they implied that the transferal of the same level of investor protection to the target enhances value. In line with this, Chari et al. (2010) contended that companies from developed countries enjoy stock price gains after acquiring targets that are exposed to a weaker institutional environment.[60] Although we included quality of governance in our analysis, our results do not show a significant association with cross-border M&As. One reason for this may be that the differences in governance are less pronounced in our sample of EU countries. Cultural proximity is another, fourth antecedent. Ahern et al. (2012) found that cultural differences measured by trust, hierarchy and individualism are negatively related to bilateral merger activities. Our results confirm that similarities in language and religion also play a role, at least in a European setting.

This chapter is structured as follows. Section 6.2 describes the method of sampling and methodological challenges, while section 6.3 explains the construction of variables. Section 6.4 presents and discusses the empirical results, and section 6.5 concludes the chapter.

6.2 Sampling and methodology

Sampling

In line with previous studies (e.g., Alquist et al., 2013; Erel et al., 2012), we focused on M&As rather than all forms of FDI. Although the use of M&A data might understate FDI, mergers play a predominant role. Stiebale and Reize (2011: 155) contended that "*cross-border mergers and acquisitions (M&As) constitute a large share of global FDI flows reaching 80% in the years of merger waves.*" There are several reasons why we did not use FDI data, all of which relate to data quality. First, in contrast to M&A data, which refers to individual transactions, FDI data was not available at such a fine-grained micro level (Shimizu et al., 2004). Second, the measurement of the non-merger component of FDI differed widely across countries, owing to different definitions of foreign investment, different geographic breakdowns of FDI flows, and varying time lags between FDI data recording and actual investment (Erel et al., 2012). Third, non-merger FDI, which is often related to greenfield investment, can take much longer to materialize than M&As. Different realization times distorted econometric relationships between non-merger FDI and other observables. Fourth, there was an issue concerning consistency when using non-merger FDI. Using M&A data, we could easily compare cross-border and domestic transactions. With non-merger FDI, however, it was difficult to find a measure for domestic investment that was comparable (Kling et al., 2013).

60. Further, supporting evidence shows that acquirers from countries with stricter governance pay a higher premium for cross-border targets (Bris and Cabolis, 2008) and that Tobin's Q of the industry in which a target is active increases after a cross-border merger (Bris et al., 2008).

We employed the Thomson Reuters SDC database to identify M&As. The study considers deals announced from January 1999 to December 2012. We chose 1999 as starting date, as this year marked the introduction of the Euro in several EU countries. We only included M&As involving acquirer and target countries from the 27 EU member states (as of 2012). The sample excluded financials, utilities, or government agencies owing to differences in reporting and market regulation (as in, e.g., Erel et al. 2012). We excluded LBOs, spinoffs, recapitalizations, self-tenders, exchange offers, and repurchases of own shares. Our final sample included 76,479 M&As, out of which 19,024 were cross-border deals representing 24.9% of all transactions. An inspection of the sample reveals two methodological challenges.

Methodological challenge #1: Potential selection bias

Table 6.1 shows the number of mergers per country pair over the entire investigation period. The first column denotes the acquirer country and the first row the target country. The columns 'Total' and 'Total (%)' report the number of all cross-border mergers per acquirer or target country and their fraction of all inbound or outbound mergers in percent. Note that many of the countries that experienced severe problems during the financial crisis, namely, Greece, Ireland, Italy and Portugal and Spain (Beetsma et al., 2013; Kalbaska and Gatkowski, 2012), were net providers of targets. Spain was a target in 6.9% of all cross-border mergers, but an acquirer in only 3.5%. Portugal was also twice as often a target compared to an acquirer country (1.7% v 0.8%, respectively). Italy was a target in 5.7% of all inbound mergers, but an acquirer in only 5%. In contrast, many countries that did not get into difficulties in the sovereign debt markets (Beetsma et al., 2013) were net providers of acquirers. Dutch firms, for example, were acquirers in 10.1% of all cases, but targets in only 7%. Similar ratios also applied to Sweden, the UK, and France, with 9.4% v 6.3%, 15.4% v 12.9%, and 12.8% v 10.5%, respectively.

All countries had at least once been an acquirer and also a target in a cross-border merger. Malta provided the fewest targets to foreign investors (15), while acquirers from Bulgaria were the least active abroad (7). The UK was the most active cross-border acquirer (2931) and also provided most targets (2453).

Due to the large variation of merger cases per country, merger-active countries would be overweighed in simple cross-sectional estimations with individual mergers as the unit of observation. We therefore followed Erel et al. (2012) and aggregated all mergers between two countries into an ordered country-pair panel. Thus, the unit of observation is one cell of Table 6.1, one for each quarter in the sample period from 1999 to 2012. Note that UK-France and France-UK are two ordered country pairs, reflecting different bilateral flows between the two countries. Furthermore, we correct for clustering at the country-pair level in all estimations.

Table 6.1 also shows that many country-pairs did not have one merger in the whole sample period. In 212 out of 729 ordered country pairs (29%), we did not observe any

Table 6.1 Number of mergers in the EU per country pair from 1999 to 2012

Target:	Austria	Belgium	Bulgaria	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxembourg	Malta	Netherlands	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	United Kingdom	Total	Total (%)
Acquirer:																													
Austria	806	18	26	0	48	11	2	10	31	354	3	54	4	38	2	0	3	0	27	35	2	34	24	23	13	25	42	829	4.4%
Belgium	12	914	6	0	19	13	3	12	265	128	6	9	6	42	1	1	26	0	171	15	11	10	6	5	49	20	109	945	5.0%
Bulgaria	0	0	221	0	0	0	0	0	0	0	1	2	0	0	1	1	0	0	1	0	0	1	0	0	0	0	0	7	0.0%
Cyprus	0	0	7	120	5	2	2	1	0	6	17	0	0	2	1	0	0	0	2	5	1	13	0	0	2	2	11	79	0.4%
Czech Republic	3	0	5	0	558	0	1	0	2	17	0	6	0	1	0	0	0	0	3	10	0	3	27	2	1	2	7	90	0.5%
Denmark	15	16	5	2	12	1447	3	55	46	118	1	6	7	30	6	25	1	0	51	40	4	7	4	1	37	232	99	823	4.3%
Estonia	0	0	1	0	1	1	170	15	1	0	3	1	0	0	23	22	0	0	0	3	0	0	0	0	0	0	0	71	0.4%
Finland	15	17	1	0	18	52	74	2078	35	140	1	12	5	32	22	31	0	1	53	44	1	5	10	3	17	284	60	933	4.9%
France	31	249	13	2	61	49	4	26	7593	418	20	31	31	218	4	4	24	2	185	99	52	32	11	5	309	87	472	2439	12.8%
Germany	336	132	23	3	123	110	6	61	380	8562	16	66	23	214	8	11	27	1	302	126	15	33	26	12	155	158	448	2815	14.8%
Greece	6	6	33	37	3	3	0	2	8	19	997	10	3	13	0	0	1	0	9	8	1	30	2	0	15	6	20	235	1.2%
Hungary	4	0	7	0	14	0	0	1	3	5	0	374	0	3	0	1	0	0	1	15	2	14	6	1	0	0	2	79	0.4%
Ireland	8	22	5	0	4	11	1	8	26	34	0	6	555	9	2	0	0	0	37	7	3	1	3	0	6	19	374	586	3.1%
Italy	25	25	12	0	22	5	2	14	189	176	17	13	6	3053	4	3	7	1	43	33	16	21	7	4	140	32	137	954	5.0%
Latvia	0	1	0	1	0	0	13	2	1	3	0	0	0	0	100	13	0	0	0	1	0	0	0	0	0	2	1	38	0.2%
Lithuania	0	0	0	0	0	3	12	2	0	1	0	1	0	0	14	158	0	0	0	3	0	0	3	0	0	5	1	45	0.2%
Luxembourg	8	14	5	0	7	9	1	3	43	70	4	4	1	22	0	1	28	0	23	23	3	5	4	0	12	12	30	304	1.6%
Malta	0	0	0	0	0	0	0	0	2	1	0	0	1	2	0	0	0	16	0	0	1	0	0	0	0	2	3	12	0.1%
Netherlands	34	243	13	4	53	58	5	40	199	403	16	34	27	102	9	7	15	2	2695	58	27	32	13	4	138	84	304	1924	10.1%
Poland	5	1	5	3	32	6	2	2	4	30	0	11	3	5	1	24	1	0	5	1534	0	13	8	0	11	4	4	180	0.9%
Portugal	2	2	0	0	1	0	0	0	12	12	2	0	2	4	0	0	0	0	1	4	663	1	0	0	102	0	11	156	0.8%
Romania	1	0	3	1	3	0	0	0	2	0	0	4	0	2	0	0	0	0	0	2	0	225	3	0	3	0	4	28	0.1%
Slovakia	3	0	0	0	19	0	0	0	0	1	0	6	0	1	0	0	0	0	0	0	0	0	53	1	2	0	0	33	0.2%
Slovenia	3	0	0	0	1	0	0	0	2	6	1	0	0	7	0	0	0	0	1	2	0	1	2	171	2	1	2	31	0.2%
Spain	7	13	2	0	18	8	0	18	151	78	4	3	6	80	0	3	5	0	33	28	135	2	2	0	4255	9	67	672	3.5%
Sweden	22	44	7	2	36	304	49	334	135	194	7	14	15	51	27	29	8	4	104	63	9	9	8	9	56	3825	245	1785	9.4%
United Kingdom	45	115	16	9	55	104	8	65	453	570	21	34	293	202	6	6	10	4	287	83	47	35	15	3	234	211	16284	2931	15.4%
Total	585	918	195	64	555	749	188	671	1990	2784	140	327	433	1080	131	182	128	15	1339	707	330	302	184	73	1304	1197	2453		
Total (%)	3.1%	4.8%	1.0%	0.3%	2.9%	3.9%	1.0%	3.5%	10.5%	14.6%	0.7%	1.7%	2.3%	5.7%	0.7%	1.0%	0.7%	0.1%	7.0%	3.7%	1.7%	1.6%	1.0%	0.4%	6.9%	6.3%	12.9%		

Note: The column 'Total' reports the totals only for cross-border mergers. The column 'Total (%)' expresses the cross-border mergers for a respective country as a percentage of the total cross-border merger activity.

merger activity. Missing activity points towards a potential selection bias, where firms from particular countries self-selected into a sample of 'merger-active countries'. This is consistent with the literature, which showed that cross-border M&As are not random, but depend on many macroeconomic and institutional factors both in the target and acquirer country (Bris and Cabolis, 2008; Bris et al. 2008; Erel et al., 2012; Rossi and Volpin, 2004). For example, acquirers from Bulgaria only merged with targets in six foreign countries. All other country pairs with Bulgaria as acquirer self-select into a group without observed mergers. According to the literature, we cannot exclude that unobserved macroeconomic or institutional factors have to exceed a particular threshold before a country is observed as acquirer country in a specific country pair. Particularly in times of crisis, countries that are in financial distress may be unobserved as acquirers, effectively biasing the sample towards non-crisis countries. To correct for this potential selection effect, we estimated a Heckman model (Heckman, 1979). In a first step, we estimated with maximum likelihood whether a particular country pair was actively merging, using the following selection equation.

$$(6.1)\ Z^{*}_{TA,t} = \alpha + W_{A,t}{}'\beta + \varepsilon_{TA,t}$$

We used an indicator variable for merger activity defined as Z=1 if $Z^{*}_{TA,t}>0$ and Z=0 otherwise. $Z^{*}_{TA,t}$ is a latent variable for an ordered country pair with target T and acquirer A in quarter t. It reflects the propensity to be included in the merger sample. The vector $w_{A,t}$ contains k covariates with macro-economic and institutional factors of the acquiring country which potentially affect the propensity to become an acquirer of foreign targets. The logic behind this is that, for firms to go abroad, the acquirer country needs to offer a sufficient set of supporting characteristics, as captured in the selection equation 6.1. If this condition is met, both acquirer and target country characteristics determine the specific direction and magnitude of merger activity in the outcome equation specified below.[61] The main results of this chapter are also robust to the additional inclusion of corresponding target country covariates ($w_{T,t}$). β is a vector of coefficients and $\varepsilon_{TA,T}$ a random disturbance for the selection equation.

In a second step, we estimated the following outcome equation, where $Y_{TA,t}$ represents one of the two dependent variables, either the proportion of cross-border mergers in a country pair or the target premium.

$$(6.2)\ Y_{TA,t} = \gamma + X_{TA,t}{}'\delta + u_{TA,t}$$

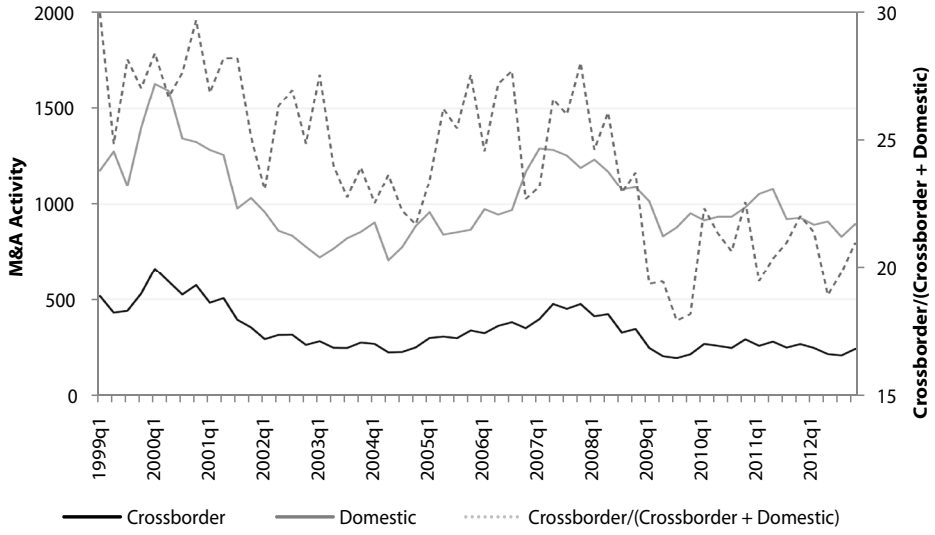
Country-pair specific macro-economic, institutional, financial, and deal-related variables refer to the vector $X_{TA,t}$. Section 6.3 provides detailed definitions of these variables. δ is a vector of coefficients and $u_{TA,t}$ a random disturbance for the outcome equation.

61. Baker et al.'s (2009) cheap financial capital hypothesis uses a similar argument.

Methodological challenge #2: Merger cycles

Figure 6.1 depicts the total number of M&A deals in Europe from 1999 to 2012, which exhibit a cyclical pattern. The period includes the peak of the fifth merger wave in 2000, the subsequent burst of the 'internet bubble', and the complete sixth merger wave from 2004 to 2007. There is a clear decline in total and in cross-border M&A activity after the start of the financial crisis.

Figure 6.1 Cross-border and domestic M&As in the EU from 1999 to 2012



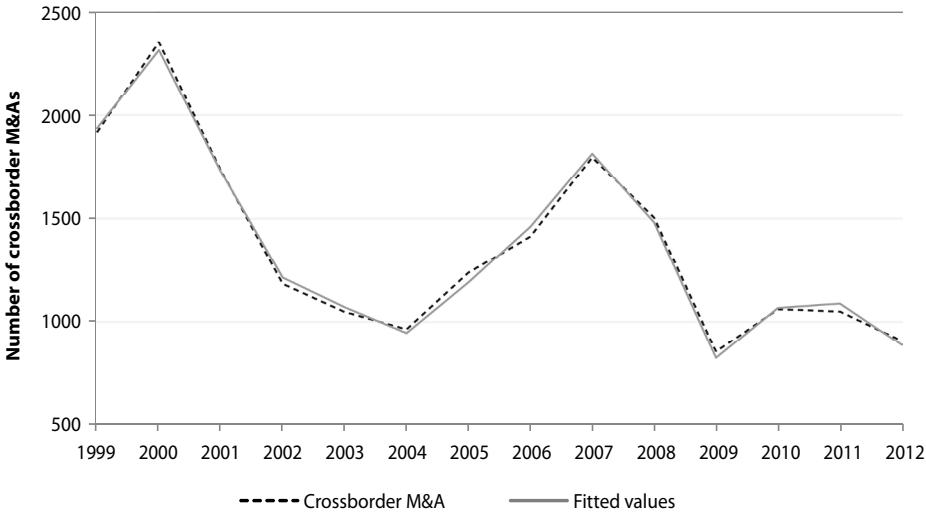
Establishing definitive evidence of fire-sales in cyclical markets is challenging, because clustering of cross-border M&As coincides with similar patterns in domestic activity. The ratio of cross-border deals to total deals fluctuates around 25% before the crisis and then drops to around 20% from 2008 to 2012. Moreover, even if a change in FDI in crisis countries seems pronounced relative to pre-crisis levels of the same country, it may be less considerable when viewed against the general backdrop of the European M&A cycle. Previous literature often de-trended M&A activity; however, most approaches are crude, such as being above or below a five-year average (Bouwman et al., 2009). We followed a more sophisticated approach and corrected M&A activity between country pairs for the European merger wave. In doing so, we estimated the cyclical component with a trigonometric regression of M&A waves that allowed for higher order polynomials, to ensure that boundary conditions were fulfilled (Cox 2006; Eubank and Speckman, 1990; Popinski, 1999). Specifically, if merger activity m_t exhibits waves captured in the term $\mu(t)$, then

(6.3) $m_t = \mu(t) + \varepsilon_t$

Where $\mu(t)$ has the following general form:

(6.4) $\mu(t) = b_0 + \sum_{j=1}^{d} b_j t^j + \sum_{j=1}^{\lambda} (c_j \cos(jt) + s_j \sin(jt))$

Figure 6.2 Model fit: actual number of cross-border M&As and fitted values

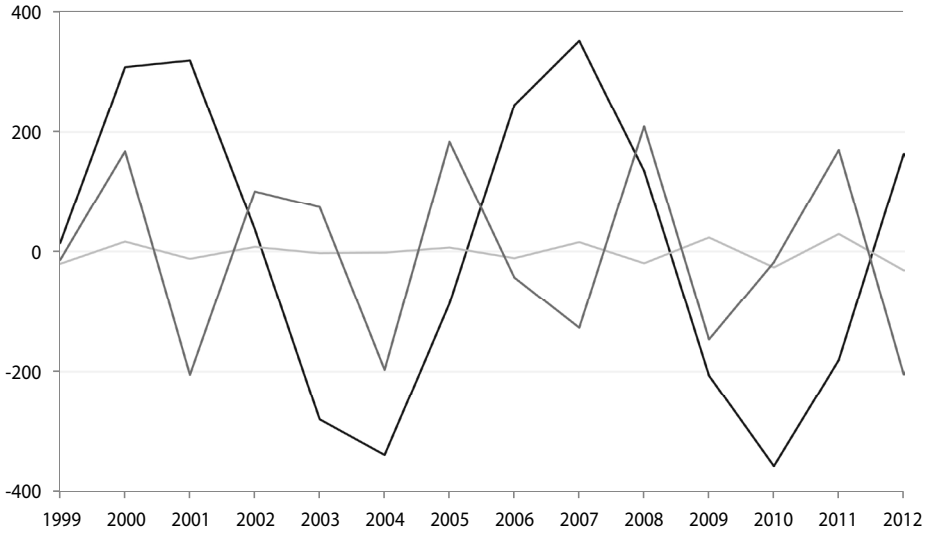


The cyclical component $\mu(t)$ consists of an intercept b_0, a polynomial trend (the terms $b_j t^j$ where t refers to the time dimension), and cycles captured by the Fourier series $c_j cos(jt) + s_j sin(jt)$. Using standard methods to specify the model 4 based on information criteria (SBIC, Akaike), the optimal number of cycles is four with different periodicity (one to four years) and the non-linear time trend has order four. We then estimated the M&A activity between ordered country pairs with the trigonometric regression 6.4. Figure 6.2 plots the annual activity of all cross-border M&As labeled m_t and the fitted values m_t^* of the trigonometric regression 6.4.

