Puzzling or dazzling? Analysts' recommendations on stock prices

A study for listed firms in the Dutch market

MASTER THESIS

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"Desire is the key to motivation, but its determination and commitment to an unrelenting pursuit of your goal – a commitment to excellence – that will enable you to attain the success you seek"

- *Mario G. Andretti*

Abstract

This paper investigates the market reactions on stock recommendations taken from the website Analist.nl between January 1, 2005 and May 30, 2014. I document large and positive abnormal volumes in the week preceding and the week after the recommendations for both buy and sell advices. I find positive abnormal returns for the two days preceding the recommendations and one day after the recommendations for both buy and sell recommendations. The positive abnormal return on announcement is partially reversed within 20 trading days indicating that this is mostly a result of naïve buying pressure of uninformed investors. The cross-sectional results imply that the impact on traded volume is strongest for small stocks. I find a short-term announcement effect and confirm the retail attention hypothesis of Barber and Odean (2008) that individual investors are net buyers of attention grabbing stocks, e.g., stocks experiencing high abnormal trading volume and stocks with higher than usual one-day returns. Furthermore, the results show that abnormal volumes are present two weeks before the recommendations for both buy and sell advices providing some evidence of front-running. Finally, I find no evidence that investment strategies based on publicly available consensus recommendations could be profitable in the long-run. The alphas for the market model, three-factor model as well as the four-factor model are not significantly different from zero even gross of trading costs.

Table of Contents

1 Introduction **5**

2 Literature review **10**

3 Hypothesis Development **18**

4 Data and Methodology **23**

4.1 Data....23

4.2 Methodology....27

4.2.1 Event study of returns....27

4.2.2 Event study of trading volumes....30

4.2.3 Calendar-time portfolios....33

4.2.4 Cross-sectional analysis of trading volumes and returns....37

5 Empirical Results **39**

5.1 Event study of returns....39

5.2 Event study of trading volume....45

5.3 Calendar-time portfolios....50

5.4 Cross-sectional analysis of trading volumes and returns....54

6 Conclusion **62**

7 References **64**

1

Introduction

The headline of an article on bespokeinvest.com on the 6th of May reads "Not a good year for analysts either". The company analysed the recommendations of stockbrokers for the last couple of months. They rearranged the S&P 500 into deciles, 10 groups of 50 stocks each, based on analyst ratings. The top decile contain the 50 stocks that are most favored (the amount of buy ratings compared to sell ratings) by analyst, while the bottom decile contains the 50 stocks that were least favored by analysts. Surprisingly, the 50 stocks in the S&P 500 that were most favored by analyst are down an average of 2.4% over the last couple of months, while the 50 stocks that were least favored are up an average of 3.5%![1]. Many investors and individuals rely on the recommendations of financial analysts to choose whether to buy, sell or hold a particular stock within their portfolio. In a sense, investors and potential investors rely on these recommendations because they believe that these specialists have more extensive knowledge of the stock itself and the market in which the stock operates, resulting in a better forecast of future returns than an average person is able to do. As previously displayed, holding the most favored stocks (stock-picked by brokers), has been a losing strategy in the current marketplace.

Stock recommendation by financial analysts and the academic literature related to stock recommendations dates back some time ago. Charles H. Dow (1851-1902), co-founder of Dow Jones and Company presented the Dow Theory on stock price movements over a century ago. The theory was constructed from a series of Wall Street Journal editorials that mirrored Dow's beliefs on how the stock market behaved. Following Dow's death, William Peter Hamilton, Robert Rhea and E. George Schaefer expanded Dow's work and contributed

[1] http://www.bespokeinvest.com/thinkbig/2014/5/6/not-a-good-year-for-analysts-either.html

to the Dow Theory[2]. As early as 1930s, Cowles (1933), showed that analyst' recommendations barely ever perform better than the market. Other studies confirmed similar outcomes related to stock recommendations.

Dimson and March (1986), who investigated brokers' and analysts' unpublished forecasts of UK stock returns found that analyst' recommendation hardly ever perform better than the market. In an analysis conducted by Metcalf and Malkiel (1994) between professional forecasters and a random choice ('dartboard' contest), professionals barely beat the market while the random choice overperformed the market in 50% of the cases. However, not all studies report negative performances of analyst' recommendations on stocks. A study by Womack (1996), find stock prices to be significantly influenced by analyst' recommendation revisions giving at least thought to the idea that analysts appear to have market timing and stock picking abilities. According to Barber et al. (2009) it is generally clear that analysts' recommendations on stocks can predict security returns[3], however it is unclear whether this stems from the rating level assigned by analysts or the change in the rating level. They conclude in their paper that stock price impacts of analysts' recommendations stem from both the rating levels allocated and the changes in those ratings. For rating levels, upgrades earn the highest returns and downgrades the lowest and for rating changes, buy and strong buy recommendations have greater returns than do holds, sells and strong sells. Sant and Zaman (1996) find significant positive abnormal returns for stocks, gross of transaction costs, listed in Business Week with a favorable report. However, the abnormal returns earned and their magnitude decrease with the number of analysts following them. Yazici and Muradoglu (2001) and Syed, Liu and Smith (1990) all find, at least in the short run, gross returns in excess of the market following stock recommendations.

In recent years, analyst' recommendations have been widely studied by academics (e.g. Barber et al. 2001; Barber et al. 2008; Keasler and McNeil 2010; Engelberg et al. 2012). The vast dissemination through printed and electronic media as well as through television appearances, blogs, forums and columns have attributed to the increasing attention that analysts received over the last couple of years. Their ability to exert substantial influence in today's market makes it interesting to see if short-and longer term returns associated with recommendations issued by electronic media exist and perhaps also persist.

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[2] William P. Hamilton's "The Stock Market Barometer" (1922), Robert Rhea's "The Dow Theory" (1932), E. George Schaefer's "How I Helped More Than 10,000 Investors To Profit In Stocks" (1960)
[3] Barber et al. (2009) give reference to Barber et al (2001), Womack (1996) and Jegadeesh and Kim (2006).

My results are in line with Engelberg et al. (2012) and Keasler and McNeil (2012) who investigate Mad Money stock recommendations. They find, performing the calendar-time portfolio approach, no statistically detectable alpha in the long-run. My results are also in line with Barber et al. (2001) after accounting for transactions costs. No abnormal net return is earned that is reliably greater than zero for each of the investment strategies in the long-run.

The analysis on traded volumes show us that there are positive and significant abnormal volumes surrounding the publication date. The (cumulative) average abnormal volumes for the publication day (and one week after the event date 0) for AEX and AMX listed firms are 23% (57%) and 41% (119%) respectively for buy recommendations. I also find positive and significant (cumulative) abnormal volumes for sell recommendations for the same time-intervals. I find positive and significant abnormal volumes for the one week before the recommendations for both buy and sell advices, which might be an indication of front-running.

For the analysis on abnormal returns I document average abnormal returns (AARs) for buy recommendations on the event day 0 that are significant at the 1% level for AEX (0.26%) and AMX (0.44%) listed firms. The two days preceding the publication day are also significant at the 5% level for AEX listed companies and at the 1% for AMX listed companies. The AARs preceding the publication date also provide additional evidence of front-running which is also visible by examining the cumulative average abnormal returns of the added time periods preceding the publication. All intervals preceding the publication are significant at the 1% level for both AEX and AMX listed firms. Hence, in conjecture with the observed average abnormal volumes found in the same period we can infer that induced volume activity is mainly instigated by buy orders. Also for sell recommendations significant and negative average abnormal returns are observed for the recommendation date providing some evidence of the mispricing of sell recommended stocks. The observed negative returns for sell recommendations are in contrast to findings of Barber and Odean (2008) who claim that there should be a strong asymmetric effect with respect to buying and selling following an attention shock. Furthermore, the resulting impact for AEX and AMX listed firms in terms of observed abnormal returns are in line with Barber and Loeffler (1993) and Stickel (1985) that firms with smaller market capitalizations experience larger price reactions to analysts' recommendations.

The last part of my thesis consists of cross-sectional regressions on the abnormal volumes and returns stated before. The results provide evidence for the retail attention-hypothesis of

Barber and Odean (2008) that individual investors are net buyers of attention-grabbing stocks. The larger negative effects after the event date 0 imply that the market reaction one week and two weeks after the publication is larger, the smaller the stock that is recommended which is in line with Keasler and McNeil (2008). In their paper they point out that a given level of uninformed buying or selling following analysts' recommendations would tend to create greater price pressure for smaller size stocks than larger size stocks since these stocks are less liquid in general. Consequently, this might also explain why attention is more pronounced in smaller size stocks.

This thesis explores how stock prices for companies on the Dutch stock market react to the recommendations given by financial analysts. Whether or not analyst' recommendations yield any benefit at all, when compared towards a passive attitude towards the market, is something that will divulge itself throughout this thesis. To quantify this issue, the general research question of this paper is:

Are private investors able to earn abnormal returns following stock recommendations for the Dutch stock market?

Chapter 3 reformulates these questions into detailed hypotheses that help answer the main questions.

The ongoing research on analyst recommendations and their performance over the last couple of years was, in part, instigated by the upsurge of the financial markets. The dissemination of financial and investment issues through different channels helped to reach a broad audience. With the stock market boom following the 1990s, coverage of the stock market increased as well. The purpose of this study is to deepen our understanding about analyst' performance for the Dutch stock market by investigating the recommendations of analysts across large samples of stocks. The additional research about the usefulness of analyst' recommendations in other developed countries gives us a better understanding about how much value analysts can add to investors and would help to strengthen similar results, or not, for similar developed countries. The bulk of studies about analyst's recommendations are focused on data that comprise the U.S (e.g. Syed, Liu and Smith 1990; Womack 1996; Barber et al. 2001; Barber and Odean 2008; Engelberg et al. 2012) but little has been investigated for the continental Europe. A noticeable exception in this is the study by Jegadeesh and Kim (2006). The study focuses on analyst' recommendations in the G7 countries which comprises of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States. They find that the frequencies of sell and strong sell recommendations in all countries are far less than that of buy and strong buy recommendations. Although this study focusses on al G7 countries, the U.S. was found to have the largest price reactions as well as the least sell recommendations. Furthermore, they conclude that analysts in all of the G7 countries add only a modest amount of value with their recommendations implying that these markets are fairly efficient. This thesis offers an interesting insight into the Dutch stock market and a better understanding in added value by analysts in the uncovering of mispricings. Furthermore, it will give us insights in how analysts evaluate stocks. By having an in-depth analysis on the Dutch stock market, we will have a better understanding of the information efficiency of the Dutch financial markets and how it compares to other developed countries.

The plan of this paper is as follows. Chapter 2 gives a review of the existing literature. Chapter 3 formulates detailed hypotheses that help answer the main question. Chapter 4 explains the data set and methodology that is used. The results of my empirical research is presented in Chapter 5. Finally, the last chapter concludes and gives suggestions for future research.

2

Literature review

The question about how much value analysts potentially add to financial market operations has been raised decades ago. In a perfectly efficient market, where any information is already reflected in the price, analysts would not have any added value. However, stock analysts are considered a key part of capital market operations, providing valuable information about stock performance. Their unique skills in collecting, analysing and processing value-relevant information, allow them to possibly add value and making them, at least in part, of value to investors. Accessing the impact of analysts' recommendations has proven to be difficult and left its mark in the dispersed and inconclusive results that exist in today's literature. It is widely accepted that capital markets are semi-strong form efficient, giving thought to the idea about the usefulness of the role of financial analysts. In a semi-strong efficient market, the publication of analysts' recommendations should not affect prices since this is to be considered as stale information and should already be incorporated in prices of subsequent stocks. Only information that is not publicly available can benefit investors seeking to earn returns in excess of the market. Regardless of the amount of fundamental and technical analysis, no abnormal returns can be earned on investments. Nevertheless, studies on the stock price impact of analysts' recommendations have been widespread and formed a variety of interesting results and implications for both researchers and practitioners. In the following, we will discuss a wide, but not exhaustive, range of studies on the matter with an overview of the academic results in past research.

Stock analysts are considered to be an important part of capital market operations. Based on the collecting and processing of information about different stocks, analysts issue recommendations that reflect their consensus of the intrinsic value of the stock. According to Elton, Gruber, and Grossman (1986) analysts' recommendations are one of the few cases where the analyst is recommending an explicit course of action rather than producing a vague number which is left up to interpretation by the user. Therefore, recommendations by financial analysts offer a unique opportunity to study analyst judgement, (un)biasedness and forecasting ability in an empirical context. Analysing a company by financial analysts requires a commitment of time, resources and money. One reason analysts issue recommendations is to generate trades and thus commissions (Chan et al. 2006). Furthermore, according to Michaely and Womack (1999) analysts are important contributors to the underwriting support of their investment banks. Traditionally investment banks have had three sources of income; corporate financing, brokerage service and proprietary trading. The relationship within the bank and with its client could cause conflicts of interest. Most noticeable conflict is the relationship between corporate finance and its brokerage service division. The corporate finance department is primarily responsible for the completion of transactions (e.g. IPOs, seasoned equity offerings), while the brokerage department deals with providing timely, accurate and unbiased information for their clients in order to maximize commissions and spreads. Michaely and Womack (1999) mention the possibility for financial analysts to recommend stocks solely for the reason that this will increase the investment banking or trading profits of their firms, their own compensation, or even their own personal investments instead of recommending stocks because analysts have the genuine believe that these stocks are expected to (under)out-perform[4]. A perfect example of this is the before and aftermath of the economic failure surrounding Enron. Just six weeks prior to its bankruptcy filing, a majority of analyst still remained supportive of Enron, issuing buy or strong buy recommendations[5]. Brokerage firms, analysts' employers and the largest banks had received a huge amount of money in the form of fees for lending, underwriting, advice in merger and acquisitions and trading[6]. In December 2002 rules and regulation introduced by the SEC, FINRA, the NYSE, the New York State Attorney General and ten of the ten-largest investment banking firms in the United States[7] addressed the issues related to conflicts of interest between investment banking and the research department of firms during the late 1990s and early 2000s.

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[4] Hearings before the Subcommittee on Capital markets, Insurance, and Government Sponsored Enterprises of the Committee on Financial services, U.S. House of Representatives, June 14; July 31, 2001

[5] http://online.wsj.com/news/articles/SB1004043182760447600

[6] http://online.wsj.com/news/articles/SB1010960065659882600

[7] Definition of SEC, FINRA and NYSE as well as the ten-largest firms joining the agreement: Securities and Exchange Commission, Financial Industry Regulatory Authority and New York Stock Exchange. The participating investment firms are; Bear, Stearns & Co. Inc.; Citigroup Global Markets Inc. (f/k/a Salomon Smith Barney, Inc.); Credit Suisse First Boston LLC; Goldman, Sachs & Co.; J.P. Morgan Securities Inc.; Lehman Brothers Inc.; Merrill Lynch, Pierce, Fenner & Smith Incorporated; Morgan Stanley & Co. Incorporated; UBS Warburg LLC; and U.S. Bancorp Piper Jaffray Inc.

Clear evidence in biased recommendations is also in existence. Over-optimistic analysts' recommendations exists in general (Rajan and Servaes 1997) and in particular when the brokerage firm analysts work for, has an investment banking relation with the firm they recommend (Michaely and Womack 1999). The documented buy-to-sell recommendation ratios were about 10 over 1 up to the 1990s but even more skewed thereafter.

Price reaction occurrences upon recommendations given by financial analysts have been attributed to different theories. Firstly, the information hypothesis model (Kraus and Stoll 1972; Scholes 1972) tells us that recommendations could reveal relevant information to the market. Furthermore, the information hypothesis maintains that financial markets are semi-strong efficient making the possible adjustments in price more permanent since the analysts' recommendations conveys real news and information that was previously not known. Secondly, we distinguish between the price pressure hypothesis (Kraus and Stoll 1972; Scholes 1972) that states that recommendations cause temporary buying pressure by naïve investors, which leads to the observed abnormal returns and finally a more recent hypothesis proposed by Barber and Odean (2008), entitled the attention-grabbing hypothesis. Similar to the price pressure hypothesis, the attention-grabbing hypothesis assumes that naïve investors' behaviour affects the market. Merton (1987) suggested that the lone attention for a certain company could permanently affect its stock price, despite the fact that no new information has been conveyed to the market. According to Barber and Odean (2008) individual investors are net buyers of attention-grabbing stocks. Since such an investor buys more than he or she sells consequently, recommendations that consist of more buy recommendations than sell recommendations increase prices because of the excess demand on certain stocks. The consequence is that such a price increase is more permanent and mean-reversion should not occur with respect to this model.

On the other hand, Da, Engelberg and Gao (2010) and Campbell, Grossman, and Wang (1992) predict a temporary stock price change due to the publicity effect. Da, Engelberg and Gao (2010) find, using a sample of Russel 3000 stocks, evidence supporting the price pressure hypothesis. They find that price pressure is more likely to occur for stocks with smaller market capitalizations. Also, stronger price pressure is documented following higher search requests in Google among stocks traded by retail investors (Da, Engelberg and Gao 2010). The initial overreaction causes a demand shift among naïve noise traders and leads to short-term overreaction. This price pressure effect is not permanent and mean-reversion sets in after two weeks.

Barber and Loeffler (1993) investigate the returns and trading volumes around the announcements of analysts' recommendations appearing in the monthly "Dartboard" column of the Wall Street Journal. For the period analysed (1988-1990) they found an average announcement return of 3.53 percent on the day of publication. Stocks selected by financial analysts earn in excess of 4 percent abnormal returns for the two days after the announcement in the Wall Street Journal. This price effect is partially reversed within the next 25 trading days. Between the period [+2,+25] following the publication a negative abnormal return of 2.08 percent is documented. Positive abnormal volume is documented for at least six days after the publication of the analysts' recommendations in the Wall Street Journal and is positive for all 15 days after the publication day suggesting that analysts' recommendations persuade trading. These results are in line with Harris and Gurel (1986) and Lamoureux and Wansley (1987) who also examine price impacts of announcements of analysts' recommendations on firms added to the S&P 500. Both Barber and Loeffler (1993), Harris and Gurel (1986) and Lamoureux and Wansley (1987) conclude that the results give reason to suggest buying pressure around the publication date caused by investors following upon recommendations issued by financial analysts. Before mentioned papers indicate that this price effect is partially reversed within the next 25 trading days. This suggests that the initial price response conveys no new information and is at least partially a result of the price pressure hypothesis.

In a later study, Liang (1999) researched the validity of both the information hypothesis and the price pressure hypothesis in the same "Dartboard" column of the Wall Street Journal. His research is in line with the conclusion in Barber and Loeffler (1993), Harris and Gurel (1986) and Lamoureux and Wansley (1987) who stipulate the existence of a prise pressure hypothesis. Liang (1999) documents abnormal returns on the publication day of on average 2.84% and 3.52% with the inclusion of the following day. These returns are reversed within the next 15 trading days. Furthermore, Liang (1999) reports abnormal trading volume up to 144% directly after publication and reports a larger price impact for analysts' recommendations with a better track-record. Greene and Smart (1999) also document results in line with Barber and Loeffler (1993). They report gains of 3% and turnovers of 140% above average on the publication day that dissipates quickly in subsequent days. Similarly, Allen and Awang-Damit (1998), Metcalf and Malkiel (1994) as well as Ghani (1996) all report comparable results in terms of excess returns and abnormal volumes. Besides the comparable results in above mentioned papers all papers make notion of the fact that the observed positive effect sets in before the publication day.

Syed, Liu and Smith (1990) contribute to the existing literature that financial markets respond to the information provided by financial analysts. They show that stock prices react to recommendations in the “Heard on the Streets” column in the Wall Street Journal. Besides the price impact of analysts’ recommendations they also analyse the trading volumes around the publication day. They analyse a period between September 1982 and September 1985. Furthermore they categorized the daily “Heard on the Streets” column into a buy or a sell recommendation according to whether the overall content within this column was (un)favorable. Additionally, each recommendation was further classified according to whether it belongs to the only stock (single-company columns) featured in the column or was one of several stocks (multi-company columns) featured. They find a symmetric impact of buy and sell recommendations with the former (single-company) being significantly greater than the latter (multi-company). Furthermore, they document significant abnormal returns on the publication day and one and two days before the publication [-2,0]. The cumulative abnormal return over the three-day period is 3.09 percent further classified in to a cumulative abnormal return of 5.11 percent for single-company recommendations and 2.39 percent for multi-company recommendations. Additionally, the average trading volume is significantly greater over the three-day period. These results are in line with Millon and Thakor (1985) and Stickel (1985) who argue that even if investment advice is completely based on information that is publicly available, it may affect prices if investors believe “their individual marginal cost of gathering and processing information is greater than their individual expected marginal benefits”. Davies and Canes (1978) and in a later replicated study by Beneish (1991) document positive significant average abnormal stock price performance on the day of publication and on the two preceding trading days following the publication in the “Heard on the Streets” column. According to Beneish the stock price reaction on the two preceding trading days may be due to analysts trading on information subsequently released in the “Heard on the Streets” column. The findings of both Beneish (1991) and Davies and Canes (1978) are generally in line with the studies of Syed, Liu and Smith (1990).

Dorfleitner and Klein (2002) examine the price impact of recommendations made in the German investment magazine Börse Online in the period 1995 – 2001. They conclude that the suggested recommendations have no informational value at all and that it can be even better to do the opposite of the projections made by analysts.

Benesh and Clark (1994) investigate the value of stock recommendations appearing in Barron's. Barron's is a weekly edition that publishes recommendations on single and multiple company selections made by mutual fund managers with an above average track-record. Benesh and Clark document statistically significant market reaction on the day of the publication. Excess returns are an average of 1.8% on the publication day with no distinctive price movements in subsequent days. In a similar study Han and Suk (1996) investigate stock price reactions to securities recommendations by investment firms covered in the Barron's 'Research Reports' column. Abnormal returns of on average 0.54% on the day of the publication and no price reaction on subsequent days are found. The results are in line with Benesh and Clark (1994). Trahan and Bolster (1995) examine the impact on stock prices of purchased recommendations published in Barron's. They show that short-term price reactions have more effect on smaller companies then bigger companies. There data consists of 144 recommended stocks with average abnormal returns of 2.1% on average. There data is subdivided into groups of small and big companies based on market capitalization. They evidence that the group with companies that have relative smaller market capitalizations experience higher abnormal returns. Furthermore, they provide support for the information and in lesser form the prise pressure hypothesis.

Besides financial and investment magazines, television has also been more and more an interesting topic of investigation. The shift from recommendations given in printed media towards stock advice on television left its mark in past research. One of the earliest papers to comment on stock advice on television is Pari (1987). Pari investigates the recommendations given in the television show Wall $treet Week hosted by Louis Rukeyser for the years 1983 and 1984. In his paper he documents abnormal returns that are short-lived and reverse quickly after the publication day. In a similar study, Beltz and Jennings (1997) investigate short-term volume activity and short-and longer-term returns for the same television program. The authors come to conclusions that are roughly in line with Pari (1987).

Busse and Green (2002) study the response of stock prices and traded volume when a stock is featured on the Morning Call or Midday Call segment on financial news provider CNBC. They confirm that prices respond to reports within seconds of discussion and trading activity doubles in the first minute. Stocks that have been discussed positively experience statistically and economically significant price impacts that lasts roughly one minute. The price impact for stocks for which the reports are negative are larger but slower in implementing. This, according to Busse and Green, could be due to the higher costs of short selling.

Recently, a well-known television show that has had a lot of attention is Mad Money. Mad Money is a popular financial television show that airs every weekday on CNBC and is hosted by Jim Cramer who is a former hedge fund manager. Neumann and Kenny (2007) investigate stock recommendations covering shows aired nightly between July 26, 2005 and September 16, 2005. Their final sample size consists of 171 recommendations of which 127 are buy and 44 are sell recommendations. They find returns that are significantly different from zero during the first trading day after a buy recommendation has aired. Furthermore, they document average abnormal returns that are positive on event day 0 and a positive average raw return on the day after the publication that is explained by the difference between the closing price on the publication day and the next day's opening price. Neumann and Kenny attribute this effect to viewers reacting on the recommendations they hear while simultaneously increasing the cost of those decisions for all investors by the time the market opens on the next day. For sell recommendations, the results are much weaker and less significant. Also, traded volume for buy recommendations on the publication date, 15.72%, and the following day, 27.78%, in excess of the market is positive and highly significant. They also observe a volume effect for sell recommendation, albeit weaker and less significant with abnormal volumes of 12.99% on the day of airing and 8.20% on the following day. The discrepancy between buy and sell recommendations on the behaviour of volume and returns could be explained by a smaller sample size for sell recommendations. The difference in magnitude is also evidence in support of the retail attention hypothesis of Barber and Odean (2008). They argue in their paper that there should be a strong asymmetric effect with respect to buying and selling following an attention shock. The idea is that short selling is more difficult because it requires ex-ante ownership and therefore an attention shock can result in asymmetries between buying and selling of stocks by individual traders.

Keasler and Mcneil (2010) documents similar results as in Neumann and Kenny (2007). They investigate 7,807 stock recommendations between December 1, 2005 and December 31, 2006 covering 1,694 individual stocks. Keasler and Mcneil (2010) report significant market reactions with respect to volume and returns. The strongest results are acquired for buy recommendations of smaller stocks. Furthermore, these market reactions are primarily driven by the price pressure of uniformed traders as opposed to value relevant information. They support their results by stating that the observed announcement returns are almost completely diminished in the next 25 trading days. Furthermore, the day after the publication of Mad

Money recommendations the bid-ask spread declines significantly and finally, they mention that no evidence is attained of positive longer-term abnormal returns.

Engelberg et al. (2012) investigate a sample of 826 recommendations made between July 28, 2005 and February 6, 2009. They report large overnight returns that reverse over the next few months. The spike-reversal pattern is most distinctive for small, illiquid stocks that are hard to arbitrage. The temporarily rise of stock prices during the show is further explained by mentioning that no other news is disclosed of the recommended stocks and the fact that prices of recommended stock rice in the precise hour that the show airs. Engelberg et al. (2012) use daily Nielsen ratings as a direct measure of attention. They report the strongest overnight returns when high-income viewership is high. Sell recommendations result in weak price effects and all results together give support to the retail attention hypothesis of Barber and Odean (2008). This is further strengthened by an overnight return of 2.4% for buy recommendations and -0.29% overnight return for sell recommendations giving evidence to support the idea that an attention shock in the form of a sell recommendation has a low impact on returns, perhaps because retail traders rarely sell short. They conclude that there evidence might suggest that analysis in the media of certain stocks may lead to substantial mispricing perhaps also because the limitation to arbitrage allows mispricing to persist.

3

Hypothesis Development

This thesis focuses on the recommendations provided on the website analist.nl. This particular website provides analysts' recommendations for all of the Dutch stocks listed on the AEX and AMX index. Therefore this dataset is useful to evaluate whether it is possible for private investors to make net profits by implementing a trading strategy based on the recommendations provided on analist.nl. To my knowledge, I am the first to investigate the impact of analysts' recommendations on the Dutch market on such a broad scale. The Dutch stock market is an interesting market to research(ers) because previously discussed studies and papers almost all used US data to do their analysis (e.g. Syed, Liu and Smith (1990); Womack 1996; Barber, Lehavy, McNichols and Trueman 2001; Jegadeesh et al. 2004; Barber and Odean 2008; Engelberg et al. 2012). A noticeable exception in this is the study by Jegadeesh and Kim (2006). The study focuses on analyst recommendations in the G7 countries which comprises of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States. Ryan & Taffler (2006) investigate the economic role of sell-side analysts' stock recommendations in the UK market linking the results to sell-side analysts' performance in the United States but so far little to nothing has been mentioned about the Dutch market in the context of this thesis. By having an in-depth analysis on the Dutch stock market, a better understanding of the information efficiency of the Dutch financial markets and how it compares to other developed countries can be obtained. Subsequently, based on prior knowledge, the discussion in the literature and my research question, the main focus of this thesis is:

Are private investors able to earn abnormal returns following stock recommendations for the Dutch stock market?

I investigate the research question by implementing eight hypotheses. The first five hypotheses focus merely on the short-run behaviour of the impact of analysts' recommendations on stock prices and volume. Both buy and sell recommendations are considered in analysing the impact of recommendations on stock prices and traded volume.

Documentation of abnormal returns and traded volume on the issuance of analysts' recommendations have been widespread. Barber and Loefller (1993) investigate the impact of analysts' recommendations published in the monthly "Dartboard" column of the Wall Street Journal. They document average positive abnormal returns of 4% and average volume double normal volume levels on the two days following the announcement of the recommendation. Moreover, approximately half of this price response is reversed within 25 trading days. Their study concludes that the evidence provided by their research is in line with both the information and the price pressure hypotheses. Greene and Smart (1999) observe excess returns accompanied by abnormal trading volume on the day of publication of 3% and turnovers of 140% above average. More interesting is that these gains were realized almost completely in the first minutes of trading making the price movement on the event day relatively low. Liang (1999) documents a significant two day announcement effect that is reversed within 15 days and significantly positive abnormal volumes are observed for 3 days before and 5 days after the issue of the recommendation. The abnormal trading volume is 144% on the publication day and continues during the first 5 days after the publication. Moreover, abnormal volumes just before the issue of the recommendation are significantly positive which might be an indication of front running. Womack (1996) documents, in case of buy recommendations, a mean postevent drift of 2.4% which is temporary. For sell recommendations, negative abnormal returns are more likely. Womack (1996) shows a larger drift (-9.1%) for sell recommendations which prolongs for six months. Furthermore, Stickel (1985) also mention the prolongation, although small, of negative abnormal returns. This leads me to the following hypotheses:

- **I.** Positive abnormal returns can be observed directly before and after the publication of buy recommendations on analist.nl.
- **II.** Negative abnormal returns can be observed directly after the publication of sell recommendations on analist.nl.
- **III.** Abnormal trading volumes can be observed directly before and after the publications of both buy and sell recommendations on Analist.nl.

Stickel (1985) accounts for cross-sectional differences in firm response to Value Line rank changes. Stickel (1985) documents results that support the work of Ohlsen (1979) and Holthausen and Verrecchia (1982), who suggest that the frequency of report arrival and the precision of information are key determinants of price changes. In accordance, Stickel (1985), using firm market value as a proxy for the frequency of report arrival and the precision of information, found that firms with smaller market capitalizations have a larger effect to a rank change. Barber and Loeffler (1993) confirms results in line with Stickel (1985) that firms with smaller market capitalizations experience larger price reactions to analysts' recommendations. This leads me to the next hypothesis:

IV. The smaller the market capitalization of the recommended stock the larger are the observed price responses.

Additionally, Da, Engelberg and Gao (2010) and Campbell, Grossman, an Wang (1993) show a temporary stock price change due to the publicity effect. Da, Engelberg and Gao (2010) find in their sample of Russel 3000 stocks evidence supporting the price pressure hypothesis. They find that price pressure is more likely to occur for stocks with smaller market capitalizations. The initial overreaction causes a demand shift among naïve noise traders and leads to short-term overreaction. This price pressure effect is not permanent and mean-reversion sets in after a short time period. This leads us to the following hypothesis:

V. Perceived abnormal returns erode and disappear after a few days.

The hypotheses mentioned before all have a short-term focus. The next hypothesis tries to quantify whether the provided analysts' recommendations offer value to investors in the long-run and hence whether it is rewarding to follow analysts' recommendations taken from Analist.nl. Barber, Lehavy, McNichols and Trueman (2001), Keasler and McNeil (2010) and Engelberg, Sasseville and Williams (2012) found no evidence of long-run profits from following recommendations in their case. Investors would have been just as well off holding the market portfolio and henceforth no value-relevant information in analysts' recommendations is found. This thesis can shed light on the following hypothesis by looking at long term returns with portfolio formation:

VI. No outperformance can be obtained by investors in the long run, who are informed about the recommended stock on analist.nl.

The existence of abnormal returns raises questions about the underlying factor for these price reactions. Theory attributes different clarifications that might explain the observed price reactions. Firstly, there is the information hypothesis (Kraus and Stoll 1972; Scholes 1972) that tells us that recommendations could reveal relevant information to the market. Furthermore, the information hypothesis maintains that financial markets are semi-strong efficient making the possible adjustments in price more permanent since the analysts' recommendations conveys real news and information that was previously not known.

Secondly, the price pressure hypothesis (Kraus and Stoll 1972; Scholes 1972) states that recommendations cause temporary buying pressure by naïve investors, which leads to the observed abnormal returns.

Finally, a more recent hypothesis proposed by Barber and Odean (2008), entitled the attention-grabbing hypothesis, assumes that naïve investors' behaviour affects the market. Merton (1987) suggested that the lone attention for a certain company could permanently affect its stock price, despite the fact that no new information has been conveyed to the market. According to Barber and Odean (2008) individual investors are net buyers of attention-grabbing stocks. Since such an investor buys more than he or she sells consequently, recommendations that consist of more buy recommendations than sell recommendations increase prices because of the excess demand on certain stocks.

Additionally, Hirshleifer et al. (2009) proposes the investor distraction hypothesis, which holds that the arrival of inessential earnings news causes trading volumes and market prices to react sluggishly to relevant news about a firm. In his paper, Hirshleifer et al. (2009), specifically examine how the number of earnings announcements by other firms affects a firm's volume, announcement period return, and post-event return reactions to an earnings announcement. They give evidence that a large number of competing earnings announcements by other firms is related to weaker announcement date price reactions to a firm's own earnings announcement, a lower volume reaction, and stronger following post-earnings announcement drift. An attention-grabbing event is expected to be specified in the news. To assess the impact and reach of an attention-grabbing event I observe their effects on trading volume and returns. If an unusual number of investors trade a stock, it is nearly redundant that the same amount of investors pay attention to that stock. I focus on buy recommendations and in lesser degree on sell recommendations since Barber and Odean (2008) argue that there should be a strong asymmetric effect with respect to buying and selling following an attention stock. In addition, there should be substantially more buying then selling resulting an attention stock since selling requires ex ante ownership.