Figure 6.2 confirms that the trigonometric specification of order four exhibits a good fit. Consequently, we extracted the four cycles from the trigonometric regression, which the model identifies with different frequency. Figure 6.3 (see next page) shows only three of the cycles, for better display, including the very long-term and short-term cycle.

The total underlying cyclical component C_t is computed as the sum of the four cyclical components, which represents a Fourier series. Finally, we corrected M&A activity between country pairs by dividing the cross-border activity $Y_{TA,t}$ with the total cyclical component C_t, normalized over the range of C_t.

Figure 6.3 Example of three cyclical components



$$(6.5)\ Y^{C}_{TA,t} = \frac{Y_{TA,t}}{\frac{C_t - \min(C_t)}{\max(C_t) - \min(C_t)} + 1}$$

Hence, the higher the European merge cycle C_t, the lower weighs a surge in mergers between a specific country pair $Y_{TA,t}$, because the increase in $Y_{TA,t}$ is less likely to be driven by country-specific determinants. If the European merger cycle is at its minimum, the de-cycled merger activity between a country pair is $Y^{C}_{TA,t} = Y_{TA,t}$. If mergers between a country pair increase, but together with a European merger wave, then $Y^{C}_{TA,t} < Y_{TA,t}$. In an alternative econometric specification, we used the unadjusted merger activity $Y_{TA,t}$ as the dependent and used C_t as a control variable in both the selection and the outcome equation of the Heckman model. The results reported in this chapter are valid for both specifications. For brevity, we report the results for the de-cycled dependent $Y^{C}_{TA,t}$ only.

6.3 Variables

6.3.1 Dependent variables

(a) Merger activity ($Y_{TA,t}$): Our aim is to measure the propensity of firms from one country to acquire firms from another country, particularly if the latter experienced severe problems during the financial crisis. Following Erel et al. (2012), our dependent variable measured the proportion of cross-border mergers between a country pair ($X_{TA,t}$) in a specific quarter t as a percentage of both the number of domestic mergers in the target country ($X_{T,t}$) and the

number of cross-border mergers between the country pair ($X_{TA,t}$). Hence, the dependent variable $Y_{TA,t}$ (before de-cycling), which we referred to in the preceding section, was defined as:

$$(6.6)\ Y_{TA,t} = \frac{X_{TA,t}}{X_{TA,t}+X_{T,t}}$$

The higher the value of $Y_{TA,t}$, the higher the amount of cross-border takeovers in a target country from a certain acquiring country relative to the number of domestic deals. Obviously, $Y_{TA,t}$ is in the range 0 to 1. The inclusion of both domestic and cross-border deals in the denominator allowed us to control for factors that influence both types of M&A activity.[62]

(b) Target premium: The target premium is the final price (*F*) per ordinary share offered by the acquirer divided by the target's stand-alone share price (*P*) one week before the first announcement of the merger. The variable was provided by the Thomson Reuters SDC database and refers to a percentage measure *(F/P-1)100*, which is zero if the final price is equal to the pre-announcement market value of the target. For each country-pair, we take the average target premium per quarter.[63]

6.3.2 Independent variables

(a) Crisis period: The dummy variable is equal to one for the period from 2008 to 2012 and zero otherwise. There are two key moments, dependent on the region of interest, which can be considered as the start of the crisis. In the US, the first signs of the crisis were publicly recognizable in mid-2007. In June, Bear Stearns supported two failing hedge funds, and then disclosed in July 2007 that they had lost almost all their value. Subsequently, three big credit rating agencies downgraded several mortgage products, and interest rate spreads went up as of August 2007 (Mizen, 2008). Although the global implications of these events were not clear at first, the financial crisis fully reached Europe and other parts of the world with the filing for Chapter 11 bankruptcy protection of Lehman Brothers in September 15, 2008. For our analyses, we took the middle point of these two dates (2008q1) as the first 'crisis quarter' in Europe.[64]

62. This approach follows Erel et al. (2012), Ferreira et al. (2009) and Rossi and Volpin (2004). In the denominator we include both domestic deals in the target country and deals between the acquirer and the target. We, on purpose, do not include all cross-border deals between the target and acquirers from other nations. Most of our explanatory variables contain a comparison between the acquiring country and target country. The aim of the paper is to detect whether these differences affect the relevance of an acquirer in a specific target country. Denominating the fraction by the total number of deals in the target country would introduce confounding effects in the relation.

63. For robustness, we also computed target premiums with stand-alone share prices one day or four weeks prior to the merger announcement. The results remain qualitatively intact. We only report the results for the 1-week measure.

64. The results of this chapter do not depend on this specific date. The reported results remain intact if we use crisis dummies starting in 2007q3 or in 2008q3.

(b) Crisis countries: Following Beetsma et al. (2013) as well as Kalbaska and Gatkowski (2012), we dummied the following target countries as crisis countries in the EU: Portugal, Italy, Greece and Spain are grouped together in the dummy '*Crisis countries (T,4)*'. The dummy '*Crisis countries (T,5)*' also included Ireland. All five countries experienced severe problems during the crisis and were partly excluded from capital markets (Beetsma et al., 2013).

(c) Alternative crisis country proxies: A dichotomous dummy variable for certain crisis countries, or a group of crisis countries, cannot capture gradual differences in financial distress within and between countries. We therefore also computed six continuous and time-varying variables as alternative proxies for a country's economic and financial situation: two variables for economic risk, two for (potential) economic demand, and two for macroeconomic liquidity. For each of these variables, we gathered data on a monthly basis, which we converted to quarterly data by taking simple averages. We then computed the difference between the target and the acquirer country by subtracting the value of the acquirer country from the corresponding value of the target country.[65] Hence a high value indicates that the target country scores higher than the acquirer. To ensure weak endogeneity, all variables are lagged by one quarter unless stated otherwise.

Yield, souv. bond (T-A): The first proxy for macro-economic risk is the harmonized ten-year government bond yield (source: Datastream/Eurostat). A higher yield indicates higher sovereign default risk. In case of missing values, we turn to the long-term government bond yield (source: Datastream/International Financial Statistics).[66]

Rating, Moody's (T-A): The second proxy for macro-economic risk is the long-term sovereign credit rating issued by Moody's Investors Service. To be able to use credit ratings for a quantitative analysis, we followed Cantor and Packer (1997) and assigned numerical values for each rating (e.g., AAA is coded as 1, Aa1 as 2). A higher value indicates a lower rating.[67]

Economic sentiment (T-A): The first proxy for economic demand is the economic sentiment. The data are compiled by the Directorate General for Economic and Financial Affairs (DG ECFIN) and consist of five components: industrial confidence (40%), services confidence (30%), consumer confidence (20%), construction (5%), and retail trade (5%). This value fluctuates around a level of 100, where a higher value indicates more confidence in the future economic development.[68]

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65. We indicate this by adding *'(T-A)'* to the variable name.

66. We also tried to compute the spread on sovereign credit default swaps (CDS). Unfortunately, CDS data is only available since 2007 for most countries.

67. We also computed Moody's Rating where the watchlist is taken into account. The watchlist states whether a rating is under review (Keenan et al., 1998). If a sovereign is placed on review for downgrade, a half-point is added to its numerical rating, while a half-point is deducted when a sovereign is placed on review for upgrade. However, the reported results for '*Rating, Moody's (T-A)*' do not change when we consider the watchlist.

68. As industrial confidence is the most important component in the economic sentiment index, we ran robustness checks with the industrial confidence index on its one. The reported results do not change qualitatively.

Household fin. sit. (T-A): The second proxy for economic demand is an index for the financial situation of private households, which is compiled by the DG ECFIN on the basis of a survey. A high value indicates a better financial situation.

Domestic credit (T-A): The first proxy for macro-economic liquidity of a target country is a measure of the total of resources provided to the private sector, as a percentage of GDP (source: World Bank). These resources are not limited to credit or loans by the banking sector (also see below). The variable is only available on a yearly basis, and is lagged by one year.

Domestic credit banking (T-A): The second proxy for macroeconomic liquidity is a measure of all credit provided by the banking sector to various sectors in the economy. The amount of credit is expressed as a percentage of GDP (source: World Bank). This variable is only available on a yearly basis and is therefore lagged by one year.

6.3.3 Control variables

We used control variables for *(i)* differences in the economic and financial situation of a country pair, *(ii)* institutional differences, and *(iii)* deal-specific characteristics, averaged per quarter. The choice of control variables was based on similar specifications in the pertinent cross-border M&A literature (e.g., Erel et al., 2012; Rossi and Volpin, 2004). All variables with '*(T-A)*' are differences between target and acquirer countries (target minus acquirer values; used in the outcome equations). Variables with '*(T)*' or '*(A)*' only apply to the target or acquirer country (used in the selection equation), respectively. With the exception of (iii), all time-varying variables are lagged by one period.

Economic and financial control variables

We included the annual GDP per capita in US$ at constant prices (*GDP/CAP (T-A)*; source: World Bank). To reduce the effect of outliers, we computed the natural logarithm. To account for the degree of stock market development, we measured the market capitalization as percent of GDP (*MKTCAP (T-A)).* Market capitalization equals the share price times the number of shares outstanding (source: World Bank). Year-on-year growth rates of GDP in current US$ (source: World Bank) are deflated with the year-on-year change of the US Consumer Price Index (source: Datastream) (*GDP growth (T-A))*. The total of imports and exports as a percentage of a country's GDP per year proxies the openness of the economy (source: United Nations Commodity Trade Statistics Database) (*Openness (T-A))*.[69] To capture stock market valuation, we determined the quarterly value-weighted ratio between the market and book values for all listed companies per country (*Market-to-book (T-A)*). In Datastream, we selected all companies on a country's main exchange and downloaded companies' market values and market-to-book ratios. We winsorized all values at the 1 and 99 percentile at country-year

69. Not all import and export figures for 2011 were published. If missing, we used the 2010 values for 2011 as well.

level to correct for outliers. The difference in the quarterly nominal return on the local stock market index between acquirer and target country indicates relative performance (*Stock market return (T-A))* (source: Datastream). We resorted to a Datastream index if there was no official index available. If there was neither an official index nor a Datastream index, we used either an MSCI or an S&P country index. To account for risk, we used the standard deviation of the local stock market (*S.D. stock market return (T-A)*). We calculated the quarterly standard deviation based on monthly returns of each country's stock market in local currency (source: Datastream). To determine the real appreciation of a country's currency, we first calculated the nominal appreciation versus US$ for each currency and quarter (*Currency appreciation (T-A)*; source: Datastream/ WM/Reuters). We then deflated the nominal appreciation by the difference in CPI between the country and the US (source: Datastream/Eurostat).[70] As a last step, we deducted the real appreciation of the target country's currency against the US dollar from the acquirer country's corresponding value.

Institutional control variables

The governance indicator (*Governance index (T-A)*) from the Worldwide Governance Indicators dataset measures the governance quality on six different dimensions: voice and accountability, political stability and lack of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. We averaged the outcomes across the six variables for each country. We interpolated linearly between years in case of missing values. We used the total tax rate as reported by the World Bank (*Tax rate (T-A)*). This annual rate measures "*the amount of taxes and mandatory contributions payable by businesses after accounting for allowable deductions and exemptions as a share of commercial profits*".[71] We used Stulz and Williamson (2003) data on language for most countries (*Same language (T-A)*). If data was missing, we resorted to the Language Database (http://www.language-database.com).[72] Given that most countries in Europe have different languages, we coded the language group for each language. We created a dummy *LANGUAGE* which takes value "1" if both countries share the same language group and "0" otherwise. A commonly used cultural variable is religious proximity (see, e.g., Erel at al. 2012). We therefore computed a dummy equal to one if the primary religion of the acquirer and target country is identical (*Same religion (T-A)*). Given the limited heterogeneity in Europe, where sixteen countries are primarily Catholic and seven are Protestant, we also used the difference in religiosity between countries. Religiosity is defined as the percentage of inhabitants in a certain country who believe that there is a God

70. Suppose the appreciation of country A's currency versus the US dollar is 4% in a certain year. In the same year, A experiences an inflation rate of 5% while the US inflation is 2% in that year. The real appreciation of country A's currency is then 4 – (5 – 2) = 4 – 5 +2 = 1%.

71. Data is available as of 2005. Given the fairly constant nature of tax rates, we apply the 2005 numbers also to the years 1999 to 2004.

72. Luxembourgish is absent on this website. We used Wikipedia to find that this language belongs to the Germanic language group.

(*Population ratio believers (T-A)*). The data refer to the Special Eurobarometer issued by the European Commission. Finally, the composition of the EU has changed several times since 1999. Particularly, the EU welcomed several new entrants. To account for these changes in the composition of the EU, we computed the dummy *EU_NEW*. This variable takes the value "1" for countries which have entered the EU after 1999.

Deal-specific control variables

All deal-specific control variables refer to SDC. We controlled for the number of mergers where cash was the only means of payment, expressed as a fraction of all mergers per country pair and quarter (*Ratio all-cash deals*). The variable '*Ratio horizontal deals*' refers to the number of mergers where the target and the acquirer are in the same industry (four-digit SIC), expressed as a fraction of all mergers per country pair and quarter. We accounted for the following deal-specific factors: (a) the number of mergers that are withdrawn before completion, expressed as a fraction of all mergers per country pair and quarter (*Ratio withdrawn deals*); (b) the number of mergers with a public acquirer, expressed as a fraction of all mergers per country pair and quarter (*Ratio public acquirer*); (c) the number of friendly mergers, expressed as a fraction of all mergers per country pair and quarter (*Ratio friendly deals*); (d) the number of mergers where the target is privatized, expressed as a fraction of all mergers per country pair and quarter (*Ratio privatization*); and (e) the number of mergers where the acquirer makes a tender offer, expressed as a fraction of all mergers per country pair and quarter (*Ratio tender offers*).

6.3.4 Variable description

Table 6.2 reports summary statistics and Pearson coefficients of pairwise correlations between all variables in the outcome equation. All pairwise correlations above 0.0276 are statistically significant at the 1% level, except correlations with 'target premium', where all values above 0.0838 are statistically significant at the 1% level. A variance inflation factor (VIF) test of the baseline specification (model A3, see next section) indicates no problems of multicollinearity. The mean VIF is 1.54 and the variable with the highest VIF, *'Governance index (T-A)'* has a value of 4.53, which is still well below 5.3, the cut-off point according to Hair et al. (1992) or even 10, the cut-off according to Belsley et al. (1980) and Studenmund (1992). Despite the acceptable values of the VIF test, Table 6.2 indicates a couple of high correlations above 0.5. *'GDP/CAP (T-A)'* and *'MKTCAP (T-A)'* are highly correlated with the control variable *'Governance index (T-A)'*. Rerunning all estimations without *'Governance index (T-A)'* shows that the results are robust.