VII. The short-term abnormal trading volumes following the buy recommendations taken from analist.nl are caused by attention.

VIII. The short-term abnormal returns following the buy recommendations taken from analist.nl are caused by attention.

In the next chapter of this thesis I describe the data set that is used and the methodology.

4

Data and Methodology

4.1 Data

The recommendations used in this empirical study are taken from the website www.analist.nl. The site offers free reviews of buy and sells recommendations of European and U.S. equities issued by reputable (securities) banks and other institutions (e.g. brokers, credit rating agencies, research institutions, investment magazines etc.). The buy and sell recommendations on analist.nl are followed during the day and are updated on the website as soon as a new recommendation is issued.

Each analyst uses its own method to communicate a certain recommendation. Some analysts use a three-point scale while others use a five-point scale. Also the designation of an advice varies across analysts. Analist.nl translates all terms and methodologies to a three-point scale with the following categories: “buy”, “hold” and “sell”. The category “buy” on analist.nl comprises of the following terms: accumulate, add, buy, outperformer, positive, strong buy and recommended list. Hold consists of the following terms: hold, in line, equal weight, market performer and neutral. Finally, the category sell includes the following terms: negative, reduce, sell, strong sell and underperformer. Currently analist.nl identifies some 700 stocks from the United States, the United Kingdom, France, Belgium, Germany, the Netherlands and Switzerland. The information is easily and freely accessible via the website www.analist.nl. Furthermore, the website provides the opportunity to subscribe to the digital newsletter which is issued every week containing the previous week’s recommendations. The motivations to focus on the Netherlands have already been stipulated in the introduction and include among other things a better understanding in added value by analysts in the uncovering of mispricings. Furthermore, it will give us insights in how analysts evaluate stocks. By having an in-depth analysis on the Dutch stock market, we will have a better understanding of the information efficiency of the Dutch financial markets and how it compares to other developed countries.

My dataset consists of all the analysts' recommendations of companies in the large-cap index (AEX) and mid-cap index (AMX) on the Dutch stock market. Both indices consist of 25 companies with in total 18.149 analyst recommendations. The data is gathered over a period of almost 14 years from January 1, 2000 until May 30, 2014. Since the first couple of years yielded few to no analysts' recommendations I narrowed the time period down to nearly ten years starting on January 1, 2005 until May 30, 2014. A distribution of the collected recommendations over time is presented in Table 1. From Table 1 we can clearly deduct that buy recommendations account for most of the recommendations given by analysts. In the total period of 2000 until May 2014 buy recommendations account for almost 54% of all the recommendations given by financial analyst. This accounts for nearly 9800 recommendations. Sell recommendations are represented in nearly 11% of the cases (1927 recommendations) and hold recommendations amount to almost 36% (6460 recommendations). The distribution of recommendations is consistent with papers such as Barber et al. (2001), Engelberg et al. (2012), Keasler and McNeil (2010), Neumann and Kenny (2007) and Womack (1996). Buy recommendations increase until 2008 with the exception of 2007 that shows a slight decrease. After 2008 buy recommendations are on a decreasing line with the exception of 2010. This is also clearly visible from Figure 1. The amount of sell recommendations are generally the same in the period 2005 to 2013 with the exception of 2008 and 2008 which show twice the average amount of sell recommendations. According to Jegadeesh and Kim (2004) analysts' recommendations do contain and element of bias towards being favorable. When examining the period 1985 to 1999 they show that the average analyst rating is approaching a buy recommendation and sell or strong sell recommendations account for less than five percent of all recommendations. Furthermore, Jegadeesh et al. (2006) find international evidence that occurrences of sell and strong sell recommendations are far fewer than the rate of recurrence of the buys and strong buys in all the countries they researched. According to existing literature this generally is one indication of the conflict of interest analysts face (e.g Michaely and Womack, 1999).

For each stock in the AEX and AMX, I downloaded the closing price (P) from Thomson Reuters Datastream to determine the return of each individual stock *i* for every day *t* between January 2004 and May 2014. Furthermore, I gathered trading volumes, the market capitalization and market-to-book equity of each individual stock *i* for every day *t*. Since all the stocks in my dataset are Dutch I use the AEX and AMX index as image for the market returns. Additionally, to determine the risk free rate, I extracted the daily return on a one month Dutch government bond from Thomson Reuters Datastream and converted it to a monthly rate.

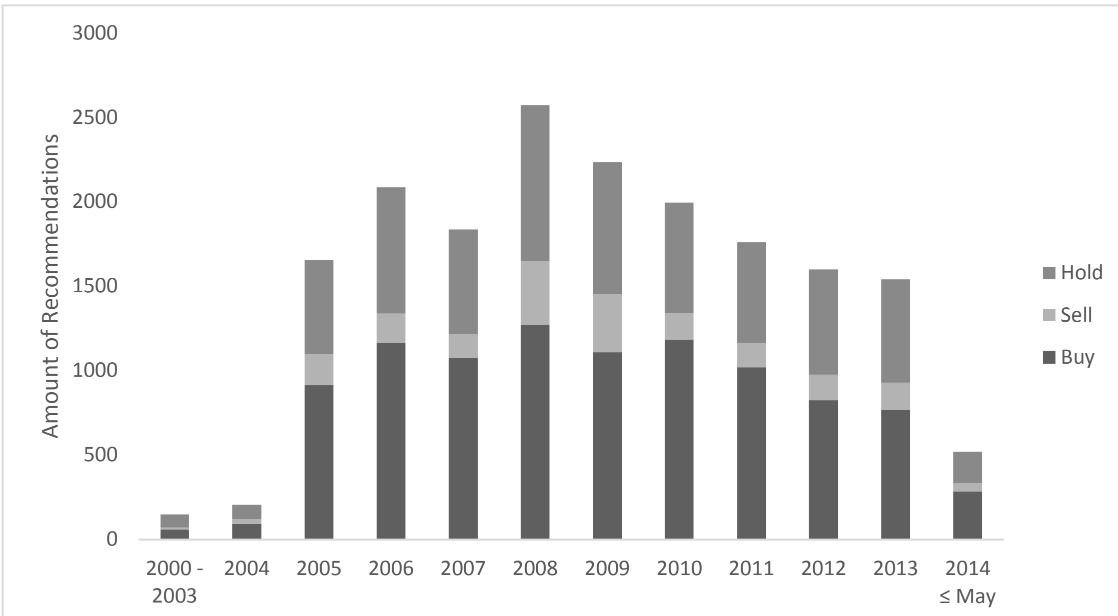

Figure 1. Distribution of analyst recommendations per year in absolute values divided into subsections for buy, hold and sell, 2000 to May 2014

Table 1

Distribution of Recommendations per Year in Percentages and Absolute Values Formed on the Basis of Analyst Recommendations from Analist.nl, 2000 to May 2014

This table presents the analyst recommendations from analist.nl for firms listed on the AEX /AMX stock return file, by year. Panel A shows an overview of buy, hold and sell recommendation in absolute numbers per year and total recommendations per year and over the period 2000 to May 2014. Panel B shows a distribution of recommendations per year in percentages and the change in total recommendations from 2000 to May 2014.

Panel A

	2000 - 2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 ≤ May	Total	%
Buy	61	92	912	1165	1075	1270	1109	1184	1020	824	765	285	9762	*53,8%*
Sell	10	28	186	172	144	380	342	157	143	151	164	50	1927	*10,6%*
Hold	79	85	557	748	615	920	784	654	597	624	612	185	6460	*35,6%*
All recommendations	150	205	1655	2085	1834	2570	2235	1995	1760	1599	1541	520	18149	100,0%

Panel B

	2000 - 2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014 ≤ May
Buy	40,67%	44,88%	55,11%	55,88%	58,62%	49,42%	49,62%	59,35%	57,95%	51,53%	49,64%	54,81%
Sell	6,67%	13,66%	11,24%	8,25%	7,85%	14,79%	15,30%	7,87%	8,13%	9,44%	10,64%	9,62%
Hold	38,54%	5,14%	26,71%	40,79%	23,93%	41,16%	39,30%	37,16%	37,34%	40,49%	117,69%	1,02%
Change in total recommendations	36,67%	707,32%	25,98%	-12,04%	40,13%	-13,04%	-10,74%	-11,78%	-9,15%	-3,63%	-	

4.2 Methodology

The empirical research part of this thesis can be split up into four sections. I investigate short-term returns and trading volumes by conducting an event study surrounding the dates of recommendations. Furthermore, I examine long-term returns by forming calendar-time portfolios and perform a cross-sectional regression on abnormal trading volumes and abnormal returns to determine if the retail attention hypothesis of Barber and Odean (2008) is explaining the observed results, if any.

4.2.1 Event study of returns

The main research question and the sub questions mentioned before are expressed in terms of abnormal returns. Abnormal returns (AR) can be defined as the returns (R) minus the normal returns (NR). This tests whether returns of firms' stock are greater (or smaller) than those predicted by the market.

$$AR_{it} = R_{it} - NR_{it}$$

Where NR_{it} is the predicted return for each stock *i* at time *t* and R_{it} is the actual return of the stock *i* at time *t.*

A vital step in conducting an event study is the choice of a benchmark model for stock return behaviour. The normal return is calculated using an asset pricing model. With a wide variety of models in existence in today's literature it's important to choose a model that captures both the market wide stock price movements from the benchmark return as well as a model that accounts for differences in "beta" defining abnormal returns. Therefore, a good way to define abnormal returns is as residuals of the market model:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t}$$

The abnormal returns are then defined as the residuals or prediction errors of this model,

$$NR_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t}$$

where $\hat{\alpha}$ and $\hat{\beta}$ are OLS estimates of the regression coefficients. In order to measure abnormal returns we need the return of each individual stock *i* for every day *t* for the same time window as the dataset that contain the recommendations of financial analysts. Furthermore, I use the return on the AEX and AMX for the same time window. Preceding with the data mentioned above, it is possible to estimate the alpha and beta for each stock *i* at time *t*. The estimation window that I use to construct estimates for alpha and beta is [-120,-21] trading days prior to the recommendations. This amounts to an estimation window of 100 trading days. These estimates of alpha and beta are used to render the normal return for each time *t* in the event period. Following my previously mentioned formula for abnormal return, subtracting the rendered normal return from the actual return for each time *t* gives us the abnormal return. In analysing abnormal returns, it is conventional to label the event date as time *t=0*. Therefore, the abnormal return on the event date would be denoted as $AR_{i,0}$. In order to analyse stock price changes around events I first average the abnormal returns over all recommendations since it is very difficult to draw conclusions based on the abnormal return of only one stock on one day in time. Furthermore, lots of stock price movements are caused by information unrelated to the event under study so by averaging the abnormal return of all recommendations I mitigate noisy component of returns which will greatly improve the informativeness of the analysis. I obtain equally weighted average abnormal returns by applying the following formula:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

To test whether this average abnormal return is significant on a specific date in the event window I perform the following statistical test:

$$TS_1 = \sqrt{N}\frac{AAR_t}{S_t} \sim N(0,1)$$

Where S_t is estimated as $S_t = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(AR_{i,t} - AAR_t)^2}$

In order to apply this test, we assume some restrictive assumptions. Specifically, I assume that the abnormal returns AR_{it} that together amount to the average abnormal return AAR_{it}, are independently and identically distributed. Additionally, I assume that they follow a normal distribution with mean zero (under the null hypothesis) and variance σ^2. Consequently, under the stated assumptions, TS_1 follows a standard normal distribution as a result of the Central Limit Theorem, which states that under these assumptions, $\sqrt{N}$ times the average, divided by the standard deviation converges to a standard normal variable. Therefore, if N is large enough (N>30), the quantiles of the normal distribution can be used as critical values for the t-test . Since in practice σ is unknown, an estimator of σ can be assembled from the cross-sectional variance of the abnormal returns in period t, namely S_t as expressed before.

I investigate performance over longer periods surrounding the event by means of cumulative abnormal returns, where the abnormal returns are aggregated from the start of the event period, t_1, up to time t_2, as follows:

$$CAR_i = AR_{i,t_1} + \cdots + AR_{i,t_2} = \sum_{t=t_1}^{t_2} AR_{i,t}$$

Next, I aggregate the CARs over the cross-section of events to obtain cumulative average abnormal returns (CAAR):

$$CAAR = \frac{1}{N}\sum_{t=t_1}^{t_2} AAR_t$$

The CAAR states something about the abnormal return earned. In order to make up how reliable this return is, I test the CAAR using a t-statistic. Specifically, I test the null hypothesis (H_0) that $E(CAR_i) = 0$. This hypothesis can be test in the same fashion as testing a one-period abnormal return resulting in the following t-statistic:

$$TS_2 = \sqrt{N}\frac{CAAR}{s} \approx N(0,1)$$

Where *s* is estimated as $s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(CAR_i - CAAR)^2}$

Above mentioned abnormal returns and there significance levels tells us something about the impact of recommendations on the stock market but fail to describe if a private investor can make net profits following analysts' recommendations. To determine whether a private investor can make (net) profits following analysts' recommendations I construct calendar time portfolios that have, according to Fama (1998) and Mitchell and Stafford (2000), better statistical properties than leading alternatives. This part of the methodology is presented in Section 4.2.3.

4.2.2 Event study of trading volumes

In this section I describe how the event study for abnormal volumes is employed and examine whether there exists, if any, abnormal trading volumes surrounding the buy recommendations. Similar to returns, the estimation window that I use to construct estimates for alpha and beta is [-120,-21] trading days prior to the recommendations. This amounts to an estimation window of 100 trading days. These estimates of alpha and beta are used to render the normal volume of a certain stock for each time *t* in the event period. Two prior studies of daily trading volume include Ajinkya and Jain (1989) and Cready and Ramanan (1991). Ajinkya and Jain (1989) report raw trading volume for NYSE to be highly nonnormal, but rather a log-transformation yields trading volume measures that are approximately normally distributed. Furthermore, they conclude based on the analysis made that, in general, the apparition of daily trading volume data in event studies is straightforward. The results in Ajinkya and Jain (1989) and Cready and Ramanan (1991) clearly document the importance of using a log-transformed measure of raw trading volume. “Natural log transformations of the volume measures lend greater symmetry to trading volume and prediction errors such that the entire empirical cumulative distribution function is close to the normal cumulative distribution function”. Specifically, the prediction errors for raw volume measures are significantly positively skewed, with thin left tails and fat right tails. Therefore, as recommended by Ajinkya and Jain (1989) and Campbell and Wasley (1996), I apply the log function to correct for this. To avoid the problem of zero daily trading volume, I add a small constant (0.00000255) to the turnover before taking logs[8]. The log-transformed relative volume is expressed in the following way:

$$V_{i,t} = \mathrm{LN}[\frac{n_{i,t} \times 100}{S_{i,t}}] + 0.00000255$$

where $n_{i,t}$ is the number of shares traded for firm *i* on day *t*, and $S_{i,t}$ is the firm’s outstanding shares on day *t*. Chordia, Roll and Subrahmanyam (2001) document significant increases of trading activity [liquidity is characterised by a high level of trading activity] in either up or down markets. Recent market volatility induces less trading activity and there are strong day-of-the-week effects; Fridays are relatively sluggish while Tuesdays are the opposite. Furthermore, trading activity tend to increase just prior to major macroeconomic

[8] The valuie of [0.00000255] is chosen to make the distribution of daily trading volume closer to a normal distribution. See Ajjnkya and Jain (1989) for further information.

announcements. Jain and Joh (1988) document that average trading volume is lowest on Monday, increase monotonically up to Wednesday and then declines on Thursday and Friday. Since trading volumes are consistently different on each trading day of the week, I take into account the day of the week effect in line with Jain and Joh (1988) and Chordia, Roll and Subrahmanyam (2001). I use dummy variables to expand upon the market model benchmark for Tuesday, Wednesday, Thursday and Friday to incorporate differences in trading volumes for the different days of the week. To estimate the alpha, beta and lambda for each stock recommendation for the estimation window [-120,-21], I estimate the following regression equation with ordinary least squares:

$$V_{i,t} = \alpha_i + \beta_i V_{m,t} + \lambda_{1,i} D_{Tuesday,t} + \lambda_{2,i} D_{Wednesday,t} + \lambda_{3,i} D_{Thursday,t} + \lambda_{4,i} D_{Friday,t} + \varepsilon_{i,t}$$

The market volume measure for a given day *t* is measured as:

$$V_{m,t} = \frac{1}{N}\sum_{i=1}^{N} V_{i,t}$$

where *N* is the number of securities in the market index. The log-transformed abnormal relative volume for each recommendation *i* and each trading day t in the event window is expressed as follows:

$$AV_{i,t} = V_{i,t} - [\hat{\alpha}_i + \hat{\beta}_i V_{m,t} + \hat{\lambda}_{1,i} D_{Tuesday,t} + \hat{\lambda}_{2,i} D_{Wednesday,t} + \hat{\lambda}_{3,i} D_{Thursday,t} + \hat{\lambda}_{4,i} D_{Friday,t}]$$

In order to analyse volume changes around events I first average the abnormal volumes over all recommendations since it is very difficult to draw conclusions based on the abnormal volume of only one stock on one day in time. Furthermore, lots of volume movements are caused by information unrelated to the event under study so by averaging the abnormal volume of all recommendations I mitigate noisy component of volumes which will greatly improve the informativeness of the analysis. I obtain equally weighted average abnormal volumes in line with Campbell and Wasley (1996), by applying the following formula:

$$AAV_t = \frac{1}{N}\sum_{i=1}^{N} AV_{it}$$

To test whether this average abnormal volume is significant on a specific date in the event window I perform the following statistical test:

$$TS_3 = \sqrt{N}\frac{AAV_t}{S_t} \sim N(0,1)$$

Where S_t is estimated as $$S_t = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(AV_{it} - AAV_t)^2}$$

In order to apply this test, we assume some restrictive assumptions. Specifically, I assume that the abnormal volumes AV_{it} that together amount to the average abnormal volume AAV_{it}, are independently and identically distributed. Additionally, I assume that they follow a normal distribution with mean zero (under the null hypothesis) and variance σ^2. Consequently, under the stated assumptions, TS follows a standard normal distribution as a result of the Central Limit Theorem, which states that under these assumptions, $\sqrt{N}$ times the average, divided by the standard deviation converges to a standard normal variable. Therefore, if N is large enough (N>30), the quantiles of the normal distribution can be used as critical values for the t-test . Since in practice σ is unknown, an estimator of σ can be assembled from the cross-sectional variance of the abnormal volumes in period t, namely S_t as expressed before.

I investigate performance over longer periods surrounding the event by means of cumulative abnormal volumes, where the abnormal volumes are aggregated from the start of the event period, t_1, up to time t_2, as follows:

$$CAV_i = AV_{i,t_1} + \cdots + AV_{i,t_2} = \sum_{t=t_1}^{t_2} AV_{it}$$

As performed before, I aggregate the CAVs over the cross-section of events to obtain cumulative average abnormal volumes (CAAV):

$$CAAV = \frac{1}{N}\sum_{t=t_1}^{t_2} AAV_t$$

The CAAV states something about the abnormal volume made. In order to make up how reliable this volume is, I test the CAAV using a t-statistic. Specifically, I test the null hypothesis (H_0) that $E(CAV_i) = 0$. This hypothesis can be test in the same fashion as testing a one-period abnormal volume resulting in the following t-statistic:

$$TS_4 = \sqrt{N}\frac{CAAV}{s} \approx N(0,1)$$

Where s is estimated as $s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(CAV_i - CAAV)^2}$

A t-statistic of 2.58 or higher implies at least 1% confidence that the CAAV is different from zero. Thus, one can say with a reasonable confidence that there exists an abnormal volume. This can be stated also for confidence levels of 5% for a t-statistic of 1.96 or higher and 10% for a t-statistic of 1.65 or higher.

4.2.3 Calendar-time portfolios

The two previous sections of my empirical research focused on short-term events. The calendar time portfolio approach is a renowned technique for analysing the risk-adjusted performance of private investors by support of a two-step procedure. First developed by Jaffe (1974) and Mandelker (1974) and advocated by Fama (1998), the technique has been used in many long-run event-studies, for example in research on the performance of stocks (e.g. Fama 1998; Mitchell and Stafford 2000) and the performance of private investors (e.g. Barber and Odean 2000; Kumar and Lee 2006). Mitchell and Stafford (2000) and Fama (1998) advocate this technique as being superior to regular procedures where abnormal returns are accrued over long periods, what can be source of serious bias (Barber and Lyon 1997). Specifically, the distribution of the abnormal returns projected is better estimated by the normal distribution, allowing for robust statistical inference. Additionally, the practical use of calendar-time portfolios explicates for cross-correlations of firm abnormal returns (Lyon, Barber and Tsai 1999).

To determine whether private investors can profit from analysts' consensus recommendations, I construct calendar time portfolios based on the consensus rating of each covered firm in line with Barber, Lehavy, McNichols and Trueman (2001). The average analyst rating, $\bar{G}_{i\tau-1}$, for firm i on date $\tau - 1$ is found by summing the individual ratings, $G_{ij\tau-1}$, of the j=n to $n_{i\tau-1}$ analysts who have outstanding recommendations for the firm on that day and dividing by $n_{i\tau-1}$. This can be expressed in the following way:

$$\bar{G}_{i\tau-1} = \frac{1}{n_{i\tau-1}} \sum_{j=1}^{n_{i\tau-1}} G_{ij\tau-1}$$

This average analyst rating (consensus rating) is tracked over a period of eight years from January 1, 2006 to December 31, 2013 because after 2005 this period exhibits enough coverage by analysts. For each stock in this period, I check daily if a recommendation is given. If a recommendation is present on a certain day in this period, I add this recommendation to the average analyst rating[9]. This provides me with the relative average analyst rating of that stock compared to other stocks. The acquired consensus henceforth is a snapshot in time that is altered as a result of the mutations over the length of the period. Hence, in the beginning the consensus would not change that much since few recommendations exists, but if time starts to progress, the consensus could change more since more recommendations are available[10]. If a certain analyst gives a revision or a confirmation of his or her recommendation then the recommendation for this particular analyst will be adapted and not counted twice in the construction of the consensus rating. Furthermore, each recommendation is accompanied with an "age" variable. This variable counts the trading days a recommendations is incorporated in the consensus without revision or confirmation by the analyst. I set the "age" of each recommendation at 60 trading days meaning that the recommendation, if not revised or confirmed within this period, will be excluded from the consensus[11]. In summary, the consensus is adapted over the entire period based on three values: the numerical score (-1,0 or +1 so buy, hold or sell), the analyst (bank) that issued the recommendation and the "age" of the recommendation[12]. I track in calendar time the investment performance of companies clustered into portfolios giving their consensus recommendation. Each time an analyst is stated to initiate coverage, altering his or her rating of a firm or dropping coverage, the consensus analyst recommendation of the firm is reviewed and the firm moves between portfolios, if necessary. Any necessary portfolio rebalancing follows at the end of the trading day[13]. The average ratings are then sorted from most highly recommended stocks to stocks that are least favorably recommended. With the help of these

[9] E.g. if Deutsche Bank on February 1 announces "buy" ING, the action will be noted as +1. If this is followed by "sell" a day later from SNS, this will be denoted as -1. The consensus recommendation of that stock (ING) on that particular moment will then be [+1-1] = 0
[10] See also table 1 for the distribution of recommendations by year.
[11] Exclusion in this case refers to the recommendation being retired if no revision or confirmation occurs in the designated time period. E.g. if a recommendation is confirmed on day 55 of the 60 trading days for example, the "age" variable starts a new count. This will prevent recommendations that were issued in 2006, to still count in 2012 without revision or confirmation of the analyst. Also confirmation could mean that the analyst received new information that made him confirm his previous recommendation to let investors know that the confirmation is still valid under the current circumstances and that the analyst might even be more certain about his previous projections.
[12] This consensus will be positive most of the time since there is a huge bias towards buy recommendations. The only exception will be the start of the tracking period since analysts can start off with a sell recommendations so that it will take time for the consensus to adjust to an average buy or hold consensus.
[13] This means that investors are assumed to react to a change in the consensus recommendation at the close of that particular trading day that the change took place.

average ratings, each covered firm is assigned to one of five portfolios as of the close of trading on date $\tau - 1$[14].

Following the composition of each portfolio p as of the close of trading on date $\tau - 1$, the value-weighted return for date τ is obtained. This can be expressed in the following way:

$$R_{p\tau} = \sum_{i=1}^{n_{p\tau-1}} x_{i\tau-1} R_{i\tau}$$

where $x_{i\tau-1}$ is the market value of equity for firm *i* as of the close of trading on date $\tau - 1$ divided by the aggregated market capitalization of all firms in portfolio *p* as of the close of trading on that date, $R_{i\tau}$ is the return on the common stock of firm *i* on date τ and $n_{p\tau} - 1$ is the number of firms in portfolio *p* at the close of trading on date $\tau - 1$.

Barber et al. (2001) describes two reasons to value weight rather than equally weight the securities in each portfolio. Equal weighting of daily returns with the contained assumption of daily rebalancing leads to portfolio returns that are severely inflated[15]. Additionally, value weighting allows for better economic significance of the results because the individual returns of the firms that are more important and larger will be more deeply embodied in the aggregate return than will those of the firms that are smaller and less important.

The monthly return $R_{p\tau}$ can be constructed by compounding the daily returns for each portfolio *p*, for every month in the sample period, over the *n* trading days of the month in line with Barber et al. (2001):

$$R_{p\tau} = \prod_{\tau=1}^{n} \left(1 + R_{p\tau}\right) - 1$$

The next part of this section explains how to determine whether profitable investment strategies exists given the analysts' consensus recommendations and hence assess if event firms persistently gross abnormal returns. This is a three-step procedure by first starting with a simple calculation of market-adjusted returns for each portfolio that I created. This is defined by $R_{p\tau} - R_{f\tau}$ for portfolio p in month τ. The month τ return on the AEX / AMX value-weighted market index is denoted as $R_{m\tau}$. We first start with the implementation of the

[14] The decision to go for five portfolios lies in the high degree of separation across firms in the sample while retaining sufficient power of test that is achieved in this way. For a more detailed discussion, see Barber et al. (2001).

[15] For a more detailed discussion, see Harris (2002), Blume and Stambaugh (1983) and Barber and Lyon (1997) about this problem that arises because trade prices bounce between the bid and ask sides of the market and introduce a systematic bias to the data.

Capital Asset Pricing Model (CAPM) by assessing the following monthly time-series regression:

$$R_{p\tau} - R_{f\tau} = \alpha_p + \beta_p\left(R_{m\tau} - R_{f\tau}\right) + \varepsilon_{p\tau}$$

where $R_{f\tau}$ is the risk-free return, α_p is the intercept of the CAPM, β_p is the market beta and $\varepsilon_{p\tau}$ is the regression error term.

Above mentioned formula estimates the model parameters of the Capital Asset Pricing Model. The choice of risk factors depends on the underlying model that is chosen to predict expected returns. The CAPM uses only one risk factor, namely the beta. This leads me to the following step which is extending the one-factor model (Jensen, 1968) by employing the theoretical framework of the three-factor model (Fama and French, 1993). This model extends the one-factor model by adding two additional factors besides the beta namely, the SMB ("small minus big") factor and the HML ("high minus low") factor:

$$R_{p\tau} - R_{f\tau} = \alpha_p + \beta_p\left(R_{m\tau} - R_{f\tau}\right) + s_p SMB_\tau + h_p HML_\tau + \varepsilon_{p\tau}$$

where SMB_τ accounts for the month τ return differences of a value-weighted portfolio of small stocks and one of large stocks, and HML_τ accounts for the month τ return differences of a value-weighted portfolio of high book-to-market stocks and one of low book-to-market stocks[16].

Finally, the last step is extending the three-factor model by adding one last factor, namely MOM[17] ("monthly momentum"):

$$R_{p\tau} - R_{f\tau} = \alpha_p + \beta_p\left(R_{m\tau} - R_{f\tau}\right) + s_p SMB_\tau + h_p HML_\tau + m_p MOM_\tau + \varepsilon_{p\tau}$$

where MOM_τ captures a stock price's tendency to continue rising if it has been rising in the near past and to continue declining if it has been declining.

All together above three models yield parameters for $\alpha_p,\ \beta_p,\ s_p,\ h_p\ and\ m_p$. The parameters will give insight in the characteristics of the firms in each of the portfolios. The parameter β_p explains something about the riskiness of the firms in portfolio *p*. A value greater than one point out that the firms in that particular portfolio are, on average, riskier than the market. For a value less than one, the opposite is valid. The parameter s_p explains

[16] The construction of the factor HML is done using the book-to-market of equity and the SMB factor is measured by market capitalization. For the exact composition of the factors see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_factors.html

[17] For a detailed description of MOM see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_mom_factor.html

something about the market capitalization of firms in portfolio *p*. A value greater than zero indicates a portfolio skewed towards smaller firms. For a value less than zero, the opposite is true. The parameter h_p states something about the book-to-market ratio of firms in portfolio *p*. A value greater than zero symbolises a tilt towards firms with a high book-to-market ratio. The opposite is true for values less than zero for this parameter. The parameter m_p, if greater than zero, suggests a portfolio with stocks that have, on average, performed well in the past. The contrary is true if the value of m_p is less than zero. Significant positive alphas (parameter α_p) are an indication of outperformance in the long run. The opposed occurs if the value for α_p is not statistically different from zero.

4.2.4 Cross-sectional analysis of trading volumes and returns

Finally, in this section I describe how I conduct a cross-sectional analysis on trading volumes and returns to investigate what influences the magnitude of abnormal volumes and returns in the week prior and after the issuance of recommendations. This might give us insight in whether these short-term announcement effects are caused by an attention-grabbing event. For the dependant variables in these regressions, I use the (cumulative) abnormal volumes and returns of the following periods in the event window:

CAV[-10,-1]	**CAV[-5,-1]**	**AV[0]**	**CAV[0,5]**	**CAV[0,10]**
CAR[-10,-1]	**CAR[-5,-1]**	**AR[0]**	**CAR[0,5]**	**CAR[0,10]**

The provided information above results in the following regressions for both volume and returns:

$$(C)AV_i = \alpha + \beta_j X_{i,j} + \varepsilon_i \qquad (C)AR_i = \alpha + \beta_j X_{i,j} + \varepsilon_i$$

For this regression I make use of the following independent variables:

I. Liquidity: measured by dividing the total number of shares traded, $volume_{t-1}$, by the average number of shares outstanding, $shares_{t-1}$, expressed in percentages.

II. Number of analysts following stock: this number measures the amount of analysts that revised, confirmed or issued a recommendation in the last 6 months over a particular stock.

III. Number of recommendations on event date: the total number of recommendations that were provided on analist.nl on that day. I expect, in line with the investor distraction hypothesis of Hirshleifer, Lim and Teoh (2009), that private investors pay less attention to a recommendation when more recommendations by other analysts are competing with each other on the same day.

IV. AMX dummy: a dummy variable that takes the value of 1 if the company is listed on the AMX and o otherwise (meaning listed on the AEX).

V. Market capitalization: a natural log of the market capitalization of each stock that is recommended. The market capitalization is measured at $t-1$.

VI. Book-to-market equity: a measure that gives the ratio to find the value of a company by comparing the book value of a firm to its market value. The book-to-market equity is measured at $t-1$.

5

Empirical Results

5.1 Event study of returns

The first part of the methodology explained the reason for conducting and how to conduct an event study of returns. This part will draw conclusions about the behavior of stock prices around the day the recommendation is issued. I use an event period that starts 10 trading days before and ends 10 trading days after the event date. This results in an event window of [-10,10]. Observed returns at day 0 relative to the event date are always defined as the closing price of the previous day relative to the closing price of the day. I use the AEX or AMX index as benchmark to calculate the normal returns by using the market model residuals. The estimation window is [-120,-21] and amounts therefore to a 100 trading days.

Table 2.1 presents the (cumulative) average abnormal returns for buy advices for both the AEX and AMX index. On the left side of Panel A and B the average abnormal returns (AARs) is shown for each day in the event window [-10,10]. Figure 2.1 and 2.2 show a graph of the cumulative average abnormal return (CAARs) over the same period for buy and sell recommendations for AEX and AMX listed companies. The average abnormal returns for the event day 0 are significant at the 1% level for AEX (0.26%) and AMX (0.44%) listed firms. The two days preceding the publication day are also significant at the 5% level for AEX listed companies and at the 1% for AMX listed companies. The AARs preceding the event date 0 also provide evidence of front-running as illustrated in Figure 2.1 and 2.2. This is also visible by examining the CAARS of the additional event periods preceding the publication. All event periods preceding the publication are significant at the 1% level for both AEX and AMX listed firms. The CAARs surrounding the publication date are all significant at the 1% in Panel A and Panel B. Hence, in conjecture with the observed average abnormal volumes

Table 2.1

(Cumulative) Average Abnormal Returns for Buy Recommendations for AEX and AMX Listed Companies

Panel A presents the results of the event study of returns on AEX listed companies for 6687 buy recommendations in the event window [-10,10]. The right-hand side of Panel A shows Cumulative average abnormal returns (CAARs) for different event periods. Panel B presents the results of the event study of returns on AMX listed companies for 2969 buy recommendations in the same event window. The right-hand side of Panel B shows CAARs for different event periods. The event study is conducted using the market model residuals and making use of [-120,-21] estimation window which amounts to 100 trading days. Average abnormal returns (AARs) are in percentages. T-statistics are provided in the column right of the daily AARs in the event window [-10,10]. *, ** and *** represent significance at the 10%, 5% and 1% level respectively.