Table 6.2 also reveals a high correlation between some of the crisis proxies, e.g., between '*Yield, souv. bond (T-A)'* and *'Rating, Moody's (T-A)'*. This is not surprising, as these proxies are meant to be alternative measurements of the same characteristic, namely, sovereign default

Table 6.2 Variable description

	Variable	N	mean	sd	min	max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Dep: crossborder M&A	8556	0.129	0.164	0.001	1	1										
(2)	Dep: target premium	939	23.583	22.657	-5.175	67.305	-0.08	1									
(3)	GDP/CAP (T-A)	8556	-0.312	0.775	-3.332	2.703	-0.11	0.06	1								
(4)	MKTCAP (T-A)	8556	-0.134	0.586	-3.154	2.733	-0.06	0.14	0.53	1							
(5)	GDP growth (T-A)	8556	0.01	0.059	-0.298	0.308	0.10	0.02	-0.39	-0.08	1						
(6)	Openness (T-A)	8556	0.033	0.442	-1.51	1.51	0.18	-0.04	-0.16	-0.20	0.17	1					
(7)	Market-to-book (T-A)	7889	-0.247	2.029	-16.402	14.752	-0.10	0.06	0.26	0.49	-0.03	-0.14	1				
(8)	Stock market return (T-A)	8556	0.003	0.104	-0.975	1.113	0.02	-0.02	-0.06	-0.01	0.04	0.04	-0.12	1			
(9)	S.D. stock market return (T-A)	8553	0.009	0.127	-0.751	1.857	0.02	-0.03	-0.19	-0.02	0.13	-0.03	0.01	0.09	1		
(10)	Governance index (T-A)	8556	-0.178	0.551	-2.108	1.793	-0.08	0.08	0.82	0.53	-0.27	0.02	0.26	-0.01	-0.12	1	
(11)	Tax rate (T-A)	8522	0.002	0.164	-0.559	0.559	-0.14	-0.10	-0.11	-0.24	-0.10	-0.06	-0.10	0.00	0.00	-0.35	1
(12)	Currency appreciation (T-A)	8556	-0.794	4.048	-52.215	51.978	-0.10	-0.02	0.49	0.22	-0.20	-0.08	0.15	-0.05	-0.19	0.40	0.02
(13)	Same language	8556	0.477	0.499	0	1	0.19	0.02	0.34	0.19	-0.14	-0.06	0.12	-0.02	-0.05	0.29	-0.02
(14)	Population ratio believers (T-A)	8556	0.025	0.234	-0.74	0.72	0.05	-0.04	-0.35	-0.39	0.10	-0.16	-0.15	-0.04	0.14	-0.52	0.08
(15)	Same religion	8556	0.568	0.495	0	1	0.22	-0.04	0.13	0.06	-0.08	-0.03	0.03	0.00	-0.03	0.14	-0.05
(16)	Ratio all-cash deals	8556	0.083	0.214	0	1	-0.04	0.04	0.01	-0.03	-0.03	0.00	-0.02	-0.01	0.03	0.01	0.03
(17)	Ratio horizontal deals	8556	0.409	0.385	0	1	0.04	0.00	-0.03	-0.01	0.03	0.01	0.01	-0.03	0.01	-0.01	0.00
(18)	Ratio withdrawn deals	8556	0.013	0.086	0	1	0.01	0.05	-0.02	-0.01	0.01	-0.01	0.01	0.01	0.02	0.00	0.00
(19)	Ratio public acquiror	8556	0.431	0.402	0	1	-0.11	0.04	-0.03	-0.09	0.00	0.04	-0.05	0.01	0.02	-0.05	0.03
(20)	Ratio friendly deals	8556	0.929	0.206	0	1	-0.02	0.05	0.04	0.02	0.00	0.00	0.00	0.01	0.00	0.02	-0.01
(21)	Ratio privatization	8556	0.024	0.132	0	1	0.06	-0.02	-0.12	-0.05	0.05	0.02	-0.04	0.01	0.04	-0.09	-0.02
(22)	Ratio tender offers	8556	0.02	0.107	0	1	-0.01	0.08	-0.03	0.00	0.00	-0.03	0.00	0.00	0.04	-0.02	-0.01
(23)	Yield, souv. bond (T-A)	8039	0.298	1.601	-23.98	22.627	0.12	0.00	-0.55	-0.25	0.15	0.08	-0.13	-0.02	0.16	-0.47	-0.05
(24)	Rating, Moody's (T-A)	8556	1.165	3.376	-20	19.333	0.18	-0.05	-0.87	-0.49	0.30	0.16	-0.27	0.04	0.22	-0.78	0.03
(25)	Economic sentiment (T-A)	8424	-0.317	7.234	-38.533	41.067	0.02	-0.05	0.08	0.09	0.16	0.06	0.06	0.07	-0.08	0.06	0.13
(26)	Household fin. sit. (T-A)	8122	-3.625	15.983	-64.033	51.4	-0.04	0.04	0.68	0.44	-0.08	0.16	0.17	0.00	-0.08	0.81	-0.29
(27)	Domestic credit (T-A)	8218	-0.12	0.577	-2.532	2.317	-0.06	0.11	0.56	0.39	-0.29	-0.23	0.27	-0.07	-0.11	0.50	-0.42
(28)	Domestic credit banking (T-A)	8179	-0.131	0.57	-2.751	2.523	-0.09	0.10	0.59	0.33	-0.35	-0.21	0.26	-0.09	-0.13	0.48	-0.30

	Variable	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
(12)	Currency appreciation (T-A)	1															
(13)	Same language (T-A)	0.14	1														
(14)	Population ratio believers (T-A)	-0.22	-0.09	1													
(15)	Same religion (T-A)	0.10	0.25	-0.09	1												
(16)	Ratio all-cash deals	0.01	0.00	0.03	-0.02	1											
(17)	Ratio horizontal deals	-0.01	0.01	0.03	0.04	-0.02	1										
(18)	Ratio withdrawn deals	-0.02	-0.01	0.00	0.00	0.02	0.03	1									
(19)	Ratio public acquiror	-0.03	-0.08	0.04	-0.10	0.14	-0.12	0.03	1								
(20)	Ratio friendly deals	0.06	0.04	0.01	-0.02	-0.03	-0.01	-0.03	-0.07	1							
(21)	Ratio privatization	-0.11	-0.03	0.03	0.02	-0.01	0.01	0.08	-0.02	-0.04	1						
(22)	Ratio tender offers	-0.04	-0.02	0.03	0.01	0.29	0.01	0.02	0.04	-0.01	0.01	1					
(23)	Yield, souv. bond (T-A)	-0.30	-0.18	0.29	-0.05	0.01	0.03	0.00	-0.03	-0.02	0.07	0.03	1				
(24)	Rating, Moody's (T-A)	-0.53	-0.30	0.41	-0.12	0.00	0.02	0.02	0.02	-0.05	0.13	0.04	0.73	1			
(25)	Economic sentiment (T-A)	0.14	0.03	-0.12	0.01	-0.02	-0.01	-0.01	-0.04	0.00	-0.04	-0.03	-0.21	-0.14	1		
(26)	Household fin. sit. (T-A)	0.32	0.20	-0.53	0.10	-0.01	-0.02	0.01	-0.02	-0.01	-0.05	-0.02	-0.48	-0.61	0.15	1	
(27)	Domestic credit (T-A)	0.24	0.20	-0.17	0.08	-0.02	-0.04	-0.02	0.04	0.02	-0.07	-0.03	-0.22	-0.49	-0.12	0.30	1
(28)	Domestic credit banking (T-A)	0.27	0.21	-0.13	0.08	0.00	-0.04	-0.02	0.05	0.03	-0.08	-0.04	-0.24	-0.53	-0.12	0.26	0.97

Note: Summary stats (N, mean, sd, min,max) refer to all country-pairs and year-quarters with a positive number of M&A transactions. For all variables except 'target premium' (2), pairwise correlations above 0.0276 are statistically significant at the 1% level. For 'target premium' (2), pairwise correlations above 0.0838 are statistically significant at the 1% level.

risk. We therefore analyzed these proxies individually and in separate model specifications. Despite these remedies, multicollinearity may still arise as a methodological challenge, because *'GDP/CAP (T-A)'* and to a lesser extent *'MKTCAP (T-A)'* are also highly correlated with almost all continuous crisis proxies. As these are our variables of interest, we cannot simply exclude them from the specification for robustness checks. To address this issue we created a set of dummy variables for *'GDP/CAP (T-A)'* and *'MKTCAP (T-A)'* whose threshold levels are not theory-driven; rather we took an empirical approach. We chose the highest quintile as a reference category dummy. With quintiles as cut-off points, the reference dummy is highly correlated with all other independent variables. This procedure ensures that the reference dummy absorbs much of the multicollinearity, so that remaining dummies are less related to other independent variables. As the reference category dummy is excluded from regressions, multicollinearity is not a serious issue anymore.

6.4 Results

To analyze whether fire-sale FDI played a role in European countries that experienced a financial and economic crisis, we studied merger activity (quantity of firms sold) and target premiums paid (selling prices) before and during the crisis in non-crisis and crisis countries. By interacting crisis period dummies with proxies for crisis countries, we were able to test whether more corporate assets were fire-sold during the crisis by crisis countries.

6.4.1 Merger activity

As explained in the methods section, we used a multivariate regression framework with a Heckman approach to correct for possible selection biases. All standard errors were corrected for heteroskedasticity and clustering within country pairs. In all estimations, we also included period fixed effects for year-quarters, although we did not report them in tables.

We started with the analysis of two simple dichotomous variables: a dummy for the crisis period and a dummy for crisis countries. Table 6.3 reports the results of the outcome equation of the Heckman estimation.

Model A1 introduces all macroeconomic control variables, while all deal-specific control variables are added in model A2. As already indicated in Figure 6.1, the negative and statistically significant coefficient for *'Crisis period'* shows that the proportion of cross-border mergers dropped after the start of the crisis in 2008. The dummy for the four crisis countries Portugal, Italy, Greece, and Spain shows a generally higher level of cross-border activity compared with non-crisis countries. Note that the positive relation between *'Crisis countries (T,4)'* and cross-border mergers applies to the whole period, not only to the crisis period.

Table 6.3 Determinants of cross-border M&A

Dep: Cross-border M&A	Model A1		Model A2		Model A3		Model A4		Model A5		Model A6	
Crisis period	-0.037***	(-3.25)	-0.039***	(-3.44)	-0.039***	(-3.40)	-0.039***	(-3.38)	-0.039***	(-3.39)	-0.037***	(-3.25)
Crisis countries (T,4)	0.029**	(2.16)	0.028**	(2.12)							0.032**	(2.57)
Crisis period X countries (T,4)											-0.013	(-1.60)
Crisis countries (T,5)									0.018	(1.49)		
Crisis period X countries (T,5)									0.003	(0.36)		
GDP/CAP, 5th quintile (T-A)	0.037*	(1.82)	0.037*	(1.89)	0.037*	(1.71)	0.036	(1.63)	0.040*	(1.92)	0.037*	(1.89)
GDP/CAP, 4th quintile (T-A)	0.027*	(1.73)	0.027*	(1.76)	0.025	(1.45)	0.025	(1.46)	0.032**	(2.10)	0.027*	(1.75)
GDP/CAP, 3rd quintile (T-A)	0.060***	(4.06)	0.060***	(4.16)	0.060***	(4.12)	0.060***	(4.07)	0.062***	(4.31)	0.060***	(4.09)
GDP/CAP, 2nd quintile (T-A)	0.021	(1.53)	0.021	(1.56)	0.022	(1.60)	0.024*	(1.77)	0.025*	(1.82)	0.021	(1.56)
MKTCAP, 5th quintile (T-A)	0.020**	(2.23)	0.021**	(2.33)	0.019**	(2.06)	0.019**	(2.17)	0.018**	(2.06)	0.021**	(2.34)
MKTCAP, 4th quintile (T-A)	0.018**	(2.28)	0.019**	(2.42)	0.017**	(2.16)	0.017**	(2.20)	0.016**	(2.13)	0.018**	(2.37)
MKTCAP, 3rd quintile (T-A)	0.049***	(2.80)	0.050***	(2.96)	0.049***	(2.90)	0.049***	(2.94)	0.049***	(2.85)	0.049***	(2.83)
MKTCAP, 2nd quintile (T-A)	-0.009	(-1.34)	-0.009	(-1.33)	-0.009	(-1.41)	-0.009	(-1.41)	-0.009	(-1.47)	-0.009	(-1.42)
GDP growth (T-A)	0.084***	(3.30)	0.085***	(3.38)	0.091***	(3.61)	0.090***	(3.59)	0.080***	(3.10)	0.082***	(3.26)
Openness (T-A)	0.058***	(6.83)	0.058***	(6.93)	0.058***	(6.87)	0.058***	(6.73)	0.055***	(6.76)	0.058***	(6.86)
Market-to-book (T-A)	-0.006***	(-5.79)	-0.007***	(-6.11)	-0.007***	(-6.10)	-0.007***	(-5.97)	-0.007***	(-6.26)	-0.006***	(-5.98)
Stock market return (T-A)	-0.026***	(-2.61)	-0.029***	(-2.86)	-0.029***	(-2.92)	-0.029***	(-2.89)	-0.029***	(-2.94)	-0.029***	(-2.89)
S.D. stock market return (T-A)	0.019	(1.37)	0.019	(1.50)	0.019	(1.50)	0.019	(1.52)	0.021*	(1.72)	0.021*	(1.69)
Currency appreciation (T-A)	-0.005***	(-5.71)	-0.005***	(-5.78)	-0.005***	(-5.86)	-0.005***	(-5.91)	-0.005***	(-5.52)	-0.005***	(-5.28)
New EU member (T)	0.015	(1.12)	0.016	(1.22)	0.017	(1.32)	0.017	(1.36)	0.016	(1.21)	0.014	(1.03)
Governance index (T-A)	-0.015	(-1.53)	-0.015	(-1.58)	-0.015	(-1.36)	-0.015	(-1.39)	-0.017*	(-1.76)	-0.017*	(-1.75)
Tax rate (T-A)	-0.144***	(-5.22)	-0.145***	(-5.32)	-0.135***	(-4.67)	-0.137***	(-4.15)	-0.130***	(-5.00)	-0.146***	(-5.39)
Same language (T-A)	0.031***	(3.43)	0.032***	(3.62)	0.032***	(3.63)	0.033***	(3.70)	0.032***	(3.73)	0.031***	(3.53)
Population ratio believers (T-A)	0.028	(1.23)	0.029	(1.32)	0.030	(1.31)	0.032	(1.35)	0.029	(1.26)	0.027	(1.19)
Same religion (T-A)	0.009	(1.62)	0.010*	(1.75)	0.011*	(1.82)	0.011*	(1.82)	0.011*	(1.85)	0.010*	(1.76)
Ratio all-cash deals			-0.003	(-0.68)	-0.003	(-0.72)	-0.003	(-0.83)	-0.003	(-0.83)	-0.003	(-0.69)
Ratio horizontal deals			-0.002	(-0.80)	-0.002	(-0.83)	-0.002	(-0.81)	-0.002	(-0.86)	-0.002	(-0.81)
Ratio withdrawn deals			-0.014*	(-1.73)	-0.015*	(-1.73)	-0.014*	(-1.76)	-0.014*	(-1.68)	-0.015*	(-1.75)
Ratio public acquiror			-0.004	(-1.04)	-0.003	(-1.00)	-0.004	(-1.02)	-0.004	(-1.10)	-0.003	(-0.95)
Ratio friendly deals			0.008*	(1.80)	0.008*	(1.86)	0.008*	(1.83)	0.007*	(1.67)	0.008*	(1.79)
Ratio privatization			-0.043***	(-4.41)	-0.043***	(-4.47)	-0.043***	(-4.57)	-0.045***	(-4.76)	-0.043***	(-4.27)
Ratio tender offers			0.003	(0.35)	0.002	(0.26)	0.002	(0.26)	0.002	(0.31)	0.003	(0.36)
Portugal					0.037*	(1.80)	0.036*	(1.71)				
Italy					0.023	(1.15)	0.022	(1.13)				
Greece					0.059*	(1.92)	0.057*	(1.81)				
Spain					0.021	(1.45)	0.021	(1.43)				
Ireland							-0.007	(-0.26)				
Constant	-0.187***	(-11.12)	-0.191***	(-11.50)	-0.190***	(-10.90)	-0.191***	(-10.84)	-0.192***	(-11.30)	-0.191***	(-11.50)
Number of observations	7871		7871		7871		7871		7871		7871	
Wald chi^2	449.051		489.01		504.526		518.501		504.823		494.551	
Prob>chi^2	0.000		0.000		0.000		0.000		0.000		0.000	

Note: Statistical significance levels: *0.10 **0.05 ***0.01 (z/t-values in parenthesis). Standard errors corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definitions.

The statistical significance weakens as more controls are added in model A2. Using individual country dummies in models A3 and A4 shows that the positive correlation is not robust. It only weakly holds for Portugal and Greece ($p<0.1$), but not for Italy, Spain (model A3), or Ireland (model A4). When all five crisis countries including Ireland are combined into a single dummy, its coefficient is insignificant when included individually (analogue to model A2; unreported).

In models A5 and A6, we investigated the interaction between the crisis period and the crisis country dummies. The fire-sale hypothesis would predict a positive interaction coefficient, more sales by crisis countries in times of crisis, which we did not find, however, neither for the group of four nor for the five crisis countries (model A5 and model A6, respectively). The base effect of the interaction for the crisis countries is only significant in model A6, but not in A5.

When using a group dummy, we did not reliably detect a higher share of cross-border merger activity in crisis countries, neither over the whole period nor during the crisis. Although this result does not provide strong support for the fire-sale hypothesis, there is also no clear evidence against it, which would be a pronounced drop of foreign investments in crisis countries in times of crisis. In fact, we did not find any negative and statistically significant interaction effect in models A5 and A6.

The coefficients of the control variables in models A1 to A6 are consistent across all specifications and in line with prior literature. Target countries are less or equally wealthy and financially developed than acquirer countries, which can be seen from the dummies for the quintiles for GDP per capita and financial market capitalization (the 5^{th} quintile is the lowest). Investments in target countries also increase with higher GDP growth, more openness of the economy, lower market-to-book ratios, lower stock market returns, lower (higher) currency appreciation (depreciation), same language and religion, and lower tax rates. All findings are consistent with previous literature on cross-border M&As (e.g., Erel et al., 2012; Rossi and Volpin, 2004). The negative relationship with the ratio of targets that are privatized can be explained by the fact that a high privatization ratio may proxy historically more regulated and less open economies. A robustness check without this control variable does not produce qualitatively different results.

The results of the corresponding selection equation to the outcome equation in Table 6.3 are reported in Table A6.3 in the appendix. As we can see in Table A6.3, the hypothesis that rho=0 is rejected with a high statistical significance of $p<0.001$. As rho measures the correlation between the error terms of the selection and of the outcome equation, a positive rho means that the selection into the outcome equation is not a random process, and that we should correct the coefficient estimates in Table 6.3 with the proposed Heckman correction model. The statistically more significant results of the selection equation in Table A6.3 ($p<0.05$) show that acquirers have a higher propensity to invest in cross-border deals when

they come from high tax countries, with high market-to-book ratios, high currency appreciation and less volatile financial markets (low *'S.D. stock market return (A)'*).[73] This is consistent with previous literature on the determinants of cross-border mergers (e.g., Erel et al., 2012; Rossi and Volpin, 2004) and with the notion of multinationals as cross-border arbitrageurs of relatively cheap capital (Baker et al., 2009).