	(C)AAR for Buy Advices in the Event Period [-10,10]				CAAR for Buy Advices in additional Event Periods			
Panel A	AEX	Buy	N = 6687					
	Event Date	AAR	t-stat.	Conf.				
	-10	-0,02	-0,93					
	-9	-0,02	-1,05					
	-8	0,00	0,00					
	-7	0,02	1,03					
	-6	0,03	1,51					
	-5	0,02	0,94					
	-4	0,01	0,49					
	-3	0,02	0,92					
	-2	0,05	1,97	**				
	-1	0,09	2,47	**	**Event Period**	**CAAR%**	**t-stat.**	**Conf.**
	0	**0,26**	**8,77**	***	[-10,-1]	+0.21%	+2.71	***
	1	0,00	0,00		[-5,-1]	+0.19%	+3.10	***
	2	0,04	1,91	*	[-2,-1]	+0.14%	+2.97	***
	3	-0,01	-0,49		[-1,+1]	+0.36%	+6.58	***
	4	-0,01	-0,52		[-5,+2]	+0.51%	+6.61	***
	5	-0,03	-1,46		[0, 5]	+0.25%	+4.55	***
	6	-0,05	-2,47	**	[0, 10]	+0.14%	+1.99	**
	7	0,01	0,51		[0, 20]	+0.04%	+0.43	
	8	0,01	0,51		[0, 60]	-0.26%	-1.66	*
	9	-0,05	-2,60	***	[0, 120]	-0.53%	-2.26	**
	10	-0,03	-1,58		[0, 250]	-1.55%	-3.41	***

	(C)AAR for Buy Advices in the Event Period [-10,10]				CAAR for Buy Advices in additional Event Periods			
	AMX	Buy	N = 2969					
Panel B	Event Day	AAR	t-stat.	Conf.				
	-10	-0,03	-0,85					
	-9	0,00	0,00					
	-8	-0,04	-1,13					
	-7	0,03	0,86					
	-6	0,02	0,51					
	-5	0,06	1,42					
	-4	0,11	2,98	***				
	-3	0,01	0,26					
	-2	0,15	3,49	***				
	-1	0,21	3,26	***	**Event Period**	**CAAR%**	**t-stat.**	**Conf.**
	0	**0,44**	**7,28**	***	[-10,-1]	+0.50%	+3.52	***
	1	0,07	1,77	*	[-5,-1]	+0.54%	+4.88	***
	2	0,04	1,06		[-2,-1]	+0.35%	+4.24	***
	3	0,06	1,50		[-1,+1]	+0.68%	+6.53	***
	4	-0,03	-0,79		[-5,+2]	+0.88%	+7.14	***
	5	-0,10	-2,73	***	[0, 5]:	+0.48%	+4.50	***
	6	0,01	0,28		[0, 10]:	+0.54%	+4.04	***
	7	-0,02	-0,58		[0, 20]:	+0.26%	+1.49	
	8	0,03	0,89		[0, 60]:	-1.11%	-3.30	***
	9	0,03	0,86		[0, 120]:	-3.16%	-4.07	***
	10	0,01	0,30		[0, 250]:	-6.28%	-3.14	***

Table 2.2

(Cumulative) Average Abnormal Returns for Sell Recommendations for AEX and AMX Listed Companies

Panel A presents the results of the event study of returns on AEX listed companies for 1340 sell recommendations in the event window [-10,10]. The right-hand side of Panel A shows Cumulative average abnormal returns (CAARs) for different event periods. Panel B presents the results of the event study of returns on AMX listed companies for 569 sell recommendations in the same event window. The right-hand side of Panel B shows CAARs for different event periods. The event study is conducted using the market model residuals and making use of [-120,-21] estimation window which amounts to 100 trading days. Average abnormal returns (AARs) are in percentages. T-statistics are provided in the column right of the daily AARs in the event window [-10,10]. *, ** and *** represent significance at the 10%, 5% and 1% level respectively.

	(C)AAR for Sell Advices in the Event Period [-10,10]				CAAR for Sell Advices in additional Event Periods			
Panel A	AEX	Sell	N = 1340					
	Event Date	AAR	t-stat.					
	-10	0,03	0,56					
	-9	-0,03	-0,58					
	-8	-0,05	-1,03					
	-7	0,05	0,99					
	-6	0,02	0,38					
	-5	0,05	0,99					
	-4	-0,04	-0,72					
	-3	-0,12	-2,23	**				
	-2	-0,14	-2,06	**				
	-1	-0,14	-1,78		**Event Period**	**CAAR%**	**t-stat.**	**Conf.**
	0	**-0,59**	**-7,27**	***	[-10,-1]	-0.52%	-2.64	***
	1	-0,01	-0,17		[-5,-1]	-0.50%	-3.34	***
	2	0,00	0,00		[-2,-1]	-0.33%	-3.02	***
	3	-0,06	-1,12		[-1,+1]	-0.76%	-5.50	***
	4	0,02	0,35		[-5,+2]	-1.07%	-5.18	***
	5	-0,07	-1,29		[0, 5]	-0.71%	-4.59	***
	6	0,03	0,53		[0, 10]	-0.71%	-3.52	***
	7	0,03	0,52		[0, 20]	-0.49%	-1.79	*
	8	-0,05	-0,87		[0, 60]	-0.40%	-0.90	
	9	-0,10	-1,96	**	[0, 120]	+0.59%	+0.95	
	10	0,09	1,79	*	[0, 250]	+0.20%	+0.24	

	(C)AAR for Sell Advices in the Event Period [-10,10]				CAAR for Sell Advices in additional Event Periods			
	AMX	Sell	N = 569					
Panel B	Event Day	AAR	t-stat.					
	-10	-0,11	-0,83					
	-9	0,29	2,68	***				
	-8	-0,10	-0,99					
	-7	0,31	3,25	***				
	-6	0,05	0,45					
	-5	-0,06	-0,47					
	-4	-0,09	-0,88					
	-3	-0,10	-0,97					
	-2	0,04	0,35					
	-1	-0,68	-3,88	***	**Event Period**	**CAAR%**	**t-stat.**	**Conf.**
	0	**-1,24**	**-6,88**	***	[-10,-1]	-0.39%	-0.98	
	1	-0,39	-3,22	***	[-5,-1]	-0.88%	-2.89	***
	2	0,02	0,17		[-2,-1]	-0.67%	-3.75	***
	3	0,07	0,57		[-1,+1]	-2.36%	-7.52	***
	4	-0,05	-0,42		[-5,+2]	-2.28%	-5.97	***
	5	-0,02	-0,18		[0, 5]:	-1.60%	-4.57	***
	6	-0,12	-1,13		[0, 10]:	-1.45%	-3.32	***
	7	0,25	2,36	**	[0, 20]:	-0.89%	-1.62	
	8	0,05	0,57		[0, 60]:	+0.42%	+0.48	
	9	-0,12	-1,08		[0, 120]:	+3.90%	+1.79	*
	10	0,10	1,01		[0, 250]:	+10.66%	+1.42	

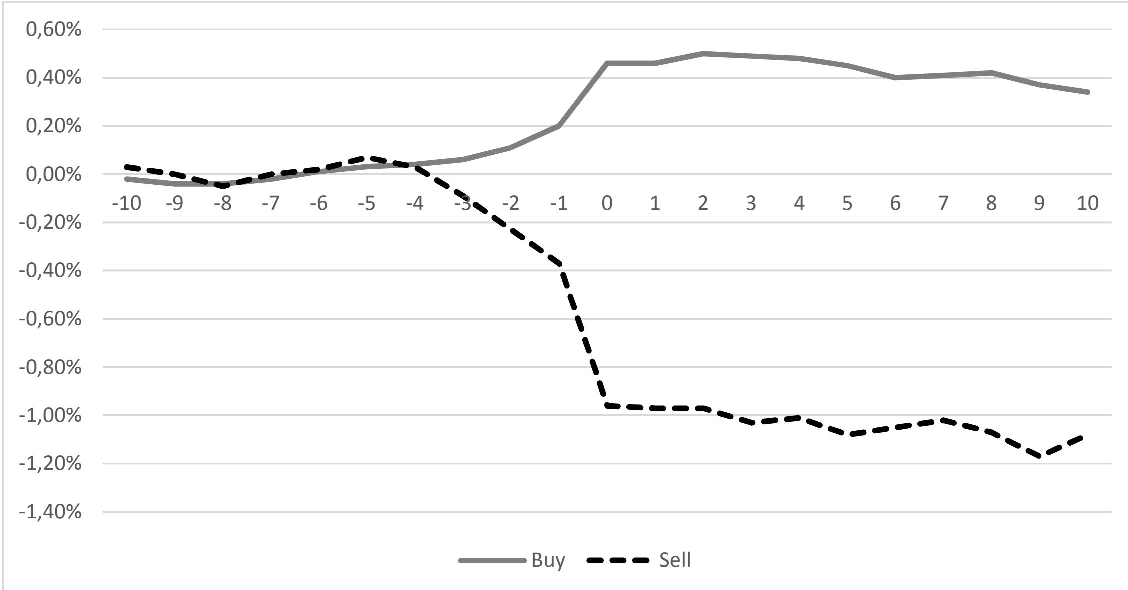

Figure 2.1 Cumulative Average Abnormal Returns for AEX listed companies for buy and sell recommendations, event window [-10,10]

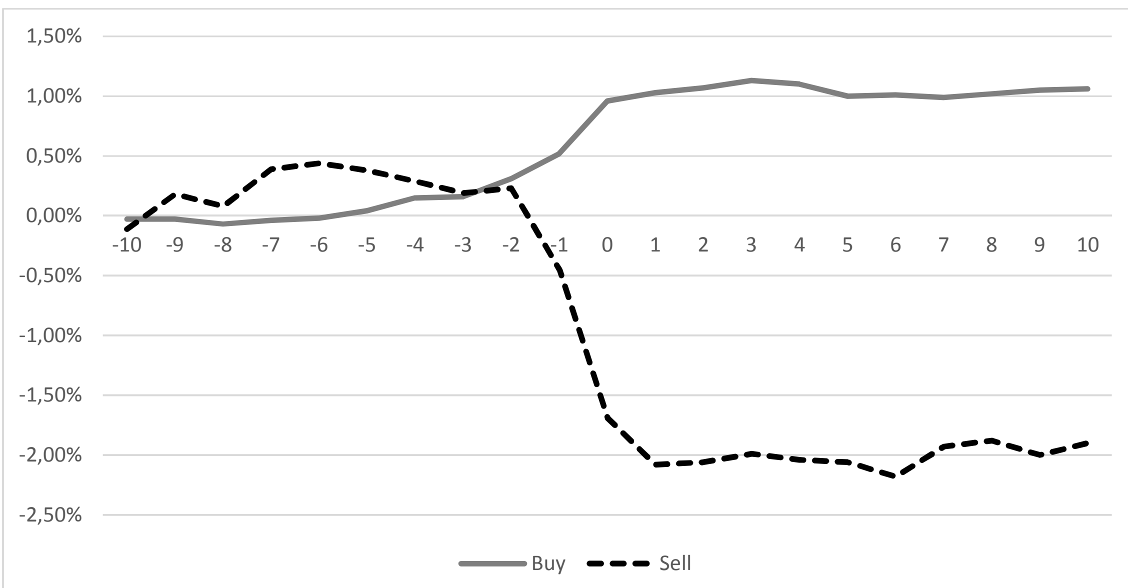

Figure 2.2 Cumulative Average Abnormal Returns for AMX listed companies for buy and sell recommendations, event window [-10,10]

found in the same period we can conclude that induced volume activity is mainly instigated by buy orders. Furthermore, the result difference from Panel A to Panel B in terms of observed abnormal returns are in line with Barber and Loeffler (1993) and Stickel (1985) that firms with smaller market capitalizations experience larger price reactions to analysts' recommendations. The right side of both Panels also makes clear that the CAARS for buy recommendations experience mean-reversion almost directly after the event date 0 giving support for the price pressure hypothesis. Figure 2.1 clearly shows a declining trend directly after the publication date for AEX listed companies. Figure 2.2 makes it visible that mean-reversion for AMX listed companies takes some time to take effect. Additional evidence of mean-reversion is shown in Table 2.1. The CAARS for longer event periods after the publication show that returns tend to reverse and even go negative. The number of recommendations in both panels also make clear that AEX listed companies are covered more than AMX listed companies perhaps because these companies tend to be more liquid. Table 2.2 shows the CAARs for 1340 and 569 sell recommendations for AEX and AMX firms respectively. Both the event date 0 for AEX as well as AMX is significant at the 1% level with returns of -0.59% and -1.24% respectively providing some evidence of the mispricing of sell recommended stocks. The overall dispersion between the amount of buy and sell recommendation give support to the idea that biased recommendations are also in existence in line with Rajan and Servaes (1997) and Michaely and Womack (1999). The observed negative returns for sell recommendations are in contrast to findings of Barber and Odean (2008) who claim that there should be a strong asymmetric effect with respect to buying and selling following an attention shock. The idea is that short selling is more difficult because it requires ex-ante ownership. Overall, the results show that abnormal returns vary considerably and inversely with market size for buys and sells. A possible explanation could be that analysts' recommendations convey more new information for smaller size stocks since less information is available for these firms on average. Additionally, Keasler and McNeil (2008) point out that a given level of uninformed buying or selling following analysts' recommendations would tend to create greater price pressure for smaller size stocks than larger size stocks since these stocks are less liquid in general. Furthermore, the CAARs sell recommendations after 20 days is generally not statistically significant giving support for the price pressure hypothesis.

Additionally, above results give reason to reject the null hypothesis (that no price reaction is observed) in favour of our own alternative hypotheses of 1 and 2 formulated in the hypothesis section of this thesis. Furthermore, we reject the null hypothesis for hypothesis 4 in favour of our own alternative hypothesis that the smaller the market capitalization of the recommended stock the larger are the observed price responses. Finally, we do not reject the null hypothesis for our 5^{th} alternative hypothesis that perceived abnormal returns erode and disappear in a few days.

In addition, I conduct the same analysis for hold recommendations for which the results are provided in Table 2.3 of the Appendix. Figure 2.3 shows a graph of the cumulative average abnormal return (CAARs) over the same period for hold recommendations for AEX and AMX listed companies. No statistically significant returns are observed for hold recommendations on the day of the event for AEX listed companies. Negative and statistically significant results are found for hold recommendations for AMX listed companies. AARs for both Panel A and B after the event are generally not statistically significant. The day preceding the event in Panel B shows an AAR of -0.22% but the overall magnitude of the returns and significance levels give us no conclusive results.

5.2 Event study of trading volume

Most of the papers in the literature review section found large abnormal volumes on the event date (e.g. Barber and Loeffler (1993), Liang (1999), Allen and Awang-Damit (1998), Metcalf and Malkiel (1994), Ghani (1996), Syed, Liu and Smith (1990), Busse and Green (2002), Neumann and Kenny (2007), Keasler and Mcneil (2010) and Greene and Smart (1999)). I calculated the average abnormal trading volume for the event window [-10,10]. As with returns the normal volume of a certain stock is calculated as the average abnormal volume over the estimation window [-120,-21] and amounts therefore to a 100 trading days.

Table 3.1 reports the results for (cumulative) average abnormal volumes (CAAV) for buy recommendations in the event period [-10,10] for both AEX and AMX listed companies. Furthermore, Figure 3.1 and Figure 3.2 shows the Cumulative average abnormal trading volume for AEX and AMX listed Companies for the same event period. Table 3.1 shows that there are positive and significant abnormal trading volumes present in the week prior to the publication of recommendations for AEX listed companies. For AMX listed companies positive abnormal trading volumes can be seen up to 4 days prior to the publication date. The cumulative average abnormal volumes for the week preceding the recommendations are 38.2% for AEX listed firms and 58.2% for AMX listed firms, both significant at the 1% level. The positive and significant abnormal volumes might be an indication of front-running. A possible other explanation for the observed abnormal trading volumes preceding the event is that analysts recommend stocks that have recently issued related news about the company which will make the recommendation a self-fulfilling prophecy since for example earnings announcement of a firm prior to the recommendation would almost certainly induce trading. Moreover, the week after the recommendations gives us a CAAV of 56.5% and 118.8% for AEX and AMX respectively. The CAAV for two weeks after the recommendations is 64.4% for AEX listed firms and 153% for AMX listed firms, both significant at the 1% level. This evidence suggests that analyst recommendations induce trading and is remarkable in light of our findings that we could not find any outperformance in the long-run and given the fact that we showed that recommendations do not contain any value-related information. However, Barber and Odean (2008) relates the short-term announcement effect to the theory that investors do not act fully rational and that they are buyers of attention-grabbing stocks. I also document that the average log-transformed relative volume on the day of the publication is 22.5% and 41.3% in excess of the market model that is used for AEX and AMX respectively.