As mentioned in section 6.3, a dummy variable for a group of crisis countries is a blunt proxy as it is not able to capture gradual differences in economic conditions. In Table 6.4, we therefore analyzed six time-varying and continuous variables as alternative proxies for a target country's economic and financial distress.

Models B1 and B2 include sovereign bond yields (*'Yield, souv. bond (T-A)'*) and Moody's sovereign credit rating (*'Rating, Moody's (T-A)'*) as two variables for country risk. Note that the values of both variables increase in risk. The variable *'Crisis period interaction'* reports the coefficients of the interaction effect of the respective proxy for a target country's distress with the dummy *'Crisis period'*. According to the fire-sale hypothesis, a country with higher default risk should attract more foreign buyers in times of crisis. And indeed, for both country risk variables we found a significant positive interaction effect for the variable *'Crisis period interaction'*. Hence both sovereign bond yields and credit ratings provide evidence for the fire-sale hypothesis. Countries with higher default risk attract a higher proportion of cross-border mergers in times of crisis.

The positive base effect of *'Rating, Moody's (T-A)'* in model B2 indicates that countries with higher risk also attracted more foreign buyers before 2008. This indicates a generally attractive risk-return trade-off, which is even stronger in times of crisis. For sovereign bond yields in model B1, the base effect is negative, but only in combination with the interaction effect. If the interaction variable *'Crisis period interaction'* is dropped from model B1 (unreported), the overall effect of *'Yield, souv. bond (T-A)'* is positive and significant ($p<0.05$).

Models B3 and B4 introduce two variables for (potential) economic demand: economic sentiment and the financial situation of private households. According to the fire-sale hypothesis, we expect that in times of crisis target countries with a particularly low economic sentiment or financial strength of households would receive a higher proportion of cross-border mergers. We therefore expect a negative interaction effect of the economic demand proxies with the *'Crisis dummy'*. In line with this prediction, we found a negative and statistically significant coefficient for the variable *'Crisis period interaction'* in both models B3 and B4. Yet, the base effects for *'Economic sentiment (T-A)'* and *'Household fin. sit. (T-A)'* are positive and significant. Also, when we drop the variable *'Crisis period interaction'* from models B3 and

73. Acquirers are also less likely to originate from countries with high openness. One reason might be that *'Openness (T-A)'* is negatively correlated with *'GDP/CAP (T-A)'*, *'MKTCAP (T-A)'*, and positively correlated with *'GDP growth (T-A)'* (see Table 6.2). Hence, openness may partially proxy less wealthy and developed economies with more growth potential, which are typically target countries and not acquirers.

Table 6.4 Determinants of cross-border M&A using alternative proxies for distress

Dependent: cross-border M&A	Model B1		Model B2		Model B3		Model B4		Model B5		Model B6	
Crisis period	-0.040***	(-3.33)	-0.039***	(-3.31)	-0.039***	(-3.28)	-0.041***	(-3.60)	-0.042***	(-3.51)	-0.042***	(-3.47)
Yield, souv. bond (T-A)	-0.005**	(-2.46)										
Rating, Moody's (T-A)			0.007***	(4.28)								
Economic sentiment (T-A)					0.001***	(4.20)						
Household fin. sit. (T-A)							0.001**	(2.20)				
Domestic credit (T-A)									-0.010	(-1.22)		
Dom. credit banking (T-A)											-0.020**	(-2.57)
Crisis period interaction	0.012***	(4.57)	0.003***	(2.71)	-0.002***	(-3.84)	-0.000***	(-2.60)	0.014**	(2.53)	0.016***	(2.67)
GDP/CAP, 5th quintile (T-A)	0.040**	(2.20)	0.006	(0.30)	0.039**	(2.11)	0.050***	(2.66)	0.038*	(1.93)	0.029	(1.44)
GDP/CAP, 4th quintile (T-A)	0.034**	(2.36)	0.016	(0.97)	0.035**	(2.32)	0.040***	(2.75)	0.037**	(2.33)	0.033**	(2.04)
GDP/CAP, 3rd quintile (T-A)	0.056***	(3.65)	0.046***	(3.10)	0.063***	(4.33)	0.065***	(4.26)	0.066***	(4.65)	0.063***	(4.54)
GDP/CAP, 2nd quintile (T-A)	0.028**	(2.25)	0.016	(1.16)	0.031**	(2.34)	0.031**	(2.42)	0.029**	(2.15)	0.026*	(1.83)
MKTCAP, 5th quintile (T-A)	0.016**	(2.02)	0.013	(1.56)	0.021**	(2.42)	0.020**	(2.57)	0.020**	(2.23)	0.021**	(2.36)
MKTCAP, 4th quintile (T-A)	0.015**	(2.20)	0.013*	(1.79)	0.020***	(2.62)	0.018**	(2.55)	0.020**	(2.46)	0.019**	(2.47)
MKTCAP, 3rd quintile (T-A)	0.043**	(2.25)	0.047***	(2.88)	0.051***	(2.97)	0.051***	(2.91)	0.053***	(3.06)	0.054***	(3.04)
MKTCAP, 2nd quintile (T-A)	-0.007	(-1.27)	-0.009	(-1.53)	-0.007	(-1.13)	-0.007	(-1.21)	-0.007	(-1.07)	-0.007	(-1.16)
GDP growth (T-A)	0.082***	(2.75)	0.116***	(4.64)	0.093***	(3.48)	0.065***	(2.58)	0.106***	(3.88)	0.083***	(3.2)
Openness (T-A)	0.048***	(5.76)	0.051***	(6.84)	0.054***	(6.90)	0.047***	(6.39)	0.056***	(7.27)	0.056***	(7.32)
Market-to-book (T-A)	-0.007***	(-6.97)	-0.006***	(-5.78)	-0.006***	(-5.97)	-0.006***	(-7.20)	-0.005***	(-5.07)	-0.004***	(-4.58)
Stock market return (T-A)	-0.016	(-1.42)	-0.020**	(-2.02)	-0.027***	(-2.64)	-0.025**	(-2.45)	-0.030***	(-2.89)	-0.034***	(-3.21)
S.D. stock market return (T-A)	0.015	(1.20)	-0.001	(-0.05)	0.022*	(1.77)	0.012	(1.02)	0.019	(1.55)	0.018	(1.53)
Currency appreciation (T-A)	-0.007***	(-5.97)	-0.004***	(-4.99)	-0.006***	(-6.46)	-0.007***	(-6.83)	-0.006***	(-6.2)	-0.006***	(-6.39)
Governance index (T-A)	-0.020**	(-2.37)	0.001	(0.07)	-0.023**	(-2.51)	-0.028***	(-2.65)	-0.025***	(-2.59)	-0.024**	(-2.51)
Tax rate (T-A)	-0.125***	(-4.66)	-0.103***	(-4.20)	-0.131***	(-5.05)	-0.120***	(-4.98)	-0.135***	(-4.64)	-0.139***	(-5.05)
Same language (T-A)	0.030***	(3.41)	0.032***	(3.97)	0.032***	(3.79)	0.032***	(3.93)	0.033***	(3.87)	0.033***	(3.93)
Population ratio believers (T-A)	0.028	(1.33)	0.039**	(2.04)	0.041**	(2.09)	0.050**	(2.4)	0.037*	(1.84)	0.038*	(1.88)
Same religion (T-A)	0.012**	(2.08)	0.011**	(2.08)	0.012**	(2.08)	0.013**	(2.33)	0.013**	(2.26)	0.013**	(2.31)
Ratio all-cash deals	-0.004	(-1.12)	-0.006	(-1.56)	-0.005	(-1.27)	-0.003	(-0.90)	-0.004	(-0.95)	-0.004	(-1.01)
Ratio horizontal deals	-0.002	(-0.87)	-0.001	(-0.62)	-0.002	(-0.88)	-0.003	(-1.25)	-0.002	(-1.05)	-0.002	(-0.96)
Ratio withdrawn deals	-0.020**	(-2.03)	-0.017**	(-2.03)	-0.018**	(-2.02)	-0.016*	(-1.89)	-0.015*	(-1.85)	-0.015*	(-1.7)
Ratio public acquiror	-0.002	(-0.54)	-0.002	(-0.62)	-0.003	(-0.83)	-0.002	(-0.6)	-0.004	(-1.13)	-0.004	(-1.05)
Ratio friendly deals	0.007	(1.54)	0.010**	(2.21)	0.008*	(1.86)	0.008*	(1.70)	0.008*	(1.79)	0.009**	(1.97)
Ratio privatization	-0.041***	(-3.53)	-0.044***	(-4.55)	-0.043***	(-4.64)	-0.045***	(-4.25)	-0.047***	(-4.66)	-0.048***	(-4.74)
Ratio tender offers	0.008	(1.05)	0.000	(0.06)	0.002	(0.32)	0.006	(0.80)	-0.001	(-0.14)	-0.001	(-0.14)
Constant	-0.186***	(-11.30)	-0.169***	(-9.92)	-0.191***	(-11.71)	-0.194***	(-11.5)	-0.193***	(-11.51)	-0.191***	(-11.26)
Number of observations	7594		7871		7771		7648		7562		7524	
Wald chi^2	466.355		520.031		526.28		570.938		500.715		520.521	
Prob>chi^2	0.000		0.000		0.000		0.000		0.000		0.000	

Note: Statistical significance levels: *0.10 **0.05 ***0.01 (z/t-values in parenthesis). S.E. corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definitions.

B4 (unreported), the overall effect of both economic demand proxies is positive ($p<0.05$ and $p<0.1$, respectively). Hence, in general, cross-border acquirers seek targets in countries with high economic demand, but in times of crisis, target countries with particularly low economic sentiment and household finance become attractive, in line with the fire-sale hypothesis.[74]

Models B4 and B5 include two variables for macro-economic liquidity: domestic credit provided to the private sector (*'Domestic credit (T-A)'*) and domestic credit provided by the banking sector (*'Dom. credit banking (T-A)'*). These are particularly interesting variables, as the fire-sale hypothesis argues that a shortage of domestic liquidity forces local owners to sell their firms to foreign buyers with superior access to liquidity (Krugman, 2000). We therefore expect a negative coefficient of the interaction variable *'Crisis period interaction'* in both models B4 and B5. The results, however, show exactly the opposite effect. Countries with lower (higher) domestic credit attract a lower (higher) proportion of cross-border mergers during the crisis years. The base effect for *'Domestic credit banking (T-A)'* in model B6 is weakly negative, but this effect becomes statistically insignificant when the variable 'Crisis period interaction' is dropped from the model (unreported).

Hence, on the one hand, we found evidence consistent with the fire-sale hypothesis for countries with higher default risk and lower economic demand in the crisis. On the other hand, for countries with lower domestic credit, which provide the most important 'test bed' for the fire-sale hypothesis, the results are in conflict with the notion of a sell-out of corporate assets in times of a shortage of liquidity.

A brief look at all other variables in Table 6.4 does not reveal any surprises. The base effect of the crisis period dummy is consistently negative across all models, as expected, and all control variables exhibit a qualitatively similar behavior to Table 6.3.

Finally, we inspected the results of the selection equation in Table A6.4 in the appendix. Again, most effects are similar to Table A6 and the test for independent equations (H0: rho=0) is rejected and therefore confirms that a Heckman selection approach is appropriate. The effects of the domestic credit proxies in the selection equation (models B5 and B6 of Table A6.4) are, however, interesting. The positive and significant coefficients in both models show that acquirers are more likely to originate from countries with higher domestic credit. This is in line with the concept of fire-sale FDI, where acquirers have access to foreign (home-country) liquidity. This evidence is also consistent with the 'cheap financial capital hypothesis' of Baker et al. (2009), which suggests that multinationals use FDI as a financial capital channel from acquirer countries with relatively low-cost capital.

74. We also found similar results for industrial confidence, which is one component of *'Economic sentiment (T-A)'*.

6.4.2 Target premium

The following investigation of target premiums complements the analysis of merger activity (quantity of firms sold) from the perspective of selling prices. Unfortunately, the data for target premiums is mostly limited to public targets. We therefore have only 910 non-missing observations at the country-pair and quarter level in the outcome equation, while there are 34330 observations in the selection equation. In addition, the test for the independence of the selection and the outcome equations cannot reject the null hypothesis that the selection is random. The p-value that rho=0 ranges from p=0.187 to p=0.862, depending on the model specification. Hence, a Heckman procedure is not needed. Accordingly, we estimated and reported the outcome equation directly using generalized least squares (GLS) panel regressions.[75] We used random-effects estimators per ordered country pair and included period fixed effects for year-quarters, although we did not report them in the tables. All standard errors are corrected for heteroskedasticity.

We started with the analysis of two dummy variables for the crisis period and for a group of crisis countries. Table 6.5 reports the results of the GLS estimation. Model C1 introduces all macroeconomic control variables and model C2 all deal-specific control variables. We found a strong negative relationship between *'Crisis countries (T,4)'* and target premiums in these four countries. This applies to the whole period and, as the country break-up in models C3 and C4 shows, also to each crisis country individually. The only exception is Ireland (model C4), where targets seem to be as expensive as in the rest of the EU. Although crisis countries generally have lower selling prices, the positive coefficient of the dummy *'Crisis period'* indicates a tendency towards higher premiums in crisis years. This effect, however, is only weakly significant and not robust (see models C5 and C6 in Table 6.5 and all models in Table 6.6), but we can confidently conclude that the average premium paid does not decrease during a crisis.

The most important test for the fire-sale hypothesis is the interaction of the crisis countries with the crisis period. The fire-sale hypothesis predicts that target prices drop in a crisis, often below their fundamental value (Krugman, 2000). As the results in Table 6.5 show, the respective interaction effects in models C5 and C6 are not negative (model C5 even reports a statistically weak positive effect). Although prices for crisis countries are generally low, they seem to remain on that level, and do not drop to fire-sale levels during the crisis.

Table 6.6 shows six alternative proxies for the crisis country dummies in Table 6.5: sovereign risk measures (models D1 and D2), proxies for economic demand (models D3 and D4), as well as measures of domestic credit (models D5 and D6). For each of these models, the fire-sale hypothesis would predict significant interaction effects. However, we do not find any significant interaction effects (see variable '*Crisis period interaction*') in any of the models.

75. For robustness, we estimated all specifications of the panel as outcome equation in a Heckman procedure, with the same selection equations as in Table A6.3 and A6.4 despite the fact that rho is never statistically different from zero. None of the reported results of the panel estimation specifications differ qualitatively.

Table 6.5 Determinants of the takeover premium

Dependent: target premium	Model C1		Model C2		Model C3		Model C4		Model C5		Model C6	
Crisis period	13.035*	(1.77)	12.782*	(1.72)	12.709*	(1.71)	12.727*	(1.71)	10.746	(1.39)	11.635	(1.53)
Crisis countries (T,4)	-12.467***	(-6.13)	-12.233***	(-6.23)							-13.820***	(-5.29)
Crisis period X countries (T,4)											5.695	(1.09)
Crisis countries (T,5)									-12.682***	(-4.58)		
Crisis period X countries (T,5)									9.058**	(2.15)		
GDP/CAP, 5th quintile (T-A)	13.674	(1.21)	14.111	(1.25)	13.669	(1.21)	14.202	(1.24)	13.465	(1.17)	14.097	(1.25)
GDP/CAP, 4th quintile (T-A)	26.648***	(2.96)	27.410***	(3.09)	27.559***	(3.11)	28.034***	(3.11)	25.270***	(2.8)	26.946***	(3.04)
GDP/CAP, 3rd quintile (T-A)	21.643***	(2.66)	23.203***	(2.97)	23.406***	(2.97)	23.681***	(2.97)	22.633***	(2.87)	22.938***	(2.94)
GDP/CAP, 2nd quintile (T-A)	18.414**	(2.26)	18.446**	(2.36)	18.344**	(2.33)	18.683**	(2.34)	17.879**	(2.26)	18.423**	(2.35)
MKTCAP, 5th quintile (T-A)	-6.694	(-1.34)	-6.480	(-1.26)	-5.986	(-1.16)	-6.273	(-1.21)	-5.944	(-1.15)	-6.559	(-1.28)
MKTCAP, 4th quintile (T-A)	-0.097	(-0.02)	0.422	(0.09)	0.562	(0.12)	0.488	(0.10)	0.641	(0.14)	0.469	(0.10)
MKTCAP, 3rd quintile (T-A)	-8.171**	(-2.05)	-6.972*	(-1.65)	-6.414	(-1.52)	-6.477	(-1.52)	-6.978	(-1.64)	-6.899	(-1.64)
MKTCAP, 2nd quintile (T-A)	0.011	(0.00)	-0.120	(-0.03)	-0.001	(0.00)	-0.046	(-0.01)	-0.054	(-0.02)	-0.149	(-0.04)
GDP growth (T-A)	13.140	(0.61)	13.038	(0.59)	14.026	(0.63)	14.096	(0.64)	16.388	(0.73)	14.396	(0.65)
Openness (T-A)	-0.186	(-0.08)	-0.339	(-0.13)	-0.596	(-0.23)	-0.798	(-0.31)	0.258	(0.10)	-0.339	(-0.13)
Market-to-book (T-A)	-0.313	(-0.47)	-0.239	(-0.36)	-0.158	(-0.23)	-0.178	(-0.26)	-0.321	(-0.47)	-0.272	(-0.40)
Stock market return (T-A)	-20.483*	(-1.80)	-20.532*	(-1.82)	-21.033*	(-1.87)	-20.987*	(-1.87)	-19.649*	(-1.71)	-20.240*	(-1.78)
S.D. stock market return (T-A)	-5.260	(-0.60)	-8.099	(-0.9)	-8.537	(-0.95)	-8.919	(-1.00)	-8.199	(-0.88)	-8.351	(-0.92)
Currency appreciation (T-A)	0.526	(0.91)	0.547	(0.95)	0.559	(0.96)	0.537	(0.92)	0.539	(0.92)	0.531	(0.92)
New EU member (T)	-5.546	(-1.61)	-6.731*	(-1.96)	-6.958**	(-2.02)	-6.854**	(-1.98)	-5.741*	(-1.65)	-6.304*	(-1.84)
Governance index (T-A)	-1.564	(-0.36)	-1.634	(-0.37)	-2.118	(-0.49)	-2.115	(-0.49)	-0.421	(-0.09)	-1.041	(-0.23)
Tax rate (T-A)	-16.847*	(-1.94)	-17.366*	(-1.93)	-18.556**	(-2.09)	-18.397**	(-2.07)	-15.554*	(-1.70)	-15.977*	(-1.76)
Same language (T-A)	2.607	(1.23)	2.996	(1.40)	2.824	(1.35)	2.679	(1.27)	3.549	(1.62)	3.169	(1.47)
Population ratio believers (T-A)	5.562	(0.89)	4.830	(0.77)	4.577	(0.74)	4.052	(0.65)	5.790	(0.88)	5.343	(0.85)
Same religion (T-A)	2.082	(0.95)	2.108	(0.95)	1.883	(0.85)	1.961	(0.89)	1.629	(0.73)	2.052	(0.93)
Ratio all-cash deals			3.030	(0.74)	3.521	(0.86)	3.410	(0.83)	3.605	(0.88)	3.247	(0.79)
Ratio horizontal deals			2.423	(0.76)	2.756	(0.86)	2.600	(0.81)	2.350	(0.72)	2.249	(0.7)
Ratio withdrawn deals			9.691	(1.26)	9.672	(1.22)	9.566	(1.20)	9.157	(1.18)	9.431	(1.22)
Ratio public acquiror			0.616	(0.21)	1.336	(0.43)	1.429	(0.46)	0.369	(0.12)	0.558	(0.19)
Ratio friendly deals			1.601	(0.37)	0.997	(0.22)	1.039	(0.23)	2.587	(0.59)	1.840	(0.42)
Ratio privatization			10.350	(0.87)	9.974	(0.85)	10.221	(0.87)	9.799	(0.82)	10.165	(0.85)
Ratio tender offers			6.224*	(1.75)	6.486*	(1.83)	6.360*	(1.8)	6.390*	(1.78)	6.134*	(1.72)
Portugal					-13.481***	(-3.96)	-13.314***	(-3.87)				
Italy					-11.629***	(-4.98)	-11.495***	(-4.75)				
Greece					-15.708***	(-4.82)	-15.549***	(-4.75)				
Spain					-8.618***	(-3.05)	-8.531***	(-2.98)				
Ireland							3.634	(1.20)				
Constant	4.911	(0.55)	-1.344	(-0.12)	-1.465	(-0.13)	-1.703	(-0.15)	-1.545	(-0.14)	-1.138	(-0.10)
Number of observations	910		910		910		910		910		910	
Wald chi^2	867.230		998.372		1,082.311		1,145.629		836.315		994.392	
Prob>chi^2	0		0		0		0		0		0	
R^2	0.106		0.113		0.113		0.113		0.118		0.117	