Table 3.1

(Cumulative) Average Abnormal Volumes for Buy Recommendations for AEX and AMX Listed Companies

Panel A presents the results of the event study of log-transformed relative abnormal volumes on AEX listed companies for 6687 buy recommendations in the event window [-10,10]. CAAVs for additional periods are listed below Panel A. Panel B presents the results of the event study of log-transformed relative abnormal volumes on AMX listed companies for 2969 sell recommendations in the same event window. CAAVs for additional periods are listed below Panel B. The event study is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Average Abnormal Volumes (AAVs) are in decimals and need to be multiplied by 100 for percentages. T-statistics are provided in the column right of the daily AAVs in the event window [-10,10]. *, ** and *** represent significance at the 10%, 5% and 1% level respectively.

Panel A **Panel B**

AAV for Buy Advices in the Event Period [-10,10]

	AEX	Buy	N = 6687		AMX	Buy	N = 2969	
Event Date		**AAV**	**t-stat.**	**Conf.**		**AAV**	**t-stat.**	**Conf.**
-10		-0,020	-4,19	***		-0,006	-0,50	
-9		-0,022	-4,97	***		-0,002	-0,15	
-8		-0,012	-2,58	***		-0,003	-0,24	
-7		-0,011	-2,33	**		0,009	0,84	
-6		0,001	0,16			0,003	0,27	
-5		0,014	3,14	***		0,018	1,59	
-4		0,027	5,80	***		0,041	3,68	***
-3		0,049	10,28	***		0,080	6,99	***
-2		0,087	17,02	***		0,154	13,21	***
-1		0,205	32,14	***		0,286	21,86	***
0		**0,225**	**39,08**	***		**0,413**	**32,29**	***
1		0,116	23,31	***		0,254	21,97	***
2		0,081	17,04	***		0,173	15,70	***
3		0,065	13,78	***		0,138	12,33	***
4		0,045	9,51	***		0,128	11,76	***
5		0,035	7,37	***		0,085	7,79	***
6		0,031	6,88	***		0,086	7,77	***
7		0,023	5,07	***		0,069	6,59	***
8		0,015	3,16	***		0,077	7,04	***
9		0,007	1,42			0,054	4,97	***
10		0,002	0,52			0,054	4,96	***

CAAV for Buy Advices in Additional Event Periods

[-10,-1]	0.319	16.73	***	[-10,-1]	0.582	12.21	***
[-5,-1]	0.382	26.67	***	[-5,-1]	0.580	17.68	***
[0,+5]	0.565	30.23	***	[0,+5]	1.188	22.49	***
[0,+10]	0.644	22.40	***	[0,+10]	1.530	16.49	***

Table 3.2

(Cumulative) Average Abnormal Volumes for Sell Recommendations for AEX and AMX Listed Companies

Panel A presents the results of the event study of log-transformed relative abnormal volumes on AEX listed companies for 1340 sell recommendations in the event window [-10,10]. CAAVs for additional periods are listed below Panel A. Panel B presents the results of the event study of log-transformed relative abnormal volumes on AMX listed companies for 569 sell recommendations in the same event window. CAAVs for additional periods are listed below Panel B. The event study is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Average Abnormal Volumes (AAVs) are in decimals and need to be multiplied by 100 for percentages. T-statistics are provided in the column right of the daily AAVs in the event window [-10,10]. *, ** and *** represent significance at the 10%, 5% and 1% level respectively.

Panel A — **AAV for Sell Advices in the Event Period [-10,10]** | **Panel B**

	AEX	Sell	N = 1340		AMX	Sell	N = 569	
Event Date		**AAV**	**t-stat.**	**Conf.**		**AAV**	**t-stat.**	**Conf.**
-10		-0,017	-1,67	*		-0,032	-1,26	
-9		-0,022	-2,33	**		-0,024	-0,96	
-8		-0,023	-2,49	**		-0,002	-0,08	
-7		-0,016	-1,76	*		0,023	0,93	
-6		-0,010	-1,01			-0,022	-0,86	
-5		-0,007	-0,68			0,010	0,38	
-4		0,030	2,93	***		0,039	1,58	
-3		0,044	4,10	***		0,062	2,63	***
-2		0,074	6,65	***		0,092	3,75	***
-1		0,186	13,25	***		0,237	7,79	***
0		**0,228**	**17,41**	***		**0,388**	**13,55**	***
1		0,116	11,22	***		0,214	8,47	***
2		0,078	7,68	***		0,155	6,15	***
3		0,053	5,16	***		0,117	4,51	***
4		0,030	2,96	***		0,131	5,10	***
5		0,025	2,56	**		0,086	3,35	***
6		0,006	0,60			0,048	1,96	**
7		0,004	0,40			0,042	1,74	*
8		0,013	1,26			0,010	0,47	
9		-0,005	-0,52			-0,004	-0,15	
10		0,004	0,37			0,012	0,48	

CAAV for Sell Advices in Additional Event Periods

[-10,-1]	0.238	6.19	***	[-10,-1]	0.383	4.11	***
[-5,-1]	0.326	10.80	***	[-5,-1]	0.439	6.57	***
[0,+5]	0.532	13.30	***	[0,+5]	1.092	9.56	***
[0,+10]	0.552	9.55	***	[0,+10]	1.199	6.87	***

Likewise, Barber and Loeffler (1993) documents that the securities with the largest abnormal volumes on the publication day experience, on average, a larger initial price response and a larger subsequent price reversal. If I compare the abnormal volumes on the day of the publication with abnormal returns on the publication date I document similar findings in line with Barber and Loeffler (1993).

Table 3.2 reports the results for (cumulative) average abnormal volumes (CAAV) for sell recommendations in the event period [-10,10] for both AEX and AMX listed companies. The table clearly documents positive and significant average abnormal volumes for the 8 days surrounding the publication date for AEX listed companies and 3 days prior to 7 days after the publication for AMX listed companies. CAAV for 1 week prior to the publication amounts to 32.6% and 43.9% for AEX and AMX listed firms respectively, significant at the 1% level. In contrast, the retail attention hypothesis of Barber and Odean (2008) states that we should not see any abnormal trading volumes surrounding the sell recommendations since there exists a strong asymmetric effect with respect to buying and selling following an attention shock. The idea is that short selling is more difficult because it requires ex-ante ownership and therefore an attention shock can result in asymmetries between buying and selling of stocks by individual traders. This evidence suggests that analyst recommendations induce trading and is also remarkable since we show in section 5.3 that we do not find any value-relevant information in the recommendations used in our calendar-time portfolio analysis. Likewise for buy as for sell recommendations, our findings are also in line with Barber and Loeffler (1993) that the securities with the largest abnormal volumes on the publication day experience, on average, a larger initial price response and a larger subsequent price reversal. Figure 3.1 and 3.2 nicely illustrated the induced trading activity before and after the publication day for AEX and AMX listed firms.

Additionally, above results give reason to reject the null hypothesis (that no abnormal trading volume is observed) in favour of our own alternative hypothesis 3 formulated in the hypothesis section of this thesis.

Table 3.3 and Figure 3.3 from the Appendix shows an event study of trading volumes for hold recommendations. Additionally, Figure 3.3 shows the cumulative average abnormal Volumes for AEX and AMX listed companies for hold recommendations in the event window [-10,10] The table and figure show similar results as presented in Table 3.1 and Figure 3.3

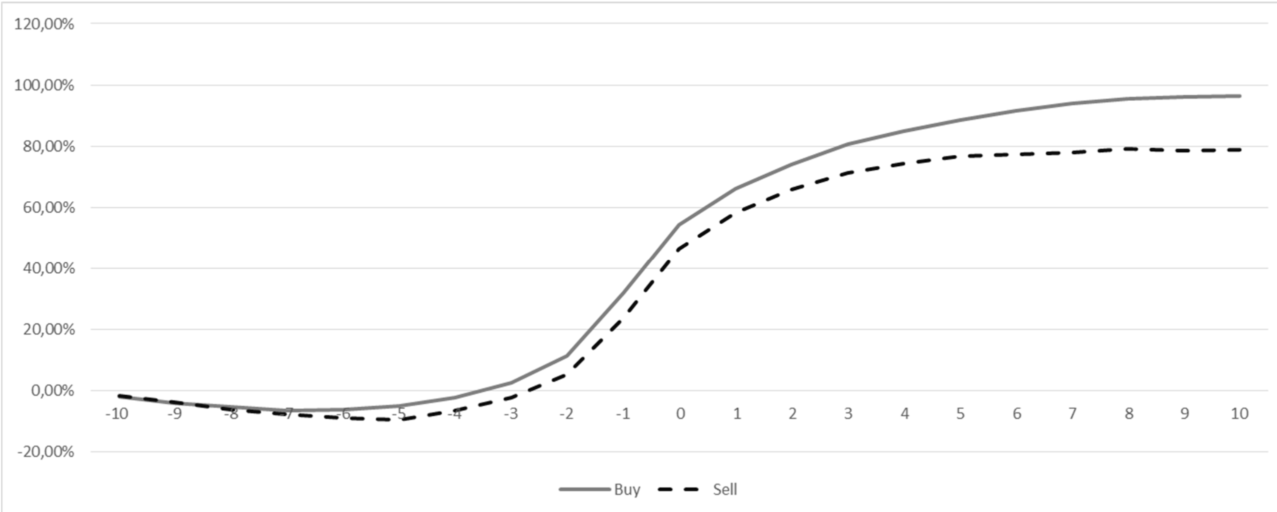

Figure 3.1 Cumulative Average Abnormal Volumes for AEX listed companies for buy and sell recommendations, event window [-10,10]

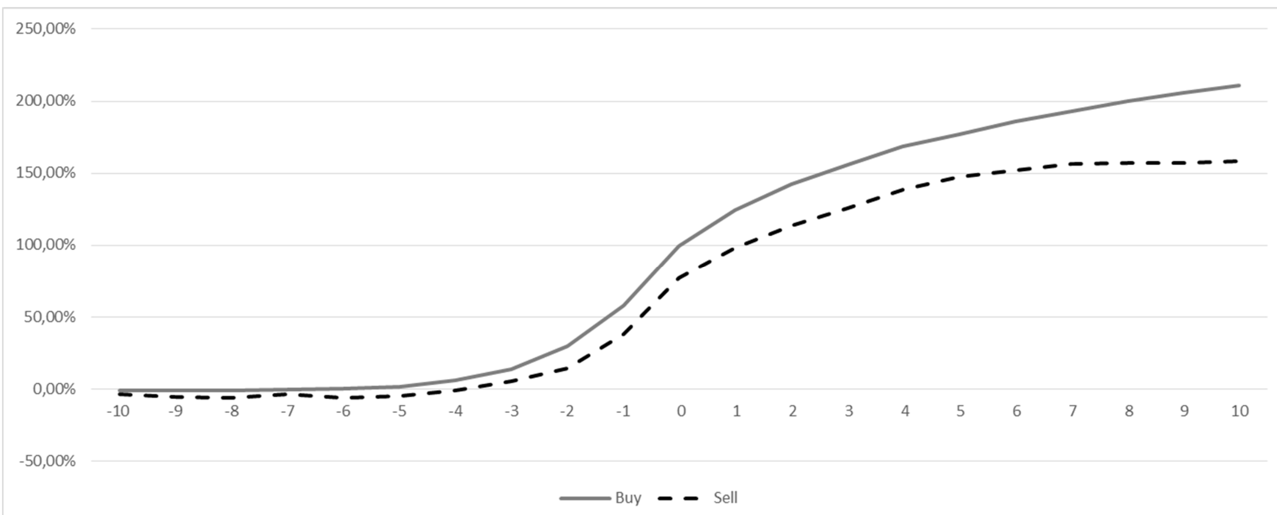

Figure 4.2 Cumulative Average Abnormal Volumes for AMX listed companies for buy, hold and sell recommendations, event window [-10,10]

5.3 Calendar-time portfolios

In order to measure the average price reaction to changes in individual analysts' recommendations, I implement a calendar-time perspective. This allows for direct measurement of the abnormal gross returns to a number of investment strategies and enables us to deduct whether stock recommendations from Analist.nl database contain any value-relevant information. To deduct any information concerning profitable investment strategies, I concentrate on consensus analysts' recommendations. This average analyst rating (consensus rating) is tracked over a period of eight years from January 1, 2006 until December 31, 2013. The consensus rating is altered over the entire period based on the numerical score, the analyst that issued the recommendations and the "age" of the recommendation. During this period the consensus analyst recommendation of the firm is reviewed and the firm moves

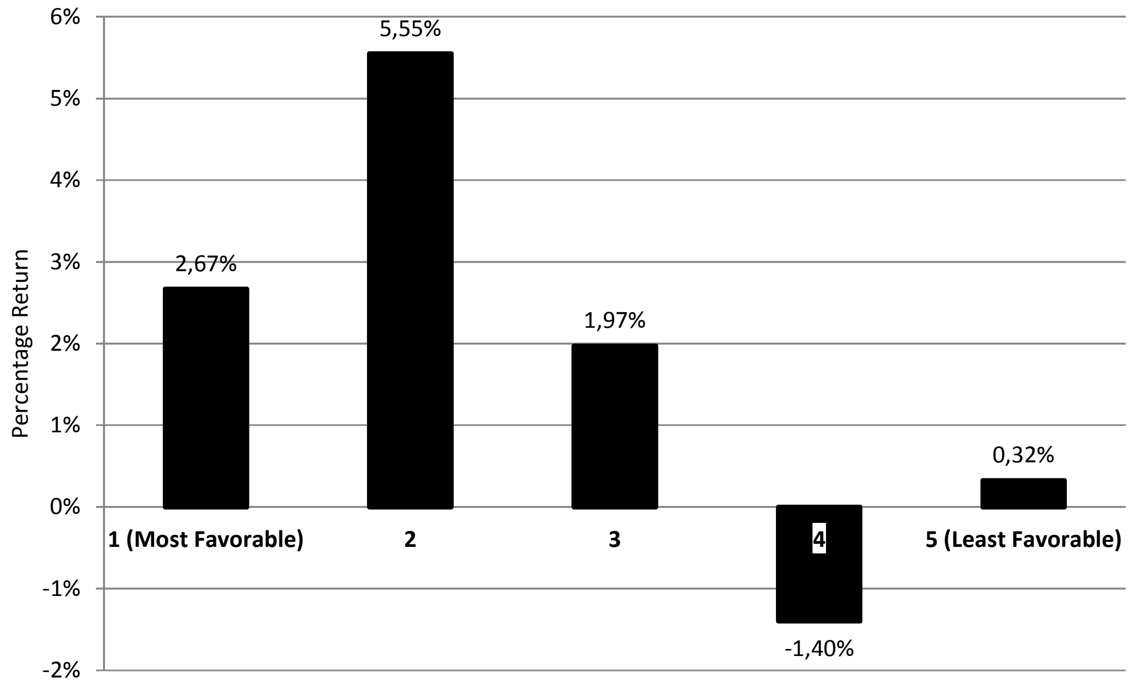

Figure 4. Annualized geometric mean percentage gross return earned by portfolios formed on the basis of consensus analyst recommendations, 2006 to 2013.

between portfolios, if necessary. Any necessary portfolio rebalancing follows at the end of the trading day. By focussing on the consensus, rather than the recommendation on an individual stock, I take into account the implicit information in the recommendations of all the analysts following a particular stock.

Figure 4 presents the annualized geometric mean percentage gross returns earned by portfolios formed on the basis of consensus analyst recommendations during the period January 1, 2006 until December 31, 2013. Figure 4 illustrates that buying the stocks with the most favorable consensus recommendations grosses an annualized geometric mean return of 2.67%, whereas buying those with the least favorable consensus recommendations grosses only 0.32%. The return on each individual portfolio generally decreases as we move from portfolio 1 to portfolio 5 with the exception of portfolio 2 and 4. Portfolio 2 earns an annualized geometric mean return of 5.55% which is remarkably higher that portfolio 1. According to Jegadeesh and Kim (2004) analysts' recommendations do contain and element of bias towards being favorable. Furthermore, Jegadeesh et al. (2006) find international evidence that occurrences of sell and strong sell recommendations are far fewer than the rate of recurrence of the buys and strong buys in all the countries they researched. According to existing literature this generally is an indication of the conflict of interest analysts face (e.g Michaely and Womack, 1999) and might give an explanation to the outperformance of portfolio 2 over portfolio 1. Furthermore, Barber et al. (2001) point out the analysts' coverage of a firm. If there are many analysts covering a firm and analyst ratings are more biased, prices tend to outweigh the risks and likely return performance.