Note: Statistical significance levels: *0.10 **0.05 ***0.01 (z/t-values in parenthesis). S.E. corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definitions.

Table 6.6 Determinants of the takeover premium using alternative proxies for crisis countries

Dependent: target premium	Model D1		Model D2		Model D3		Model D4		Model D5		Model D6	
Crisis period	11.118	(1.47)	11.497	(1.52)	12.127	(1.49)	10.657	(1.45)	11.886	(1.57)	11.615	(1.53)
Yield, souv. bond (T-A)	1.175	(0.76)										
Rating, Moody's (T-A)			-0.321	(-0.35)								
Economic sentiment (T-A)					-0.287	(-1.51)						
Household fin. sit. (T-A)							-0.002	(-0.02)				
Domestic credit (T-A)									8.784**	(2.45)		
Dom. credit banking (T-A)											9.303**	(2.49)
Crisis period interaction	-0.300	(-0.21)	0.524	(0.65)	-0.279	(-0.70)	-0.211	(-1.60)	-4.985	(-1.38)	-5.509	(-1.41)
GDP/CAP, 5th quintile (T-A)	12.633	(1.01)	18.464	(1.53)	14.569	(1.34)	7.158	(0.56)	21.203	(1.60)	19.595	(1.41)
GDP/CAP, 4th quintile (T-A)	23.693**	(2.56)	25.245***	(2.69)	24.364***	(2.74)	17.850*	(1.70)	26.999***	(2.68)	25.746**	(2.48)
GDP/CAP, 3rd quintile (T-A)	25.030***	(3.19)	25.754***	(3.21)	25.206***	(3.42)	19.415**	(2.18)	28.272***	(3.21)	27.287***	(3.00)
GDP/CAP, 2nd quintile (T-A)	18.712**	(2.39)	19.347**	(2.37)	19.231***	(2.62)	14.853*	(1.72)	24.657***	(2.71)	23.630**	(2.53)
MKTCAP, 5th quintile (T-A)	-7.337	(-1.41)	-6.920	(-1.35)	-7.082	(-1.34)	-6.522	(-1.18)	-6.492	(-1.31)	-7.976	(-1.56)
MKTCAP, 4th quintile (T-A)	0.377	(0.08)	-0.425	(-0.09)	-0.496	(-0.10)	-0.042	(-0.01)	1.342	(0.29)	0.571	(0.12)
MKTCAP, 3rd quintile (T-A)	-8.249*	(-1.92)	-9.135**	(-2.10)	-8.670*	(-1.93)	-8.091*	(-1.83)	-8.512**	(-1.99)	-9.321**	(-2.15)
MKTCAP, 2nd quintile (T-A)	0.433	(0.13)	-0.446	(-0.13)	-0.277	(-0.08)	0.871	(0.24)	1.337	(0.37)	1.380	(0.38)
GDP growth (T-A)	23.851	(0.97)	9.810	(0.42)	29.393	(1.26)	22.911	(0.96)	18.761	(0.79)	29.842	(1.27)
Openness (T-A)	1.219	(0.45)	0.046	(0.02)	-0.239	(-0.09)	0.925	(0.32)	1.633	(0.56)	1.546	(0.52)
Market-to-book (T-A)	-0.496	(-0.73)	-0.722	(-1.06)	-0.535	(-0.81)	-0.966	(-1.32)	-1.231*	(-1.65)	-1.409*	(-1.79)
Stock market return (T-A)	-16.214	(-1.27)	-17.882	(-1.52)	-15.440	(-1.31)	-16.005	(-1.28)	-17.151	(-1.38)	-16.544	(-1.33)
S.D. stock market return (T-A)	-6.123	(-0.60)	-8.463	(-0.89)	-11.711	(-1.33)	-5.095	(-0.49)	-9.696	(-0.97)	-7.099	(-0.69)
Currency appreciation (T-A)	1.288	(1.41)	0.431	(0.75)	0.281	(0.50)	0.392	(0.52)	0.515	(0.86)	0.555	(0.91)
Governance index (T-A)	-0.413	(-0.09)	0.854	(0.18)	-0.329	(-0.07)	-0.229	(-0.04)	-0.908	(-0.18)	-1.599	(-0.31)
Tax rate (T-A)	-15.771*	(-1.65)	-16.189*	(-1.72)	-11.721	(-1.24)	-20.083**	(-2.03)	-5.322	(-0.47)	-9.157	(-0.82)
Same language (T-A)	2.992	(1.29)	2.724	(1.19)	2.654	(1.18)	3.608	(1.55)	2.458	(1.06)	2.574	(1.10)
Population ratio believers (T-A)	1.030	(0.15)	1.692	(0.26)	-3.882	(-0.59)	-1.046	(-0.16)	3.490	(0.54)	2.498	(0.39)
Same religion (T-A)	-0.185	(-0.08)	1.027	(0.46)	0.853	(0.37)	-0.307	(-0.13)	1.065	(0.45)	0.860	(0.37)
Ratio all-cash deals	2.465	(0.58)	2.794	(0.68)	2.726	(0.64)	3.750	(0.87)	2.201	(0.53)	2.595	(0.61)
Ratio horizontal deals	2.295	(0.69)	2.573	(0.75)	1.838	(0.54)	3.674	(1.10)	3.042	(0.90)	3.991	(1.18)
Ratio withdrawn deals	8.870	(1.08)	10.183	(1.27)	9.341	(1.14)	6.849	(0.83)	9.504	(1.19)	7.509	(0.89)
Ratio public acquiror	-0.488	(-0.13)	-0.012	(0.00)	0.152	(0.04)	-0.263	(-0.07)	-0.687	(-0.19)	-1.045	(-0.29)
Ratio friendly deals	6.888	(1.41)	4.751	(0.97)	4.988	(1.02)	7.256	(1.47)	5.279	(1.09)	6.535	(1.36)
Ratio privatization	11.420	(0.95)	6.968	(0.53)	7.043	(0.54)	10.549	(0.82)	6.108	(0.45)	7.026	(0.53)
Ratio tender offers	9.344**	(2.53)	6.984*	(1.89)	7.028*	(1.87)	7.079*	(1.86)	7.843**	(2.14)	7.682**	(2.07)
Constant	-6.840	(-0.58)	-6.047	(-0.52)	-5.938	(-0.52)	-2.874	(-0.22)	-10.053	(-0.86)	-9.507	(-0.78)
Number of observations	871		910		901		872		873		870	
Wald chi^2	848.847		747.466		808.831		919.387		963.714		976.329	
Prob>chi^2	0		0		0		0		0		0	
R^2	0.125		0.111		0.116		0.12		0.135		0.136	

Note: Statistical significance levels: *0.10 **0.05 ***0.01 (z/t-values in parenthesis). S.E. corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section for variable definitions.

In models D5 and D6, the base effect of the two domestic credit variables is positive, suggesting lower target prices when the target country has a low liquidity. Although, on the face of it, this interpretation is in line with the notion of fire-sale FDI, the base effect of domestic credit applies to the whole period and not only to the crisis years.

In fact, the positive relationship between each of the two domestic credit variables and target premiums prevails when we exclude the interaction variables from models D5 and D6 ($p<0.1$ and $p<0.05$; unreported). The general nature of this effect is more consistent with the notion of cross-border arbitrage of liquidity by multinationals in imperfectly integrated European capital markets (Baker et al., 2009) and less with fire-sale prices in liquidity-constraint target countries during times of crisis.

6.5 Limitations

This study comes with a number of limitations. First the extensive analysis of cross-border M&A was based on the number of acquisitions taking place (as in Erel et al., 2012). The database contained relatively few deals with a reported value, so that statistical analyses could not be performed on deal values. Such an analysis would potentially be even more relevant, as it would allow us to quantify findings in terms of, for example, GDP.

Second, economic theory predicts relations between merger activity on the one hand, and different variables such as macroeconomic risk and liquidity on the other hand. It is hard, if not impossible, to find perfect instruments for these variables. Instead, we had to rely on several proxies for the measurement of these variables.

Third and last, this study has focused on the EU alone. It can be assumed that the Eurozone as a whole is prone to a crisis. In that case it can be expected that fire-sales will be made to acquirers located outside the EU. The current sample does not take non-EU acquirers or target into account.

6.6 Conclusion

This chapter investigated how the financial crisis affected the selling and buying of corporate assets between EU countries. Particularly, we analyzed whether fire-sale FDI played a role in the financial crisis in Europe. In doing so, we focused on three key implications: *(i)* more cross-border sales of corporate assets from countries that were hit hardest in the crisis; *(ii)* lower prices for corporate assets in crisis countries; and *(iii)* more cross-border sales and lower prices when credit conditions tightened and macroeconomic conditions deteriorated.

We then tested these implications with a large panel of corporate transactions in 27 EU countries from 1999 to 2012.

For cross-border sales of corporate assets from the crisis countries Greece, Portugal, Italy, Ireland, and Spain, we did not consistently detect a higher share of cross-border merger activity, neither over the whole period nor during the crisis. Cross-border activity generally declined amid the crisis, which applied equally to crisis countries. When we used sovereign risk measurements, macroeconomic demand conditions, and credit conditions to identify countries in distress, the evidence was mixed. On the one hand, for countries with higher default risk and lower economic demand in the crisis, the results were consistent with the fire-sale hypothesis. On the other hand, for countries with lower domestic credit, which provided the most important 'test bed' for the fire-sale hypothesis, the results were in conflict with the notion of fire-sales.

For target premiums paid in the five crisis countries, our results show that premiums are generally lower, but that they do not drop further during the crisis. When using sovereign risk measurements, macroeconomic demand conditions and domestic credit conditions to identify countries in distress, we have found evidence for depressed prices if credit liquidity in the target country is low. This effect, however, is not stronger in the crisis period, which, again, is not consistent with fire-sale FDI. Instead, it indicates that fire-sales are 'business as usual' (Alquist et al., 2013) and not particularly driven by the financial crisis.

Taken together, we find little evidence for the view that European crisis countries fire-sale their assets, which is in line with recent studies by Chari et al. (2010) and Alquist et al. (2013) for emerging markets. Our evidence rather points towards cross-border capital arbitrage by multinationals (Baker et al., 2009). In fact, we find that acquirers come from countries with easier access to capital in the form of high market-to-book ratios and higher currency appreciation. They seem to invest this capital in target countries with lower market-to-book values by paying lower prices in countries with domestic credit constraints. Crucially, this finding holds for all periods, not only in times of crisis.

Future research could incorporate a larger sample, such that also acquisitions by non-EU countries are taken into account. Despite the economic differences between countries in the EU, it can be argued that all EU countries – as they form an integrated economic area – have been subject to fire-sales to countries outside the EU.

Chapter 7

Conclusion and discussion

7.1 Main research question

Security analyst opinions are the central focus of this thesis. We considered two different types of analysts: fundamental analysts and technical analysts. The response of stock prices to the publication of their investment opinions can give an indication of the extent to which markets are efficient. The Efficient Market Hypothesis (EMH) (Fama, 1965a; Samuelson, 1965) is the main theoretical premise underlying this thesis. The EMH has three different versions (Fama, 1970) which describe different degrees of market efficiency. In a weak-form efficient stock market, investment strategies based on past price and trading volume will not lead to abnormal returns since this information is already incorporated in stock prices. The semi-strong form of the EMH states that stock prices additionally reflect all publicly known information. On top of that information, stock prices also incorporate private information when markets are strongly efficient.

The extent to which markets are efficient has implications for the investment decision process faced by both investors and firms. If a market is not even weakly efficient then investors could exploit strategies using past trading information (i.e., technical analysis) to identify mispriced stocks. When a market is weakly efficient but not efficient on a semi-strong basis, investors can use fundamental analysis to recognize over- or undervalued stocks. In a market which is efficient on a semi-strong basis but not on a strong basis, privileged information is needed to find mispricing (although utilizing this information may be illegal).

As long as markets are inefficient to some degree, investors can enhance returns by studying company data and/or trading information. However, this can be a lengthy (and therefore a costly) exercise. It would therefore be more cost-efficient if specialized analysts can support the investment decision process. Two types of security analysts may help investment decision makers: first, technical analysts who use past price and volume information in forming an opinion on a stock, and second, fundamental analysts who publish recommendations based on a thorough analysis of company fundamentals such as earnings, growth rate and dividend policy.

Against this background, the main research question was formulated as: ***Are security analyst opinions relevant for the decisions to invest in common stock or to acquire a company?***

7.2 Results from sub-questions

This thesis contains five different sub-questions. All of them will be briefly discussed in this section.

1. ***Are security recommendations based on technical analysis associated with positive abnormal returns?***

Technical analysts study trading information such as price and trading volume in order to recommend buying or selling a stock (Murphy, 1999). This procedure can only lead to abnormal investment returns if markets are not weakly efficient. The first sub-question is constructed to test the assumption of weak-form market efficiency.

Based on a sample of more than 5000 TA-based security recommendations for both Dutch stocks and the major Dutch stock index, we found that technical recommendations were not followed by abnormal stock returns. The explanation for this finding was that technical analysts base their recommendations on simple technical trading rules. This result is consistent with the literature that reports that these rules are generally not associated with outperformance. A further analysis revealed that stock prices generally rose (declined) in the 10-day period prior to the publication of a buy (sell) recommendation. This result is another indication that technical analysts simply base their recommendations on prior stock price patterns.

On the basis of this analysis we could not reject the premise of weak-form efficient markets. We thus conclude that technical analyst recommendations can generally not be used to pursue superior investment performance.

2. ***Do recommendations by fundamental analysts have a short-term price impact, and are portfolio strategies based on these recommendations associated with abnormal returns?***

Fundamental stock market analysts use publicly known information regarding the prospects and profitability of companies and issue a recommendation to investors as to buy, hold, or sell a certain stock (Abarbanell and Bushee, 1998). Given the nature of the applied information, fundamental stock market analysts can only play a role when stock markets are not semi-strong efficient. Put differently, markets are not semi-strong efficient if fundament analyst recommendations are associated with abnormal investment performance.

The study concerning this sub-question used more than 31000 recommendations for South African stocks based on fundamental analysis. It was found that short-term stock returns after the publication of a recommendation were positively related to the level of the respective recommendation. Recommendation revisions were also considered. Upward revisions generally had a positive short-term impact on stock prices while downward revisions were negatively related to abnormal returns. Recommendations also had an impact

beyond this initial market response. We devised two different portfolio strategies. In the first strategy five different portfolios were constructed based on the consensus (i.e., average) recommendation. The portfolio containing the twenty percent most positively recommended stocks outperformed the market, while the other four portfolios did not perform significantly different from the market. The portfolios in a next strategy were based on the change in the consensus recommendation in the preceding month. The two portfolios consisting of recommendation upgrades achieved positive abnormal returns, while the two portfolios consisting of downward revisions incurred negative abnormal returns.