To determine whether investors can benefit from analysts' consensus recommendations, I investigate calendar-time portfolios in line with Barber et al. (2001). Table 4 presents percentage monthly returns earned by portfolios on the basis of analyst recommendations during the period January 1, 2006 until December 31, 2013. I find no evidence that investment strategies based on publicly available consensus recommendations could be profitable. As shown in Table 4 the alphas for the market model (Panel A), three-factor model (Panel B) as well as the four-factor model (Panel C) are not significantly different from zero. No evidence of value-related information can be found for portfolios 1 to 5. Purchasing stocks (selling short) with the most (least) favorable consensus recommendations, assuming daily portfolio rebalancing and a timely response to recommendation changes, yield annual abnormal gross returns that are slightly positive although all insignificant, even at the 10% confidence level. If the recommendations contained value-relevant information not already impounded in prices, we would expect to detect statistically significant alphas. Although almost all alphas in all panels are positive (with the exception of portfolio 4), none are significant. Taking a closer look at the betas, we can conclude that all betas have on average the same risk as the market. Portfolios 2 and 4 are on average riskier than the market whereas portfolios 1, 3 and 5 are on average less risky than the market. Portfolio 1 for Panel B and C and portfolio 5 for Panel B are indicative of small growth stocks. For portfolio 5 HML indicates that less favorable analyst ratings are associated with firms of lower market risk and higher book-to-market ratios. The significant coefficient on MOM for portfolio 3 indicates firms that have performed poorly in the past. All returns presented thus far are gross of transaction costs. Under the assumption of daily rebalancing, purchasing the most highly recommended stocks or shorting the least favorable ones requires an enormous amount of trading. Since abnormal gross returns are not significantly different from zero, accounting for transaction costs, does not alter the conclusion of outperformance in the long-run.

Additionally, we do not reject the null hypothesis that no outperformance can be obtained by investors, who are informed about the recommended stock on Analist.nl, in the long-run.

Table 4

Percentage Monthly Returns Earned by Portfolios Formed on the Basis of Analyst Recommendations, 2006 to 2013

This table presents percentage monthly returns earned by portfolios formed according to average analyst recommendations. Panel A shows the estimated CAPM from a time-series regression of the portfolio return $(R_p - R_f)$ on the market excess return $(R_m - R_f)$. Panel B shows the estimated Fama-French three factor model intercept from a time-series regression of the portfolio return on the standard three factors. Panel C is the intercept for the four-factor and is attained by adding Mom (momentum) as an independent variable. The alphas are noted in percentages in line with Barber et al. (2001). Factor returns are calculated on a monthly basis. Standard errors are in brackets for $(R_m - R_f)$.and each t-statistic pertains to the null hypothesis that the associated return is zero. *,** and *** represent significance levels at the 10%,, 5% and 1% respectively.

			(Most Favorable)				(Least Favorable)
		Portfolio	**1**	**2**	**3**	**4**	**5**
Market Model							
		Intercept	0.332	0.617	0.240	0.071	0.157
			(0.70)	(1.41)	(0.59)	(0.15)	(0.30)
	Panel A	$R_m - R_f$	0.8524***	1.0250***	0.8290***	1.0857***	0.8686***
			(0.084)	(0.077)	(0.073)	(0.082)	(0.086)
		Observations	96	96	96	96	96
		R^2	0.5216	0.6508	0.5781	0.6533	0.5194
Three-Factor Model							
		Intercept	0.142	0.598	0.215	-0.030	0.068
			(0.30)	(1.35)	(0.52)	(-0.07)	(0.14)
		$R_m - R_f$	0.8523***	1.0217***	0.7811***	1.0749***	0.8158***
			(0.086)	(0.081)	(0.075)	(0.085)	(0.088)
	Panel B	SMB	0.304**	0.021	0.133	0.183	0.228*
			(2.33)	(0.17)	(1.17)	(1.42)	(1.71)
		HML	-0.055	0.011	0.192**	0.015	0.196*
			(-0.49)	(1.35)	(1.96)	(0.13)	(1.71)
		Observations	96	96	96	96	96
		R^2	0.5494	0.6546	0.6008	0.6608	0.5481
Four-Factor Model							
		Intercept	0.145	0.595	0.163	-0.050	0.043
			(0.31)	(1.34)	(0.41)	(-0.11)	(0.09)
		$R_m - R_f$	0.8549***	1.0182***	0.7218***	1.0529***	0.7869***
			(0.090)	(0.085)	(0.075)	(0.089)	(0.092)
		SMB	0.309**	0.015	0.035	0.146	0.181
	Panel C		(2.25)	(0.12)	(0.31)	(1.08)	(1.29)
		HML	-0.051	0.006	0.103	-0.018	0.154
			(-0.43)	(0.05)	(1.05)	(-0.15)	(1.27)
		MOM	0.013	-0.017	-0.290***	-0.108	-0.141
			(0.11)	(-0.15)	(-2.90)	(-0.91)	(-1.16)
		Observations	96	96	96	96	96
		R^2	0.5495	0.6547	0.6346	0.6639	0.5547

5.4 Cross-sectional analysis of trading volumes and returns

Based upon the findings of section 5.1 and 5.2 I conclude that there are significant abnormal trading volumes and returns surrounding the publication date for both buy and sell recommendations for AEX and AMX listed companies. This section tries to explain the observed volumes and returns by means of cross-sectional regressions.

Table 5.1 and 5.2 present cross-sectional regressions on (cumulative) abnormal volumes and (cumulative) abnormal returns of buy recommendations. Table 5.1 inhabits next to the other displayed independent variables also the effect of CAV [-10,-1] and CAV[-5,-1] on the dependant variable AV[0]. It shows that prior to the event date 0, CAV[-5,-1] has a positive and significant effect on the abnormal volume on the publication date. This might be an indication of front-running. The correlation coefficient, measured at 0.253 indicates a positive relationship between the two coefficients although this should be treated with caution since this does not necessarily imply a causal relationship[18] and each variable might be strongly affected by one or more of the other variables. Furthermore, the coefficient is likely to be weak in terms of strength (Dancey and Reidy's, 2004) since the value closely approaches zero suggesting that the movements of the two variables might be completely random[19]. Liquidity is positive and significant for all time intervals and implies that more liquid stocks have higher (cumulative) abnormal volume. However, since liquidity already correlates strongly with the dependant variables the interpretation of the results should be treated with caution.

The attention parameter for the number of analysts following a stock is significant and negative for all time-intervals. The coefficient of -0.018 indicates that the number of analysts following a stock is inversely related to CAV two weeks after the publication. This relationship can also be seen from the relation between the number of recommendations on the event date and the (C)AV for the different time-intervals. The coefficient -0.015 indicates that a one standard deviation increase in the number of recommendations on the event date decreases the CAV with 17.55% one week after the publication of the recommendation. Both variables provide evidence for the retail attention-hypothesis of Barber and Odean (2008) that individual investors are net buyers of attention-grabbing stocks. The variable for AMX dummy is positive indicating that AMX listed firms, in general observe higher (C)AV than AEX listed firms, but is insignificant for all time-intervals.

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[18] Correlation matrices for all the variables used are available upon request.
[19] The correlation coefficient being close to zero does not imply their independence.

The negative and significant coefficients of market capitalization provide additional evidence of front running but are insignificant both one week and two weeks prior to the publication. The market capitalization is significant and negative for AV[0] and the 2 weeks following a recommendation. A one standard deviation decrease in market capitalization leads on average to 9.18%, 22.04% and 25.22% higher (cumulative) abnormal volumes for AV[0] and the one week and two weeks following the publication. The larger negative effects after the event date 0 imply that the market reaction one week and two weeks after the publication is larger, the smaller the stock that is recommended which is line with Keasler and McNeil (2008). In their paper they point out that a given level of uninformed buying or selling following analysts' recommendations would tend to create greater price pressure for smaller size stocks than larger size stocks since these stocks are less liquid in general. Consequently, this might also explain why attention is more pronounced in smaller size stocks. Also noticeable is the effect of book-to-market equity on (C)AV for all time-intervals. The book-to-market ratio exhibits a negative relationship indicating that the (cumulative) abnormal volumes are negatively influenced by an increase in the book-to-market ratio. Subsequently, the focus for investors is more tilted towards growth stocks than value stocks in explaining part of the (cumulative) abnormal volumes for buy recommendations.

Table 5.2 shows the cross-sectional regressions on (cumulative) abnormal returns for buy recommendations. The number of analysts following a stock is significant and positive for the one and two week prior to the publication. It suggest that a one standard deviation increase in the number of analyst covering the stock, increases the one week and two week CAR by 71.53% and 54.95% respectively. The amount of recommendations on the event date is positive and significant for two weeks prior to the recommendation and negative on the publication day and one week and two weeks after the publication. The coefficient -0.015 tells us that a one standard deviation increase in the number of recommendations on the event date, decreases the CAR one week after the publication with on average 26.24%. This also provides us with additional evidence of the retail attention hypothesis of Barber and Odean (2008). If more recommendations compete with each other for the scarce attention of one particular investor than he would have less time to focus on one stock making the impact on returns lower.

Table 5.1

Cross-sectional regressions on (cumulative) abnormal volumes of buy recommendations

This table reports the results of cross-sectional regressions on (cumulative) log-transformed relative abnormal volumes for different period intervals for 4196 buy recommendations. The regression is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Liquidity is measured by dividing the total number of shares traded, $volume_{t-1}$, by the average number of shares outstanding, $shares_{t-1}$, expressed in percentages. Number of analysts following stock measures the amount of analysts that revised, confirmed or issued a recommendation in the last 6 months over a particular stock. Number of recommendations on event date is the total number of recommendations that were provided on analist.nl on that day. AMX dummy is a variable that takes the value of 1 if the company is listed on the AMX and o otherwise. Market capitalization is a natural log of the market capitalization of each stock that is recommended measured at $t-1$. The book-to-market equity is measured at $t-1$. T-statistics for variables that are significant at a level of 10 percent or better are shown in bold.

Dependant variable	**CAV[-10,-1]**	**CAV[-5,-1]**	**AV[0]**	**CAV[0,5]**	**CAV[0,10]**
Constant	0.300	0.409	**0.558**	**2.106**	**3.125**
	(0.61)	(1.43)	(6.69)	(5.96)	(5.42)
CAV[-10,-1]			0.003		
			(0.65)		
CAV[-5,-1]			**0.110**		
			(11.93)		
Liquidity	**0.529**	**0.492**	**0.079**	**0.487**	**0.668**
	(10.65)	(17.21)	(9.07)	(13.74)	(11.56)
Number of analysts following stock	**-0.008**	**-0.004**	**-0.004**	**-0.010**	**-0.018**
	(-2.42)	(-1.83)	(-6.34)	(-4.38)	(-4.68)
Number of recommendations on event date	-0.008	**-0.006**	**-0.004**	**-0.015**	**-0.021**
	(-1.45)	(-1.99)	(-4.78)	(-3.89)	(-3.28)
AMX Dummy	0.031	0.058	0.026	0.058	0.019
	(0.20)	(0.65)	(0.98)	(0.52)	(0.11)
Control Variables					
Market Capitalization	0.037	-0.005	**-0.017**	**-0.107**	**-0.156**
	(0.63)	(-0.15)	(-1.76)	(-2.56)	(-2.29)
Book-to-Market Equity	**-0.350**	**-0.223**	**-0.076**	**-0.365**	**-0.590**
	(-3.91)	(-4.34)	(-5.04)	(-5.71)	(-5.67)
Observations	4196	4196	4196	4196	4196
R-squared	0.0300	0.0713	0.2161	0.0751	0.0607

The variable AMX Dummy is positive and significant one week prior to the recommendation providing additional evidence of the retail attention hypothesis. The coefficient of 0.430 implies that AMX listed firms have CAR that are on average 47.57% higher than AEX listed firms during the week prior to the recommendation supporting the notion that the impact of returns is higher for smaller stocks then bigger stocks. This is also clearly visible from the variable market capitalization that complements the AMX Dummy. Both give evidence to support a larger impact on returns for smaller companies. The book-to-market equity shows that in the two weeks preceding the publication, a one standard deviation increase in the book-to-market equity, decreases the CAR with on average 43.67% for the two weeks prior to the recommendation. Liquidity tends to have an inverse relationship with returns except on the publication day. The coefficient of -0.595 indicates that a one standard deviation increase in the liquidity ratio decreases the one week CAR prior to the recommendation with on average 132.65%.

These results give additional evidence for the dispersion between small and big stocks. Furthermore, the book-to-market equity variable two weeks before the announcement date indicate that the attention from investors is directed to growth stocks whereas this changes for the one week and two weeks after the announcement where value stocks tend to be more prevailing. This corresponds with the idea that investors do not rely on the value premium before, but rather after the announcement date, by investing in stocks with high book-to-market ratios to earn an abnormal return. Griffin and Lemmon (2002) conclude in their paper that consistent with mispricing arguments, the book-to-market effect is largest in small firms with low analyst coverage and that exhibit the largest return reversals around earnings announcements because of the greater risk of distress. This provides us with additional evidence for the retail attention hypothesis by Barber and Odean (2008).

Table 5.3 and 5.4 present cross-sectional regressions on (cumulative) abnormal volumes and (cumulative) abnormal returns of sell recommendations. Table 5.3 inhabits next to the other displayed independent variables also the effect of CAV [-10,-1] and CAV[-5,-1] on the dependant variable AV[0]. It shows that prior to the event date 0, CAV[-5,-1] has a positive and significant effect on the abnormal volume on the publication date. This might be an indication of front-running as mentioned earlier. The correlation coefficient, measured at 0.307 indicates a positive relationship between the two coefficients although this should be treated with caution since this does not necessarily imply a causal relationship. Liquidity is positive and significant for all time intervals and implies that more liquid stocks have higher (cumulative) abnormal volume in line with our results in Table 5.1.

The attention parameter of the number of analyst following a stock is significant and negative for all time-intervals with the exception of one week prior to the publication. The coefficients of -0.011 indicates that a one standard deviation increase in the number of analysts following a stock decreases the cumulative abnormal volume two weeks prior to the publication with 63.71%. This is additional evidence of the retail attention hypothesis of Barber and Odean

(2008). The AMX dummy variable is positive and significant for all time-intervals except on the publication day. The coefficient of 0.793 implies that AMX listed firms have cumulative abnormal volumes that are on average 109.85% higher than AEX listed firms during the two weeks before the publication. Hence, (cumulative) abnormal volumes of sell recommendations are larger for smaller stock firms. This also potentially explains why AMX listed firms are more subjectible to front-running in terms of returns and volume for both buy and sell recommendations since this might be more profitable.

Table 5.2
Cross-sectional regressions on (cumulative) abnormal returns of buy recommendations

This table reports the results of cross-sectional regressions on (Cumulative) abnormal returns for different period intervals for 4196 buy recommendations. The regression is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Liquidity is measured by dividing the total number of shares traded, $volume_{t-1}$, by the average number of shares outstanding, $shares_{t-1}$, expressed in percentages. Number of analysts following stock measures the amount of analysts that revised, confirmed or issued a recommendation in the last 6 months over a particular stock. Number of recommendations on event date is the total number of recommendations that were provided on analist.nl on that day. AMX dummy is a variable that takes the value of 1 if the company is listed on the AMX and o otherwise. Market capitalization is a natural log of the market capitalization of each stock that is recommended measured at $t-1$. The book-to-market equity is measured at $t-1$. T-statistics for variables that are significant at a level of 10 percent or better are shown in bold.

Dependant variable	**CAR[-10,-1]**	**CAR[-5,-1]**	**AR[0]**	**CAR[0,5]**	**CAR[0,10]**
Constant	1.387	1.042	**1.531**	**4.469**	**6.950**
	(1.44)	(1.39)	(3.54)	(5.77)	(7.04)
Liquidity	**-0.692**	**-0.595**	**0.060**	-0.048	**-0.170**
	(-7.19)	(-7.92)	(1.38)	(-0.61)	(-1.72)
Number of analysts following stock	**0.014**	**0.011**	-0.000	**0.011**	**.019**
	(2.11)	(2.24)	(-0.12)	(2.15)	(2.79)
Number of recommendations on event date	**0.033**	0.011	**-0.011**	**-0.015**	**-0.021**
	(3.12)	(1.29)	(-2.40)	(-1.82)	(-1.93)
AMX Dummy	0.438	**0.430**	0.047	**-0.527**	**-0.919**
	(1.45)	(1.82)	(0.34)	(-2.16)	(-2.95)
Control Variables					
Market Capitalization	-0.1503	-0.101	**-0.112**	**-0.508**	**-0.830**
	(-1.32)	(-1.14)	(-2.33)	(-5.54)	(-7.09)
Book-to-Market Equity	**-0.342**	-0.032	0.099	**0.551**	**0.966**
	(-1.97)	(-0.23)	(1.27)	(3.95)	(5.42)
Observations	4196	4196	4196	4196	4196
R-squared	0.0176	0.0173	0.0078	0.0128	0.0209

Table 5.4 shows the cross-sectional regressions on (cumulative) abnormal returns of sell recommendations. Market capitalization is negative and significant for the two week period after the recommendation. The large negative effects imply that the smaller the recommended stock the more pronounced the market reaction is two weeks after the publocation. This implies that smaller stocks are more affected by attention giving support for the retail attention hypothesis of Barber and Odean (2008). The number of recommendations on the publication date is negative and significant for day 0. The coeffcient of -0.051 implies that on average, more recommendations on the event date result in lower abnormal returns.

Similar as in Table 5.2 the book-to-market equity variable two weeks before the announcement date indicate that the attention from investors is directed to growth stocks whereas this changes for the one week and two weeks after the announcement where value stocks tend to be more prevailing. Griffin and Lemmon (2002) conclude in their paper that consistent with mispricing arguments, the book-to-market effect is largest in small firms with low analyst coverage and that exhibit the largest return reversals around earnings announcements because of the greater risk of distress. This provides us with additional evidence for the retail attention hypothesis by Barber and Odean (2008).