The findings indicate that the South African stock market is not semi-strong efficient as recommendations from fundamental analysts can be used to achieve outperformance. This may be less so in other, possibly more developed financial markets. Given this conclusion, fundamental stock market recommendations may also support the investment decisions by firms in real projects, more specifically the acquisition of control in other firms. This topic was addressed in sub-questions 3 and 4.

*3. **Do security analyst target prices provide an indication of a company's future value?***

In addition to recommendations, analysts also publish target prices. A target price is the analyst's opinion of a potential stock price level over a 6 to 12 month horizon (Bradshaw et al., 2012). The publication of target prices generally has an impact on the stock price (Brav and Lehavy, 2003), despite the fact that the level of target prices is usually too high compared to the actual level achieved in the forecasting period (Asquith et al., 2005; Bradshaw et al., 2012; and Bonini et al., 2010).

Target prices may be inaccurate for various reasons. For example, the market may take longer than expected to value the growth potential as suggested by the analyst's forecast. The inaccuracy could also emanate from analyst optimism: analysts may incorporate overly optimistic forecasts of the market return due to which the forecasted stock return becomes too high. Both arguments call for the evaluation of target prices against a benchmark of instant valuations. Takeover bids can provide such a benchmark.

Regarding this third sub-question, it was found that security analysts' forecasted returns (defined as the average target price divided by the stock price) were strongly related to the bid premium (defined as the takeover price divided by the stock price prior to the bid). However, it is argued in the literature (Bradley et al., 1983) that the takeover premium is not an indication of a firm's stand-alone valuation since it may contain synergy considerations. Additional tests revealed that the relation remained intact after controlling for management estimates of synergy gains. The literature further suggests that target prices may incorporate return expectations based on systematic risk (Da and Schaumburg, 2011). A firm-specific stock price potential has been constructed by deducting CAPM-required returns from the return forecasted by analysts. Also in this case the relationship remained statistically significant.

The findings indicate that target prices reflect intrinsic value estimates, hence, short-term price response to target price publications may be rational.

In addressing this sub-question only completed deals were considered. The fourth sub-question broadens the approach by also including withdrawn deals.

*4. **Can analyst opinions be used to predict merger completion?***

Announced mergers do not always lead to completed deals. About one-fifth of the intended deals are later withdrawn (Holl and Kyriazis, 1996; O'Sullivan and Wong, 1998). Cancelled deals can be costly for, among others, the acquirer and the investment banks involved. An indicator of completion likelihood could therefore be beneficial to these parties. Security analyst opinions may provide such a benchmark.

We expected that positive recommendations and high target prices would be associated with a lower completion rate for a given takeover bid, since these opinions create high expectations of the firm's stand-alone growth potential for the investors. In addition, we considered the divergence of opinion among analysts. In case of high dispersion, some investors would have high growth expectations and this could lead, for a given bid, to less target shareholder approval.

The literature on analyst opinions suggests that target prices contain more relevant information than recommendations (Asquith et al., 2005; and Kerl and Walter, 2008). To test this assumption for a sample of acquisitions, merger completion was related to both recommendations and target prices in chapter 5. It was concluded that neither the recommendation level nor the recommendation dispersion was associated with the likelihood of a completed takeover. Target prices appeared to be significantly related to merger completion. Merger completion rates were lower when the target price was high relative to the stock price. This finding holds also when the analysis controlled for the takeover premium. A larger dispersion in target prices was associated with lower completion rates.

We concluded that security analyst opinions are able to provide a benchmark for takeover completion. While recommendations are not associated with completion, target prices appear to be relevant.

*5. **What are the determinants for cross-border M&A in the European Union during the financial and economic crises of 2008 onwards?***

To address sub-questions 3 and 4, merger premiums and completion rates were introduced. These chapters did not explore why mergers occur in the first place. The literature shows that synergy estimates (Brigham and Ehrhard, 2013) and diversification benefits (Mukherjee et al., 2004) play a role in identifying potential merger targets. Furthermore, firm valuation (Erel et al., 2012) is an important determinant, while governance (Rossi and Volpin, 2004), cultural and geographical (Erel et al., 2012) factors also play roles in cross-border M&A flows.

Most reported studies investigating the determinants of mergers and acquisitions did not take into account economic crises. The recent financial and economic crises in Europe provide an opportunity to assess whether merger determinants remain important during times of crisis. In addition, they provide a setting in which the fire-sale hypothesis can be tested. Fire-sales played an important role in the East Asian crisis in 1997-1998: the crisis contributed to a discount on East Asian firms, leading to an increase in inward M&A activity (Krugman, 2000).

We addressed the fifth sub-question using a sample of cross-border deals. Little evidence is found for fire-sales during a crisis. The findings suggest that acquirers originate from countries with high valuation (i.e., high market-to-book ratio and a strong currency) and they invest in countries with domestic credit constraints where market-to-book ratios are lower. Acquirers follow this pattern both during crisis and during non-crisis periods.

7.3 Final results: theoretical and practical implications

Given the results of the sub-questions, the main research question can be answered as follows:

Through the publication of recommendations and target prices, fundamental stock market analysts can support the decision process to invest in stocks and in real assets (i.e., a controlling stake in a firm). We did not find any support for the notion that recommendations based on technical analysis have any relevance in the investment process.

The Efficient Market Hypothesis is the theoretical premise on which some sub-questions were based. Other sub-questions were based on previous findings in the takeover literature. Several contributions to the literature have been made, regarding:

(a) the Efficient Market Hypothesis:

1. We find support for weak-form market efficiency, given that technical recommendations are not related to abnormal returns.
2. We do not find support for semi-strong market efficiency as fundamental stock market recommendations are associated with a short-term price impact. It may be possible that fundamental analysts could have made use of privileged information in shaping their opinion, despite the fact that the use of this information may be illegal. However, recommendations seem to yield abnormal returns beyond the initial price impact. This result suggests that the information content of recommendations is not instantaneously absorbed in stock prices and again illustrates that markets are not semi-strong efficient.

(b) the literature on analyst recommendations:

3. While fundamental analyst recommendations can provide an indication of future stock performance, technical recommendations merely "predict the past".
4. Analysts' target prices can contain value estimates as witnessed by the valuation in takeover deals.

(c) the literature on takeovers:
5. Both the takeover premium and the completion likelihood are associated with the value that analysts assign to a company.
6. Well-known takeover determinants are also valid during economic crises.
7. The role of fire-sales in the Asian crisis can not be generalized as there was not any increased fire-sale activity during the most recent European crisis.

Apart from contributing to the academic literature, the findings in this thesis are also relevant for practitioners, more specifically those active in the field of:
a) stock market investing:
1. Investors should not rely on recommendations based on technical analysis as average stock returns are not significantly different from zero after recommendations are published.
2. It is recommended that investors take the level and recent revision of fundamental recommendation into account when making investment decisions. These recommendations are associated with both short-term and long-term abnormal returns.
3. Target prices contain information regarding fundamental firm values.
b) mergers and acquisitions:
4. In constructing a takeover offer, analyst target prices should be taken into consideration as takeover bids which are below the average target price are more likely to fail.
5. Takeover completion probability is lower for companies incurring a high degree of opinion divergence among analysts as measured by the average forecasted return.

7.4 Limitations and suggestions for future research

The research findings have to be interpreted with a degree of caution due to a number of limitations. Some relatively important ones are listed below.
1. The first limitation concerns technical recommendation data. These recommendations have been hand-coded by the data vendor. Some recommendations therefore may have been erroneously coded. A large impact on results is not expected given both the sheer sample size and the robustness of the findings.
2. Although fundamental analyst opinions were followed by abnormal returns in South Africa, this does not mean that a strategy can be developed in which abnormal returns are generated by using recommendation data. First, the study did not account for transaction costs. Such a correction would be difficult to implement as different investors face different transaction costs. Second, the South African stock market may face liquidity constraints. The findings of this study are nevertheless relevant for investors who are otherwise considering buying or selling a stock. These investors face transaction

costs in any case. The reported returns of the rebalancing strategy may, however, not be achievable.

3. The extensive analysis of cross-border M&A was based on the number of acquisitions taking place (as in Erel et al., 2012). The total deal value may also be relevant; however, the database contained relatively few deals with a reported value and as a result statistical analyses could not be performed.
4. The various sub-questions have been answered using data from different environments. Data from the Netherlands have been used in sub-question 1, data from South Africa in sub-question 2, data from the United States in sub-questions 3 and 4, and data from the European Union in sub-question 5. Although the empirical results of the studies have been robust to several modifications within the sample, they can not be generalized to different regions.

Taking into account the limitations and findings of this thesis, several suggestions for future research are offered:

1. Fundamental and technical recommendations have been considered in isolation in this thesis. Menkhoff (2010) indicates that some investors use fundamental and technical analysis simultaneously. Given the actual implementation of the combined use of TA and FA among investors, it is of particular interest whether a strategy based on both types of recommendations can contribute to investment performance.
2. While the research on analyst recommendations covered a long time period, it would be interesting to thoroughly study recommendations during crisis years. Particularly, it would be interesting to investigate to what extent analysts anticipated the latest crisis. Barber et al. (2003) showed that analysts underperformed during the collapse of the dot-com bubble over the period 2000 to 2002. In 2003, investment banks were penalized for issuing overly optimistic recommendations during the stock market *hausse* in the 1990s. This Global Settlement[76] entailed among others (a) "*the insulation of research analysts from investment banking pressure*", (b) "*an obligation to furnish independent research*", and (c) "*disclosure of [the distribution of] analyst recommendations*". In addition, investment banks had to spend $85 million dollar on investor education. The period 2007 to 2009 was also characterized by a stock market crash. How did analyst recommendations perform during this period?
3. The portfolio strategies depending on fundamental analyst recommendations did not take transaction costs into account, while the reported portfolio returns were contingent on daily rebalancing. It would be interesting to further explore a possible strategy which could be implemented by individual investors who can not devote their full time to investing.

76. The full press release can be consulted at http://www.sec.gov/news/press/2002-179.htm

4. We averaged all recommendations and target prices across analysts. The literature shows that there are differences in forecasting ability across analysts. Examples would be between local and foreign analysts (Bae et al., 2008) and between investment bank employed and independent analysts (Agrawal and Chen, 2008). An incorporation of these differences may increase our understanding of which analysts may be more relevant for certain investment decisions.
5. The relevance of target prices has only been studied using merger premiums as benchmark. A portfolio strategy based on target prices have been conducted only for recently announced target prices (Da and Schaumburg, 2011). It would be valuable for both academics and practitioners to develop a portfolio strategy which takes into account the average published target price.
6. Not all public information is the same and/or costless. It is possible that a proper analysis of companies based on public information is so time-consuming that analysts are able to gain "semi-exclusive insights" from an overwhelming quantity of principally public information. If this is the case, then our findings of abnormal returns to fundamental analyst recommendations do not principally reject semi-strong market efficiency. To test this notion, future studies would have to differentiate between analysts who invest considerable time and costs into their analysis, and those who scan only publicly available material as any other market participant would do. If analysts who invest substantial resources in the analysis of public information earn superior returns, their insights may, in fact, be less public than commonly assumed for semi-strong market efficiency.

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Appendices

Appendix 1. Empirical findings on the Efficient Market Hypothesis

This section contains an overview and discussion of empirical research results regarding the three different versions of the Efficient Market Hypothesis.

A1.1 The weak form

An early study into predictive patterns of stock prices has been conducted by Kendall and Bradford Hill (1953). They studied whether a price change in one week conveyed information about price changes in the next week and they performed this analysis for different industry stock indices and commodities. The longest time series available covers the period 1816 until 1938. The striking conclusion of this research was that "*in series of prices which are observed at fairly close intervals the random changes from one term to the next are so large as to swamp any systematic effect which may be present. The data behave almost like wandering series*" (Kendall and Bradford Hill, 1953: 11). Fama (1970) extensively discussed the empirical work published up to his study. In line with Kendall and Bradford Hill (1953) he concluded that no signs of serial correlation for weekly return series could be found. But, some degree of positive serial correlation could be found on a day-to-day basis, which means that stock returns on day *t* are positively correlated to the returns on day *t-1*. However, the magnitude of serial correlation was too small to exploit, once factoring in the transaction costs. Although Fama (1970) concluded that the evidence in favor of the efficient markets model is extensive, he added the old saying "*much remains to be done*" (Fama, 1970: 416).

In the 1980s and 1990s the discussion on market efficiency continued with the publication of DeBondt and Thaler (1985). For the period 1933 to 1980 they found that stocks which exhibited the worst performance in a 36-month period outperformed previous "winners" during the next 36-month period. Contrary to this reversal-effect, Jegadeesh and Titman (1993) found a momentum effect in stock prices for the period 1965 to 1989. They typically used formation periods of 3 to 12 months and test periods of 3 to 12 months as well. Previous winners appeared to be future winners during each of these periods. The seemingly contrary findings led Barberis et al. (1998) to conclude that there is an underreaction to good news on the short-term (1 to 12 months) but an overreaction to series of good news on the longer run (over a period of 3 to 5 years).

The more recent findings thus suggest that markets can to some extent be predicted by using solely past price information, however, the outcomes are sometimes contradictory. This

indicates that markets may not be as weakly efficient as stated in the early literature. The next section discusses findings on semi-strong efficiency.

A1.2 The semi-strong form

The semi-strong form of the efficient market hypothesis posits that – in addition to past price data – all publicly known information is incorporated into stock prices. Publicly known information is in itself an ambiguous term but academics usually refer to data relating to size, book value, (expected) earnings, dividends, etc. These data can either be found in annual reports or on financial websites and are therefore widely available to investors.

Since the 1970s studies question the semi-strong form of the EMH. One of the earliest studies in this field is by Basu (1977). He focused on the relation between stock returns and the price-earnings (P/E) ratio. Basu found that a low P/E ratio is associated with higher future stock returns. Litzenberger and Ramaswamy (1979) studied the relation between dividend yield (defined as dividend per share divided by the share price) and expected stock returns. For individual stocks they found a strong positive correlation between both variables.

Rosenberg et al. (1985) focused on the book value of equity per share relative to a firm's market value (i.e., its stock price). The book value of equity is defined as common equity including intangibles. They found significant abnormal returns for a strategy in which stocks with a high (low) book-price ratio are bought (sold). Bandari (1988) related stock returns to leverage (debt-equity ratio). He derived the book value of debt from the balance sheet and divided this by the market value of the equity. Again, a positive correlation is found. Finally, Banz (1981) documented a size effect: stocks with a relatively low market capitalization outperformed stocks with a high market value.

All the above studies have applied a correction for market risk as suggested in the Capital Asset Pricing Model (CAPM) (Sharpe, 1964; Lintner, 1965; and Black, 1972). The CAPM theory is in line with Markowitz (1959) and implies that the required rate of return on a security is positively associated with the amount of market risk (beta) of that security. In this sense the findings in these studies seem to violate the EMH: apparently one can achieve risk-adjusted returns by systematically investing in carefully selected stocks.

The variables book-price, price-earnings, dividend yield and leverage have in common that they all have the market price in either the nominator or in the denominator. Fama and French (1992) applied a multivariate test on these variables, including firm size, and found that of these variables the market-to-book ratio (M/B, i.e., the reverse of book-price) and firm size were the ones with the highest explanatory power when tested in conjunction. Fama and French (1993) find support for their claim that M/B and firm size are proxies for risk in common stock returns, in other words, the findings that firm size and M/B are related to future returns are by no means an indication that markets are inefficient. An active investor which achieved outperformance by investing in small stocks and stocks with a high market-to-book

value did not automatically have excellent investment skills: the outperformance would just have been caused by investing in stocks with relatively high risk.

Lakonishok et al. (1994) made a distinction between value and growth stocks. Stocks with a low M/B or a low P/E are in their view exemplary for value stocks. They found that these stocks outperformed growth stocks (i.e., stocks with a high M/B or high P/E), which is consistent with Fama and French (1992). Contrary to Fama and French (1992) they did not attribute this difference to risk as value strategies consistently outperformed the market, even more so in bear markets. Lakonishok et al. (1994) attributed the outperformance of value strategies to the behavior of investors. Investors extrapolated past growth rates in their expectations of future growth rates. This leads investors to be too optimistic about growth companies and too pessimistic about value companies. This finding again is consistent with the reversal effect found by De Bondt and Thaler (1985).

Academics still disagree on the question of semi-strong market efficiency; hence a thorough analysis of company fundamentals may yield outperformance compared to broad market returns.

A1.3 The strong form

Strong-form efficiency asserts that on top of price information and public information, also inside information is incorporated into the stock price. Several studies documented abnormal returns after insider purchases (see for example Rogoff, 1964; and Jaffe, 1974). These studies generally document that stock prices rise after an insider purchase. This implies that insiders have timing ability which reflects that the information they have was not yet incorporated in the market price of the stock. Furthermore it has been documented that around the announcement of mergers and acquisitions, prices of the target company exhibit a run-up of on average 20-25% in the two trading months prior to the announcement (Schwert, 1996). This run-up is another indication of profitable insider trading activity. Given that a stock price prior to the announcement does not reflect the full acquisition premium, not all insider information is absorbed into prices. The literature thus implies that markets are not strongly efficient.

Appendix 2. Additional tables to chapter 6

Table A6.3 Selection equation results for Table 6.3

Dependent: merger activity (0/1)	Model A1		Model A2		Model A3		Model A4		Model A5		Model A6	
Crisis period	-0.107	(-1.62)	-0.110*		-0.112*	(-1.71)	-0.117*	(-1.79)	-0.119*	(-1.81)	-0.111*	(-1.68)
Crisis countries (A,4)	-0.120*	(-1.65)	-0.117*	(-1.65)	-0.120*	(-1.68)					-0.119*	(-1.71)
Crisis countries (A,5)							0.029	(0.46)	0.030	(0.47)		
GDP/CAP, 5th quintile (A)	0.023	(0.19)	0.017	(0.14)	0.026	(0.22)	-0.014	(-0.12)	-0.013	(-0.11)	0.019	(0.16)
GDP/CAP, 4th quintile (A)	0.011	(0.11)	0.006	(0.06)	0.012	(0.12)	-0.073	(-0.67)	-0.072	(-0.65)	0.009	(0.09)
GDP/CAP, 3rd quintile (A)	-0.014	(-0.20)	-0.019	(-0.27)	-0.007	(-0.11)	-0.101	(-1.23)	-0.104	(-1.24)	-0.018	(-0.27)
GDP/CAP, 2nd quintile (A)	0.013	(0.36)	0.014	(0.38)	0.018	(0.50)	0.025	(0.71)	0.020	(0.57)	0.012	(0.33)
MKTCAP, 5th quintile (A)	-0.129**	(-1.98)	-0.122*	(-1.94)	-0.118*	(-1.86)	-0.110*	(-1.74)	-0.110*	(-1.72)	-0.119*	(-1.89)
MKTCAP, 4th quintile (A)	-0.090	(-1.64)	-0.087	(-1.63)	-0.086	(-1.61)	-0.084	(-1.58)	-0.082	(-1.53)	-0.087*	(-1.65)
MKTCAP, 3rd quintile (A)	0.008	(0.21)	0.008	(0.20)	0.009	(0.23)	0.009	(0.23)	0.010	(0.26)	0.009	(0.23)
MKTCAP, 2nd quintile (A)	0.010	(0.37)	0.011	(0.39)	0.013	(0.46)	0.011	(0.41)	0.012	(0.44)	0.011	(0.40)
GDP growth (A)	-0.150	(-0.87)	-0.162	(-0.94)	-0.180	(-1.04)	-0.166	(-0.95)	-0.118	(-0.69)	-0.165	(-0.95)
Openness (A)	-0.410***	(-3.77)	-0.399***	(-3.83)	-0.402***	(-3.87)	-0.409***	(-3.93)	-0.398***	(-3.76)	-0.395***	(-3.73)
Market-to-book (A)	0.028***	(4.91)	0.029***	(5.26)	0.029***	(5.27)	0.025***	(4.57)	0.025***	(4.69)	0.029***	(5.17)
Stock market return (A)	0.083	(1.26)	0.084	(1.27)	0.080	(1.21)	0.069	(1.01)	0.070	(1.02)	0.088	(1.33)
S.D. stock market return (A)	-0.143**	(-2.01)	-0.137**	(-1.96)	-0.138**	(-1.99)	-0.135*	(-1.95)	-0.137**	(-2.06)	-0.147**	(-2.17)
Currency appreciation (A)	0.018***	(3.36)	0.018***	(3.42)	0.017***	(3.39)	0.016***	(3.23)	0.017***	(3.22)	0.017***	(3.15)
New EU member (A)	0.091	(1.34)	0.093	(1.35)	0.103	(1.49)	0.184**	(2.27)	0.177**	(2.20)	0.087	(1.25)
Governance index (A)	-0.094	(-0.78)	-0.093	(-0.80)	-0.092	(-0.79)	-0.094	(-0.80)	-0.085	(-0.71)	-0.078	(-0.65)
Tax rate (A)	1.025***	(4.17)	1.018***	(4.29)	0.987***	(4.13)	0.968***	(4.13)	0.947***	(4.04)	1.026***	(4.35)
Population ratio believers (A)	-0.277	(-1.41)	-0.280	(-1.44)	-0.276	(-1.42)	-0.373*	(-1.77)	-0.379*	(-1.78)	-0.266	(-1.34)
Constant	-0.320	(-0.98)	-0.323	(-1.01)	-0.315	(-1.00)	-0.253	(-0.78)	-0.258	(-0.78)	-0.359	(-1.10)
Number of observations	33941		33941		33941		33941		33941		33941	
N censored	26070		26070		26070		26070		26070		26070	
lambda	0.192		0.192		0.191		0.191		0.192		0.192	
rho	0.987		0.987		0.987		0.987		0.987		0.988	
Test indep. eqns. (chi^2)	63.078		72.839		72.91		76.967		79.298		64.568	
Prob>chi^2 indep. eqns.	0.000		0.000		0.000		0.000		0.000		0.000	

Note: Statistical significance levels: *0.10 **0.05 ***0.01 (z/t-values in parenthesis). Language and religion dummies included in all models. Standard errors corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section of chapter 6 for variable definitions.

Table A6.4 Selection equation results for Table 6.4

Dependent: merger activity (0/1)	Model B1		Model B2		Model B3		Model B4		Model B5		Model B6	
Crisis period	-0.146**	(-2.26)	-0.028	(-0.41)	-0.126*	(-1.71)	-0.139**	(-2.16)	-0.153**	(-2.34)	-0.171***	(-2.61)
Yield, souv. bond (A)	-0.029***	(-3.65)										
Rating, Moody's (A)			-0.042***	(-5.83)								
Economic sentiment (A)					0.000	(0.02)						
Household fin. sit. (A)							-0.005*	(-1.91)				
Domestic credit (A)									0.114**	(2.04)		
Dom. credit banking (A)											0.154***	(2.88)
GDP/CAP, 5th quintile (A)	0.044	(0.36)	0.030	(0.25)	-0.047	(-0.37)	-0.044	(-0.34)	-0.176	(-1.15)	-0.172	(-1.13)
GDP/CAP, 4th quintile (A)	-0.039	(-0.38)	-0.012	(-0.11)	-0.068	(-0.61)	-0.079	(-0.72)	-0.153	(-1.12)	-0.147	(-1.08)
GDP/CAP, 3rd quintile (A)	-0.069	(-0.92)	-0.07	(-0.89)	-0.078	(-0.97)	-0.080	(-1.01)	-0.192*	(-1.77)	-0.191*	(-1.77)
GDP/CAP, 2nd quintile (A)	0.019	(0.56)	0.021	(0.62)	0.030	(0.84)	0.005	(0.14)	0.004	(0.11)	0.004	(0.10)
MKTCAP, 5th quintile (A)	-0.071	(-1.15)	-0.095	(-1.54)	-0.145**	(-2.20)	-0.124*	(-1.92)	-0.152**	(-2.33)	-0.161**	(-2.43)
MKTCAP, 4th quintile (A)	-0.055	(-1.08)	-0.068	(-1.31)	-0.098*	(-1.82)	-0.092*	(-1.82)	-0.083	(-1.50)	-0.095*	(-1.69)
MKTCAP, 3rd quintile (A)	0.009	(0.25)	0.015	(0.38)	0.004	(0.11)	0.008	(0.22)	0.005	(0.12)	-0.001	(-0.01)
MKTCAP, 2nd quintile (A)	0.010	(0.38)	0.016	(0.57)	0.005	(0.18)	0.000	(0.01)	0.004	(0.12)	0.000	(-0.01)
GDP growth (A)	-0.168	(-1.06)	-0.353**	(-2.07)	-0.129	(-0.77)	0.171	(0.93)	-0.040	(-0.24)	0.066	(0.40)
Openness (A)	-0.306***	(-3.16)	-0.343***	(-3.87)	-0.355***	(-3.81)	-0.334***	(-3.57)	-0.341***	(-3.84)	-0.351***	(-3.91)
Market-to-book (A)	0.030***	(6.23)	0.020***	(4.24)	0.023***	(4.61)	0.023***	(4.72)	0.017***	(3.50)	0.014***	(2.87)
Stock market return (A)	-0.018	(-0.25)	0.018	(0.26)	0.054	(0.80)	0.042	(0.61)	0.077	(1.15)	0.09	(1.34)
S.D. stock market return (A)	-0.126*	(-1.85)	-0.028	(-0.42)	-0.129*	(-1.96)	-0.125*	(-1.85)	-0.127*	(-1.89)	-0.124*	(-1.85)
Currency appreciation (A)	0.023***	(3.71)	0.013***	(2.81)	0.017***	(3.79)	0.024***	(4.72)	0.019***	(4.07)	0.021***	(4.39)
Governance index (A)	-0.002	(-0.03)	-0.139	(-1.28)	0.008	(0.08)	0.081	(0.79)	-0.033	(-0.32)	-0.022	(-0.21)
Tax rate (A)	0.828***	(3.44)	0.781***	(3.52)	0.941***	(4.04)	0.897***	(3.99)	1.184***	(4.04)	1.176***	(4.24)
Population ratio believers (A)	-0.238	(-1.44)	-0.310*	(-1.90)	-0.298*	(-1.78)	-0.402**	(-2.24)	-0.211	(-1.26)	-0.208	(-1.22)
Constant	-0.347	(-1.20)	-0.098	(-0.33)	-0.457*	(-1.67)	-0.387	(-1.38)	-0.597*	(-1.94)	-0.657**	(-2.14)
Number of observations	32740		33941		33550		33108		33001		32882	
N censored	25146		26070		25779		25460		25439		25358	
lambda	0.197		0.192		0.193		0.193		0.193		0.192	
rho	0.991		0.987		0.987		0.988		0.986		0.985	
Test indep. eqns. (chi^2)	55.757		114.916		94.329		84.227		94.687		98.968	
Prob>chi^2 indep. eqns.	0.000		0.000		0.000		0.000		0.000		0.000	

Note: Statistical significance levels: *0.10 **0.05 ***0.01 (z/t-values in parenthesis). Language and religion dummies included in all models. Standard error corrected for heteroskedasticity and for clustering within country pairs. Period fixed effects incl. for year-quarters (unreported). See methods section of chapter 6 for variable definitions.

Summary

Security analysts analyze information regarding publicly traded companies and then publish their opinion regarding the company's stocks listed on the stock exchange. There are two different types of analysts.

Fundamental analysts base their view on firm fundamentals such as earnings, growth rate and the invested capital. Their opinion is summarized in a report which contains three summary measures. First, it contains an estimate of the development of the earnings per share in the upcoming years. Second, a stock recommendation is published which can range from a 'strong buy' to a 'strong sell' advice (or similar expressions). Third, the report usually contains a target price. This price reflects the estimated stock price in 6 to 12 months' time.

In contrast, technical analysts ignore firm fundamentals. Instead, they rely on historical trading information such as stock prices and trading volume. Based on trends, technical analysts publish their stock recommendation.

An impact of any of these recommendations on the stock market can give an indication of the extent to which markets are efficient. The Efficient Market Hypothesis (Fama, 1965a; Samuelson, 1965; Fama, 1970) posits that stock prices are independent of the publication of analyst recommendations when markets are strongly efficient. In strongly efficient markets all relevant information – past trading information, public information, and even privileged information – is at all times incorporated into stock prices. Semi-strong efficient markets contend that both trading information and public information are reflected in stock prices. This contention implies that – as long as fundamental analysts do not use privileged information – fundamentals-based stock recommendations should not have an impact on stock prices.[77] In weak-form efficient markets, stock prices reflect any information which could be derived from past trading information. In such a market regime the use of fundamental company information may be used for the generation of abnormal returns. However, technical analysis will be unrelated to future returns since the employed trading data is already incorporated into stock prices. In other words, technical analysis can only be relevant in markets which are not weak-form efficient.

The extent to which analyst recommendations are relevant for future stock returns not only contributes to the body of knowledge related to market efficiency, but is also relevant for practitioners active in the field of investing. If analyst opinions contain relevant information, then these opinions may also have important implications for the bidding process in mergers and acquisitions (M&As), so that the main research question would also be relevant for

77. Both in the US (Regulation Fair Disclosure) and in the Netherlands (*Wet op het financieel toezicht, Artikel 5:25i lid 5*) company officials are not allowed to share private information with analysts. In case they share private information they have to make this public simultaneously.

practitioners in the field of M&A. The main research question in this thesis is formulated as: ***Are security analyst opinions relevant for the decisions to invest in common stock or to acquire a company?***

Findings

The main research question has been divided into five different sub-questions. The first sub-question considered the relevance of recommendations based on technical analysis (TA). Using a dataset containing more than 5000 of these recommendations for Dutch stocks and the Dutch AEX index, we found that on average no abnormal returns were realized after the publication of TA-based recommendations (see chapter 2). Next, we found that the sign of these recommendations was strongly related to the sign of simple technical trading rules, for which most of the academic literature already reported that they are not associated with future abnormal returns. The study further showed that these recommendations are generally trend-following as both stock prices and the index level increased (decreased) prior to the publication of a TA-based buy (sell) recommendation.

Recommendations based on fundamental analysis (FA) were examined in chapter 3. The employed dataset consisted of over 31000 stock recommendations on the South African stock market. The publication of a buy (sell) recommendation generally triggered positive (negative) stock price responses. Furthermore, recommendation revisions were studied and we found that favorable revisions led to short-term price increases while unfavorable recommendation revisions were associated with short-term price decreases. We also studied the returns after the publication of FA-based recommendations beyond this initial short-term impact. For this purpose we devised two different calendar strategies in which all eligible stocks were divided into five different portfolios. In the first strategy portfolios were formed on the basis of the consensus (i.e., average) recommendation level. In the second strategy, portfolios were based on the magnitude of the change in the consensus recommendation level measured over the preceding month. In the first strategy the portfolio containing the top-20% recommended stocks achieved outperformance. No other portfolio generated returns which were significantly different from the market return. In the second strategy both portfolios 1 and 2 (which contained recently upgraded stocks) outperformed the market while portfolios 4 and 5 (which contained downgraded stocks) underperformed the market. This study thus documents that FA-based recommendations could be used both in the short-term and in the longer term for achieving abnormal stock returns.

Given that recommendations based on fundamental analysis contain relevant information for investors, FA-based investment opinions were also applied to investment decisions related to acquisition of control in a target company. More specifically, target prices were studied in

chapter 4. The literature shows that analysts' price forecasts are fairly inaccurate (e.g., Asquith et al., 2005), which may be caused by various factors. First, there is a specific time horizon of usually 12 months for the realization of the price forecast while it may take a stock longer to reach the specific forecast. Second, adverse market movements during the forecast period may cause erroneous forecasts. To overcome these concerns, we linked these price forecasts (as a percentage of the prevailing market price) to premiums paid in takeover bids using a sample of 592 US takeovers. We found that both variables were significantly related to each other, also when we considered *(i)* the estimated synergy gains which may determine the takeover price, and *(ii)* the systematic risk component which may be included in the target price.

Chapter 5 examined the link between takeover completion on the one hand, and analyst recommendations and target prices on the other hand. We refer to a 'completed takeover' once an announced bid ultimately led to a takeover. We expected that shareholders would be less likely to sell their stocks to an acquirer when analysts were optimistic about the stand-alone prospects of a company (i.e., the prospects for the individual company, in the absence of a takeover). Furthermore, we expected that a large opinion divergence regarding the value of the target company would be associated with a decreased likelihood of all shareholders tendering their shares for a given bid. Using a sample of 860 US takeovers, this study showed that forecasted returns were associated with takeover completion, while the recommendation level was not. Controlling for the takeover premium, we found that the forecasted return was negatively related to the likelihood of a successful takeover. The level of opinion dispersion when measured from the forecasted returns was also found to be negatively related to takeover completion.

While chapters 4 and 5 specifically focused on takeover premiums and completion rates, takeover determinants were studied in chapter 6. Using a dataset of cross-border mergers in Europe for the period 1999 to 2012, we established that the relative valuation of acquirer versus target (in terms of market-to-book value) was associated with the likelihood of being either an acquirer or a merger target: the higher (lower) the valuation, the higher the chance of being an acquirer (a target). This pattern was observed in both crisis and non-crisis periods. We found no consistent evidence for fire-sales (i.e., sales of corporate assets below their fundamental firm value) by companies based in a country experiencing a crisis. Although selling prices were depressed for target countries characterized by a low access to credit, this effect was not stronger in crisis periods compared to non-crisis periods.

Conclusions and implications

From our results we can conclude that TA-based recommendations were not followed by abnormal stock returns while FA-based recommendations were associated with both a short-

term impact and an effect on the longer term. The average return forecasted by FA analysts was associated with the premium being paid in takeover bids. This result indicates that analysts' target prices contain estimates of the intrinsic firm value. Target prices were also related to the likelihood of takeover completion. If the average forecasted return was high, the chance on a successful completion of an intended acquisition was low. This negative relation was also observed between dispersion in forecasted returns and takeover completion.

More formally, the answer to the main research question is as follows: ***Through the publication of recommendations and target prices, fundamental stock market analysts can support the decision process to invest in stocks and in real assets (i.e., a controlling stake in a firm). We did not find any support for the notion that recommendations based on technical analysis have any relevance in the investment process.***

Takeover premiums were further explored in a European setting and we found that these premiums did not decrease in those countries experiencing the recent economic and financial crises. An analysis of the number of cross-border deals did not point at fire-sales occurring in Europe during the recent crises.

The conclusions have several theoretical implications. Some academic implications concern the Efficient Market Hypothesis. Since TA-based recommendations are not followed by abnormal returns, the premise of weak-form market efficiency could not be rejected for the Dutch stock market. The South African stock market is not semi-strong efficient, given that FA-based recommendations are associated with both short-term and long-term abnormal returns. However, abnormal returns may be too small to capitalize on, due to both transaction costs and liquidity constraints. FA-based target prices have explanatory power for several M&A-related variables, as the average level of forecasted return is strongly associated with takeover premiums and merger completion. Considering takeover premiums and the volume of cross-border takeovers in the EU, a last theoretical implication is that a fire-sale is not a general characteristic of financial and economic crises since no consistent evidence could be found of its occurrence during the most recent crises.

The results of this thesis also have implications for the practitioner. First, investors should not rely on recommendations based on technical analysis as technical analysts on average do not exhibit valuable forecasting abilities as demonstrated by their recommendations. Second, investors should take the FA-based recommendation level into account when purchasing stocks: both favorably recommended and recently upgraded stocks are associated with future positive abnormal returns. Investors should also pay attention to the average target price as this assessment contains an estimate of a company's intrinsic value. Practitioners in the field of mergers and acquisitions should therefore consider the average forecasted return of target companies, since deal completion is negatively related to this return. High opinion divergence is another potential explanatory variable for the withdrawal of takeover offers.

Recommendations for future research

Although a thesis may reach completion, inspiration and research ambition will continue. It is recommended that future research regarding analyst recommendations should be directed to the four following topics:

First, Menkhof (2010) showed that some investors make use of both technical and fundamental analyses in their investment decision process. It is therefore recommended to further investigate the relevance of combining both TA- and FA-based recommendations, to determine whether such an approach can contribute to superior investment performance.

Second, research in this study covered long time periods. Barber et al. (2003) discussed analyst performance during the dot-com bubble and showed severe underperformance. Given the occurrence of yet another bear market in the period 2007 to 2009, it would be interesting to assess whether analysts have learned from the collapse of the dot-com bubble, such that their recommendations performed better in the period 2007 to 2009 than in the years 2000 to 2002.

Third, forecasted returns have been investigated in this study by relating them to premiums paid in takeover deals. Although such an approach illustrates that target prices contain fundamental value estimates, for investors it would be even more relevant if a profitable trading strategy based on target prices could be developed. Such an analysis can be performed in a similar fashion as the calendar strategy based on fundamental recommendations, as discussed in this thesis.

Fourth, the reported abnormal returns from the trading strategy based on FA-recommendations indicated that investors should take analyst recommendations into account when they are facing an investment decision. This study did not take transaction costs into account. For the actual implementation of a trading strategy employing daily rebalancing, it is, however, important to take account of these costs. These transaction costs should be incorporated in a follow-up study in the future.

Summary in Dutch – Samenvatting in het Nederlands

Een aandelenanalist analyseert informatie met betrekking tot een beursgenoteerde onderneming, waarna de analist zijn oordeel publiceert over de door het bedrijf uitgegeven aandelen. Er zijn twee verschillende soorten analisten: fundamenteel analisten en technisch analisten.

Fundamenteel analisten baseren hun mening op fundamentele bedrijfs- en sectorinformatie, zoals winst, groei en geïnvesteerd kapitaal. Het oordeel van dit type analist wordt verwoord in een lijvig rapport met drie maatstaven die het geheel samenvatten. Ten eerste een winstverwachting, dit betreft de verwachte ontwikkeling van de winst per aandeel in de komende jaren. Ten tweede bevat het rapport een beleggingsadvies. Dit advies kan variëren van kopen tot verkopen (of soortgelijke bewoordingen). Ten derde publiceert de analist gewoonlijk ook een koersdoel: dit is de verwachte koers van het aandeel binnen een termijn van doorgaans 12 maanden.

Hier tegenover staan technisch analisten. Deze analisten onderzoeken historische beursgegevens zoals aandelenkoersen en handelsvolumes. Op basis van trends formuleren technisch analisten een beleggingsadvies.

Een eventuele invloed van analistenadviezen op aandelenkoersen kan implicaties hebben voor het niveau van marktefficiëntie. De Efficiënte Markt Hypothese (Fama, 1965b; Samuelson, 1965; Fama, 1970) stelt dat een analistenadvies geen invloed op de aandelenkoers behoort te hebben zolang een aandelenmarkt sterk-efficiënt is. In sterk-efficiënte markten is alle relevante informatie – historische handelsgegevens, publieke informatie alsmede niet-publieke bedrijfsinformatie – namelijk in de aandelenkoers ingeprijsd. Een semi-sterke efficiënte markt houdt in dat slechts historische gegevens en publieke informatie in de koers zijn verwerkt. Dit impliceert dat – zolang analisten geen gebruikmaken van niet-publieke informatie – het publiceren van fundamentele aandelenadviezen ook in dit regime niet zou moeten leiden tot buitengewone aandelenrendementen (m.a.w., voor risico gecorrigeerde rendementen).[78] Immers, de door analisten gebruikte informatie is publiek toegankelijk en zou dus al in de koers moeten zijn verwerkt. In zwak-efficiënte markten reflecteren aandelenkoersen slechts alle historische koersinformatie en handelsgegevens. Toepassing van fundamentele analyse (FA) zou in dat geval kunnen leiden tot buitengewone rendementen, terwijl de toepassing van technische analyse (TA) in zwak-efficiënte markten geen nut zou hebben. TA zou pas van waarde kunnen zijn wanneer de markt niet zwak-efficiënt is.

In hoeverre het gebruik van analistenadviezen kan leiden tot buitengewone rendementen draagt bij aan de kennis over marktefficiëntie. Als het analistenoordeel relevante informatie

78. Zowel in Nederland (Wet op het financieel toezicht, Artikel 5:25i lid 5) als in de VS (*Regulation Fair Disclosure*) is het aan bedrijven niet toegestaan om koersgevoelige informatie te delen met analisten. In het geval dat dit toch gebeurt, dient de onderhavige informatie per direct publiek bekendgemaakt te worden.

bevat, dan zou een dergelijk oordeel ook implicaties kunnen hebben voor ondernemingswaardering in het kader van fusies en overnames. De onderzoeksvraag in dit proefschrift is als volgt geformuleerd: ***Is het oordeel van beleggingsanalisten relevant voor de beslissing om in een aandeel te investeren of om een bedrijf over te nemen?*** Behalve interessant voor de wetenschap, is deze vraag ook relevant voor beleggers en overnamespecialisten.

Bevindingen

De onderzoeksvraag is opgedeeld in vijf verschillende sub-vragen. De eerste sub-vraag is besproken in hoofdstuk 2 en richtte zich op de waarde van aandelenadviezen die gebaseerd zijn op TA. Er is gebruikgemaakt van een dataset die meer dan 5000 van dit soort adviezen bevat over zowel Nederlandse aandelen als de Nederlandse AEX index. Dit onderzoek laat zien dat er gemiddeld geen buitengewone rendementen plaatsvinden in de tien dagen na de publicatie van een op TA gebaseerd advies. Het beleggingsadvies (koop of verkoop) is sterk gerelateerd aan de uitkomst van simpele technische handelsregels, waarvoor academisch onderzoek al in een eerder stadium heeft laten zien dat ze doorgaans geen koersvoorspellend karakter hebben. De studie laat verder zien dat dit type adviezen voornamelijk trendvolgend is, daar zowel de aandelenkoersen als het indexniveau toenemen (afnemen) in de tien dagen voorafgaand aan een koopadvies (verkoopadvies).

Fundamentele aandelenadviezen zijn bestudeerd in hoofdstuk 3. De gebruikte dataset bestaat uit meer dan 31000 van dit type adviezen ten aanzien van aandelen genoteerd op de Zuid-Afrikaanse aandelenbeurs. In eerste instantie is de kortetermijn-koersreactie na een advies onderzocht. De publicatie van koopadviezen (verkoopadviezen) leidde doorgaans tot een koersstijging (koersdaling). De mate van adviesverandering bleek ook relevant, want een adviesverhoging leidde tot een kortetermijn-koersstijging en een adviesverlaging tot een kortetermijn-koersdaling. In het vervolg van deze studie werd onderzocht of analistenadviezen ook van waarde zijn wanneer de kortetermijnreactie buiten beschouwing wordt gelaten. Daarvoor zijn twee verschillende kalenderstrategieën ontworpen waarin de aandelen in vijf verschillende portefeuilles terecht konden komen. In de eerste strategie zijn aandelen onderverdeeld op basis van het gemiddelde advies (ook bekend als consensusadvies). In de tweede strategie zijn de portefeuilles ingericht op basis van de gemiddelde adviesverandering in de afgelopen maand. In de eerste strategie behaalde de portefeuille die bestond uit de top-20% aanbevolen aandelen *outperformance*. De overige portefeuilles behaalden geen rendement dat statistisch significant afweek van het marktrendement. Bij toepassing van de tweede strategie presteerden zowel portefeuille 1 en 2 (die beide aandelen bevatten waar analisten positiever over waren geworden) beter dan de markt, terwijl zowel portefeuille 4 en 5 bij de markt achterbleven. De resultaten van hoofdstuk 3 laten dus zien dat op FA gebaseerde adviezen zowel

op de korte termijn als op de langere termijn gebruikt kunnen worden door beleggers die als doel hebben om de markt te verslaan.

Aangezien aanbevelingen op basis van fundamentele analyse relevante beleggersinformatie blijken te bevatten, is tevens onderzocht of het gemiddelde analistenoordeel van meerwaarde is bij investeringsbeslissingen aangaande fusies en overnames. Meer in het bijzonder wordt er in hoofdstuk 4 gebruikgemaakt van het gepubliceerde koersdoel. In de literatuur zijn studies verschenen waaruit blijkt dat koersdoelen doorgaans te hoog zijn. Dit kan door verschillende factoren worden veroorzaakt. Ten eerste worden koersdoelen doorgaans afgegeven voor een periode van twaalf maanden terwijl het langer dan beoogd kan duren voordat de koers het verwachte niveau bereikt. Ten tweede kunnen ook marktbewegingen er toe bijdragen dat het koersdoel niet wordt bereikt. Om de problemen met deze tijdsdimensie op te lossen, relateert hoofdstuk 4 de rendementsverwachting aan de premies die worden betaald bij overnames. Er wordt in dit hoofdstuk gebruikgemaakt van gegevens betreffende 592 Amerikaanse overnames. Het voorspelde rendement bleek significant gerelateerd aan de betaalde overnamepremie. Deze conclusie geldt ook wanneer *(i)* er bij het overnamebedrag rekening werd gehouden met de ingeschatte synergievoordelen, en *(ii)* het koersdoel werd gecorrigeerd voor het systematisch risico van het bedrijf.

Hoofdstuk 5 bestudeert de link tussen het analistenoordeel en de kans dat een overnamebod succesvol is (dat wil zeggen, het bod wordt geaccepteerd en de overname wordt gerealiseerd). De verwachting was dat aandeelhouders minder geneigd zouden zijn om hun aandelen aan te bieden aan de overnemende partij wanneer analisten optimistisch zijn over de zelfstandige groeimogelijkheden van het over te nemen bedrijf. Verder was de verwachting dat een grote spreiding in voorspeld rendement zou leiden tot een kleinere kans dat alle aandeelhouders hun aandelen aan zouden bieden voor een gegeven bod. Bij een grote spreiding is het immers waarschijnlijker dat een substantieel deel van de beleggers niet tevreden is met een bepaald bod. In deze studie wordt gebruikgemaakt van een dataset van 860 fusies en overnames die plaatsvonden in de VS. De door analisten verwachte rendementen bleken samenhang te vertonen met de kans op een succesvolle overnamepoging, terwijl adviezen geen voorspelkracht hadden. Meer in het bijzonder blijkt dat – gecorrigeerd voor de overnamepremie – het voorspelde rendement negatief gerelateerd is aan een succesvolle afronding van een overname. Verder is het niveau van spreiding in rendementsvoorspellingen negatief gerelateerd aan de kans op een succesvolle overnamepoging.

Terwijl de hoofdstukken 4 en 5 specifiek ingaan op overnamepremies en de mate van succesvolle afronding, zijn enkele factoren die overnamegedrag verklaren bestudeerd in hoofdstuk 6. Hier is gebruikgemaakt van een dataset van grensoverschrijdende fusies en overnames in Europa in de periode 1999 tot en met 2012. De waardering van de overnemende partij ten opzichte van het overgenomen bedrijf (in termen van de aandelenkoers ten opzichte van de boekwaarde per aandeel) bleek gerelateerd aan de kans om een overnemer of een prooi

te zijn: hoe hoger (lager) de waardering, hoe hoger de kans om een overnemer (prooi) te worden. Dit patroon bestaat zowel in crisis- als in niet-crisisperioden. Er zijn geen consistente aanwijzingen gevonden voor zogenaamde *fire-sales* van bedrijven (een verkoop van bedrijven of bedrijfsonderdelen onder de intrinsieke waarde) in crisislanden. Overnamepremies zijn relatief laag in landen waar de toegang tot krediet beperkt is, maar dit verschilt niet van niet-crisisperioden.

Conclusies en implicaties

Op technische analyse gebaseerde aanbevelingen worden gemiddeld gezien niet gevolgd door buitengewone rendementen, terwijl adviezen van fundamenteel analisten zowel op de korte als op de lange termijn koersinvloed hebben. Het door fundamenteel analisten gemiddeld voorspelde rendement is gecorreleerd met de hoogte van een overnamepremie. Dit is een indicatie van het feit dat geformuleerde koersdoelen een inschatting bevatten van de intrinsieke waarde van een bedrijf. Koersdoelen zijn daarnaast gerelateerd aan de kans op een succesvolle afronding van een overnamebod. Bij een hoog gemiddeld voorspeld rendement is de kans op een succesvolle overnamepoging laag. Deze negatieve relatie werd ook gevonden tussen spreiding in voorspelde rendementen en een succesvolle afronding.

De hoogte van overnamepremies is daarnaast in een Europese setting onderzocht. Deze premies namen niet af tijdens de meest recente financiële en economische crisis in landen die het meest waren blootgesteld aan deze crisis. Ondanks dat crises vaak worden geassocieerd met *fire-sales*, wees een analyse van het aantal grensoverschrijdende transacties niet op het bestaan van *fire-sales* in Europa in de meest recente crisis.

Het antwoord op de hoofdvraag kan als volgt worden geformuleerd: ***Beleggingsadviezen en koersdoelen gebaseerd op fundamentele analyse kunnen het beslissingsproces om te beleggen in een bedrijf of om een bedrijf over te nemen ondersteunen. Het kon niet worden aangetoond dat op technische analyse gebaseerde adviezen waarde hebben in het beleggingsproces.***

De conclusies hebben verschillende theoretische consequenties. Academische implicaties hebben vooral betrekking op de Efficiënte Markt Hypothese (EMH). Aangezien op TA gebaseerde adviezen geen koersinvloed bleken te hebben, kan de zwakke vorm van de EMH niet verworpen worden voor de Nederlandse aandelenmarkt. Op de Zuid-Afrikaanse markt hebben op FA gebaseerde adviezen zowel een korte als een lange termijn koersinvloed. Semi-sterke efficiëntie kan dus worden verworpen voor deze markt. Zowel transactiekosten als liquiditeitsbeperkingen kunnen er overigens voor zorgen dat deze inefficiënties blijven voortduren. Op FA gebaseerde koersdoelen kunnen verschillende overnamegerelateerde variabelen verklaren. Het gemiddeld voorspelde rendement is sterk gecorreleerd met zowel de overnamepremie als de kans op een succesvolle afronding van een voorgenomen overname.

Een laatste theoretische implicatie betreft het concept van *fire-sales*. Er zijn geen consistente aanwijzingen gevonden voor dit type crisistransactie in de meest recente Europese crisis. *Fire-sales* vinden dus niet per definitie plaats tijdens crises.

Dit proefschrift heeft ook implicaties voor de professional. Beleggers zouden niet af moeten gaan op adviezen gebaseerd op technische analyse daar deze adviezen gemiddeld gezien geen voorspellende waarde hebben. Bij het aan- en verkopen van aandelen moeten aandelenadviezen van fundamenteel analisten wél in acht worden genomen: zowel positief aanbevolen aandelen als aandelen waarvan het gemiddelde advies is verhoogd boeken gemiddeld positieve buitengewone rendementen. Ook moeten beleggers op het gemiddelde koersdoel letten. Deze maatstaf bevat informatie over de intrinsieke waarde van het aandeel. Professionals in het veld van fusies en overnames moeten om die reden letten op het gemiddeld voorspelde rendement, aangezien een succesvolle afronding van een overnamepoging negatief gerelateerd is aan zowel de hoogte van het voorspelde rendement als aan de spreiding in deze voorspellingen.

Aanbevelingen voor toekomstig onderzoek

Hoewel een proefschrift zijn afronding vindt, geldt dit niet voor inspiratie en ambitie. Toekomstig onderzoek met betrekking tot analistenadviezen zou zich moeten richten op onder andere de volgende vier onderwerpen.

Ten eerste liet Menkhof (2010) zien dat beleggers bij hun beleggingsbeslissingen gebruikmaken van zowel technische en fundamentele analyse. Het wordt daarom aanbevolen om de relevantie van een combinatie van FA en TA adviezen te onderzoeken: kan deze combinatie leiden tot extra rendement?

Ten tweede omvatten de onderzoeken in dit proefschrift lange tijdsperioden. Barber et al. (2003) toonden aan dat positief aanbevolen aandelen sterk achterbleven bij het marktgemiddelde tijdens het barsten van de internetbubbel in de periode 2000 tot 2002. Omdat de periode 2007 tot 2009 gekenmerkt werd door een nieuwe periode van lange dalingen is het interessant om te onderzoeken of, en in welke mate, analisten geleerd hebben van de crisis aan het begin van dit millennium.

Ten derde zijn voorspelde rendementen in dit proefschrift onderzocht door ze te relateren aan overnamepremies. Deze aanpak heeft laten zien dat koersdoelen informatie bevatten over de fundamentele waarde van een bedrijf. Voor beleggers zou het nog relevanter zijn wanneer er een winstgevende beleggingsstrategie kan worden ontwikkeld op basis van gemiddelde koersdoelen. Een dergelijke analyse kan op een soortgelijke manier ontworpen worden als de kalenderstrategie op basis waarvan de fundamentele adviezen zijn onderzocht in dit proefschrift.

Ten vierde, bij de gerapporteerde buitengewone rendementen van de strategie op basis van fundamentele adviezen is geen rekening gehouden met transactiekosten. Bij een kalenderstrategie waarin de portefeuille dagelijks moet worden herwogen, hebben transactiekosten echter een belangrijke invloed op het eindrendement. Deze kosten zouden in een vervolgstudie kunnen worden meegenomen.

Curriculum Vitae

Dirk Gerritsen (1983) was born in Utrecht, the Netherlands. He completed his education at the Revius Lyceum in Doorn in 2000. He studied Economics at the Utrecht University School of Economics (USE) and obtained his Master's degree in 2004. From 2005, Dirk worked at USE where he lectured the course International Investment Management among others. In addition to his teaching position, in September 2010 he became a PhD candidate at USE, where he completed his dissertation. As of 2012 Dirk has worked as an Assistant Professor at USE. Besides this position he is involved in several committees, such as Euronext Amsterdam's AEX Indices Steering Committee, and the Editorial Committee of the *VBA Journaal*, a quarterly journal published by the Dutch association for investment professionals VBA.

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