Additionally, above results for both returns and traded volume give reason to reject the null hypothesis in favour of our own alternative hypotheses of 7 and 8 formulated in the hypothesis section of this thesis. The short-term abnormal traded volumes and returns following the buy recommendations taken from analist.nl are caused by attention.

For the interested reader, I conducted the same analysis for hold recommendations. The results are provided in Table 5.5 and 5.6 of the Appendix. The results show great similarity between the regressions conducted for buy recommendations in terms of volume. The relationship and direction between the dependant and independent variables is overall the same. For returns the results are mostly insignificant. The coefficients of market capitalization for the publication date and the two weeks after the recommendation, implies that smaller firms have, on average, higher returns. The results for book-market-ratio are in line with the results from Table 5.2

Table 5.3

Cross-sectional regressions on (cumulative) abnormal volumes of sell recommendations

This table reports the results of cross-sectional regressions on (cumulative) log-transformed relative abnormal volumes for different period intervals for 1086 sell recommendations. The regression is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Liquidity is measured by dividing the total number of shares traded, $volume_{t-1}$, by the average number of shares outstanding, $shares_{t-1}$, expressed in percentages. Number of analysts following stock measures the amount of analysts that revised, confirmed or issued a recommendation in the last 6 months over a particular stock. Number of recommendations on event date is the total number of recommendations that were provided on analist.nl on that day. AMX dummy is a variable that takes the value of 1 if the company is listed on the AMX and o otherwise. Market capitalization is a natural log of the market capitalization of each stock that is recommended measured at $t-1$. The book-to-market equity is measured at $t-1$. T-statistics for variables that are significant at a level of 10 percent or better are shown in bold.

Dependant variable	**CAV[-10,-1]**	**CAV[-5,-1]**	**AV[0]**	**CAV[0,5]**	**CAV[0,10]**
Constant	**-2.770**	**-1.249**	**0.400**	0.128	-0.376
	(-3.13)	(-2.41)	(2.31)	(0.19)	(-0.34)
CAV[-10,-1]			0.009		
			(0.74)		
CAV[-5,-1]			**0.101**		
			(5.08)		
Liquidity	**0.670**	**0.596**	**0.104**	**0.616**	**0.831**
	(6.93)	(10.52)	(5.19)	(8.30)	(6.95)
Number of analysts following stock	**-0.011**	-0.004	**-0.006**	**-0.018**	**-0.027**
	(-1.87)	(-1.15)	(-5.14)	(-4.21)	(-3.78)
Number of recommendations on event date	-0.014	-0.006	0.001	-0.008	-0.022
	(-1.09)	(-0.86)	(0.53)	(-0.82)	(-1.35)
AMX Dummy	**0.793**	**0.403**	0.050	**0.578**	**0.724**
	(2.98)	(2.59)	(0.97)	(2.83)	(2.20)
Control Variables					
Market Capitalization	**0.336**	**0.150**	0.005	0.108	0.193
	(3.28)	(2.49)	(0.26)	(1.37)	(1.52)
Book-to-Market Equity	-0.041	-0.115	**-0.099**	**-0.232**	-0.093
	(-0.31)	(-1.47)	(-3.82)	(-2.27)	(-0.57)
Observations	1086	1086	1086	1086	1086
R-squared	0.0531	0.1032	0.2008	0.0970	0.0662

Table 5.4

Cross-sectional regressions on (cumulative) abnormal returns of sell recommendations

This table reports the results of cross-sectional regressions on (Cumulative) abnormal returns for different period intervals for 1086 sell recommendations. The regression is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Liquidity is measured by dividing the total number of shares traded, $volume_{t-1}$, by the average number of shares outstanding, $shares_{t-1}$, expressed in percentages. Number of analysts following stock measures the amount of analysts that revised, confirmed or issued a recommendation in the last 6 months over a particular stock. Number of recommendations on event date is the total number of recommendations that were provided on analist.nl on that day. AMX dummy is a variable that takes the value of 1 if the company is listed on the AMX and o otherwise. Market capitalization is a natural log of the market capitalization of each stock that is recommended measured at $t-1$. The book-to-market equity is measured at $t-1$. T-statistics for variables that are significant at a level of 10 percent or better are shown in bold.

Dependant variable	**CAR[-10,-1]**	**CAR[-5,-1]**	**AR[0]**	**CAR[0,5]**	**CAR[0,10]**
Constant	-0.082	-0.495	-1.46	-1.440	3.155
	(-0.04)	(-0.27)	(-1.23)	(-0.69)	(1.23)
Liquidity	**-1.123**	**-1.015**	**-0.190**	**-0.470**	**-0.560**
	(-4.44)	(-5.10)	(-1.47)	(-2.08)	(-1.99)
Number of analysts following stock	0.001	0.003	**0.017**	**0.028**	**0.037**
	(0.07)	(0.23)	(2.22)	(2.12)	(2.24)
Number of recommendations on event date	0.015	-0.013	**-0.051**	-0.040	-0.062
	(0.45)	(-0.50)	(-2.95)	(-1.33)	(-1.64)
AMX Dummy	0.488	-0.101	-0.379	**-1.126**	**-1.997**
	(0.70)	(-0.18)	(-1.07)	(-1.81)	(-2.58)
Control Variables					
Market Capitalization	0.100	0.119	0.067	-0.039	**-0.552**
	(0.37)	(0.56)	(0.49)	(-0.16)	(-1.85)
Book-to-Market Equity	**-0.597**	-0.1256	-0.015	**0.572**	**0.601**
	(-1.72)	(-0.46)	(-0.08)	(1.84)	(1.56)
Observations	1086	1086	1086	1086	1086
R-squared	0.0218	0.0295	0.0318	0.0265	0.0199

6

Conclusion

This paper examines analysts' recommendations in the Dutch stock market and assesses the value of these recommendations. We found that buying the stocks with the most favorable consensus recommendations grosses an annualized geometric mean return of 2.67%, whereas buying those with the least favorable consensus recommendations grosses only 0.32%. I find no evidence that investment strategies based on publicly available consensus recommendations could be profitable. I document alphas for the market model, three-factor model as well as the four-factor model that are not significantly different from zero. Hence, no evidence of value-related information is found for portfolios 1 to 5. Under the assumption of daily rebalancing, purchasing the most highly recommended stocks or shorting the least favorable ones requires an enormous amount of trading. Since abnormal gross returns are not significantly different from zero, accounting for transaction costs, does not alter the conclusion of outperformance in the long-run.

I find evidence that recommendations taken from Analist.nl cause an attention shock in line with the retail attention hypothesis of Barber and Odean (2008).

The cumulative average abnormal volumes for buy recommendations for the week preceding the recommendations are significant and positive indicating the existence of front-running. Moreover, the week after the recommendations gives us a cumulative average abnormal volume of 56.5% and 118.8% for AEX and AMX respectively. I also document that the average log-transformed relative volume on the day of the publication is 22.5% and 41.3% in excess of the market model that is used for AEX and AMX respectively. Together, above results give support to a short-term announcement effect. Sell recommendations exhibit similar market responses in terms of volume as with buy recommendations.

The abnormal trading volume vary with the size of the attention shock. The variable market size implies that the smaller the market capitalizations of the recommended stock the higher the observed market reaction. The attention parameters for the amount of analysts covering a stock and the number of recommendations on the publication date provide additional evidence of the retail attention hypothesis that individual investors are net buyers of attention-grabbing stocks.

The average abnormal returns for buy recommendations on the publication day are significant. The two days preceding the publication day are also significant providing evidence of front-running and give evidence to support that firms with smaller market capitalizations experience larger price reactions to analysts' recommendations. Sell recommendations for AEX and AMX yield returns of -0.59% and -1.24% on the publication date providing some evidence of the mispricing of sell recommended stocks. The size of the abnormal return for AEX and AMX listed firms of sell recommendations is larger compared to buy recommendations. This could be explained by the fact that buy recommendations are more abundant than sell recommendations. Therefore, a sell recommendation conveys a strong negative signal, since sell recommendations are more visible than buy recommendations.

The abnormal returns vary with the size of the attention stock. The attention parameters provide additional evidence of the retail attention hypothesis and give evidence that the impact on returns is higher for smaller stocks then bigger stocks.

Further research related to our discussed topics could give more insights in the performance of (consensus) analysts' recommendations in the long-run. Alternative strategies that partition the recommendations issued for analysts with the best prior performance or analysts from the largest brokerage houses could yield positive net returns in the long-run. Furthermore, dividing the analysts' recommendations in groups based on the industry sector could give us insight in the performance of recommendations in each sector. Following Barber et al. (2001), future research might implement different trading strategies including less frequent portfolio rebalancing. The second alternative strategy could include daily portfolio rebalancing but with the assumption of a delayed reaction by investors to all changes in analysts' consensus recommendations. Even though a large number of trading strategies might be researched or proposed for future research, simply applying different time periods or different stock recommendation data, might be able to yield positive abnormal net returns.

7
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8
Appendix

Table 3.3
(Cumulative) Average Abnormal Volumes for Hold Recommendations for AEX and AMX Listed Companies

Panel A presents the results of the event study of log-transformed relative abnormal volumes on AEX listed companies for 4382 hold recommendations in the event window [-10,10]. CAAVs for additional periods are listed below Panel A. Panel B presents the results of the event study of log-transformed relative abnormal volumes on AMX listed companies for 1958 sell recommendations in the same event window. CAAVs for additional periods are listed below Panel B. The event study is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Average Abnormal Volumes (AAVs) are in decimals and need to be multiplied by 100 for percentages. T-statistics are provided in the column right of the daily AAVs in the event window [-10,10]. *, ** and *** represent significance at the 10%, 5% and 1% level respectively.

Panel A | **Panel B**

AAV for Hold Advices in the Event Period [-10,10]

	AEX	**Hold**	**N = 4382**		**AMX**	**Hold**	**N = 1958**	
Event Date		**AAV**	**t-stat.**	**Conf.**		**AAV**	**t-stat.**	**Conf.**
-10		-0,021	-3,81	***		-0,046	-3,40	***
-9		-0,027	-4,94	***		-0,004	-0,27	
-8		-0,011	-1,99	**		-0,006	-0,45	
-7		-0,005	-0,82			0,012	0,91	
-6		0,004	0,76			-0,008	-0,58	
-5		0,010	1,79	*		0,017	1,19	
-4		0,027	4,51	***		0,020	1,36	
-3		0,051	8,16	***		0,071	4,78	***
-2		0,096	14,56	***		0,135	8,76	***
-1		0,229	28,00	***		0,306	18,11	***
0		**0,229**	**30,18**	***		**0,360**	**22,08**	***
1		0,125	19,16	***		0,216	15,13	***
2		0,090	14,46	***		0,159	11,22	***
3		0,071	11,68	***		0,146	10,15	***
4		0,056	9,41	***		0,112	7,93	***
5		0,043	7,18	***		0,072	5,18	***
6		0,029	4,96	***		0,071	5,08	***
7		0,034	5,92	***		0,050	3,63	***
8		0,019	3,30	***		0,033	2,49	**
9		0,001	0,21			0,053	3,91	***
10		-0,006	-0,99			0,025	1,88	*

CAAV for Hold Advices in Additional Event Periods

[-10,-1]		0.354	14.23	***	[-10,-1]	0.496	8.84	***
[-5,-1]		0.413	22.04	***	[-5,-1]	0.548	13.42	***
[0,+5]		0.614	24.83	***	[0,+5]	1.066	17.50	***
[0,+10]		0.691	18.35	***	[0,+10]	1.296	12.93	***

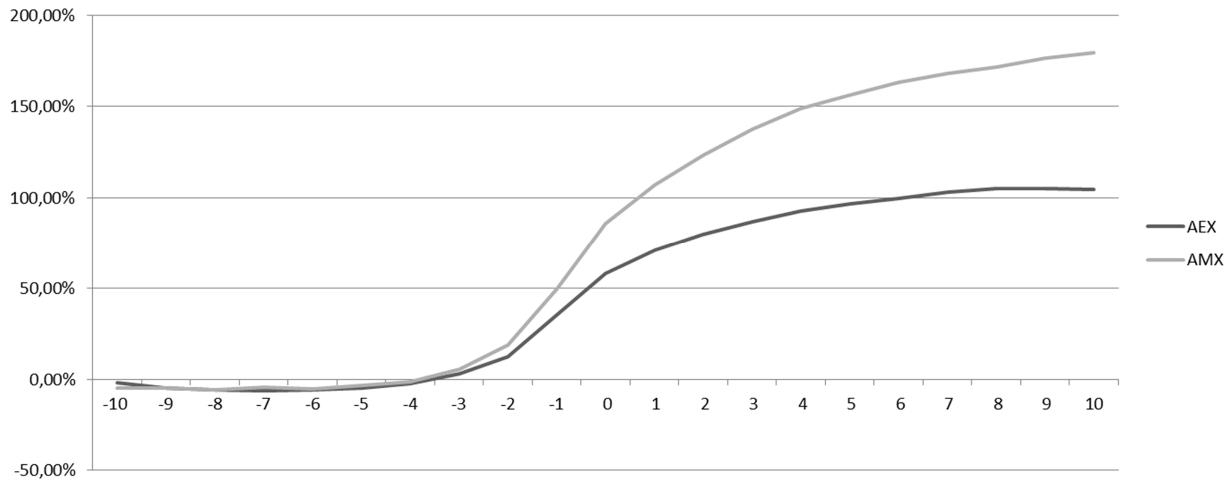

Figure 3.3 Cumulative Average Abnormal Volumes for AEX and AMX listed companies for hold recommendations, event window [-10,10]

Table 2.3

(Cumulative) Average Abnormal Returns for Hold Recommendations for AEX and AMX Listed Companies

Panel A presents the results of the event study of returns on AEX listed companies for 4382 hold recommendations in the event window [-10,10]. The right-hand side of Panel A shows Cumulative average abnormal returns (CAARs) for different event periods. Panel B presents the results of the event study of returns on AMX listed companies for 1958 hold recommendations in the same event window. The right-hand side of Panel B shows CAARs for different event periods. The event study is conducted using the market model residuals and making use of [-120,-21] estimation window which amounts to 100 trading days. Average abnormal returns (AARs) are in percentages. T-statistics are provided in the column right of the daily AARs in the event window [-10,10]. *, ** and *** represent significance at the 10%, 5% and 1% level respectively.

	(C)AAR for Hold Advices in the Event Period [-10,10]				CAAR for Hold Advices in additional Event Periods			
Panel A	**AEX**	**Hold**	**N = 4382**					
	Event Date	**AAR**	**t-stat.**	**Conf.**				
	-10	0,00	0,00					
	-9	0,01	0,40					
	-8	-0,05	-2,03	**				
	-7	0,05	1,84	*				
	-6	0,01	0,38					
	-5	-0,03	-0,97					
	-4	0,00	0,00					
	-3	-0,02	-0,61					
	-2	-0,06	-1,79	*				
	-1	-0,05	-0,92		**Event Period**	**CAAR%**	**t-stat.**	**Conf.**
	0	**-0,07**	**-1,41**		[-10,-1]	-0.15%	-1.40	
	1	-0,05	-1,82	*	[-5,-1]	-0.17%	-1.93	*
	2	-0,03	-1,13		[-2,-1]	-0.12%	-1.77	*
	3	0,00	0,00		[-1,+1]	-0.16%	-1.91	*
	4	0,05	1,88	*	[-5,+2]	-0.30%	-2.70	***
	5	-0,03	-1,13		[0, 5]	-0.13%	-1.67	*
	6	0,01	0,38		[0, 10]	-0.06%	-0.62	
	7	0,04	1,46		[0, 20]	+0.04%	+0.31	
	8	0,01	0,38		[0, 60]	-0.01%	-0.05	
	9	-0,02	-0,81		[0, 120]	+0.15%	+0.51	
	10	0,03	1,22		[0, 250]	+0.57%	+1.26	

	(C)AAR for Hold Advices in the Event Period [-10,10]				CAAR for Hold Advices in additional Event Periods			
	AMX	**Hold**	**N = 1958**					
Panel B	**Event Day**	**AAR**	**t-stat.**	**Conf.**				
	-10	0,00	0,00					
	-9	0,03	0,64					
	-8	0,10	2,18	**				
	-7	0,05	1,01					
	-6	-0,01	-0,21					
	-5	-0,08	-1,49					
	-4	-0,06	-1,27					
	-3	-0,07	-1,21					
	-2	-0,05	-0,77					
	-1	-0,22	-2,37	**	**Event Period**	**CAAR%**	**t-stat.**	**Conf.**
	0	**-0,55**	**-6,44**	***	[-10,-1]	-0.28%	-1.44	
	1	-0,08	-1,56		[-5,-1]	-0.45%	-2.86	***
	2	-0,02	-0,39		[-2,-1]	-0.25%	-2.06	**
	3	-0,04	-0,82		[-1,+1]	-0.82%	-5.56	***
	4	-0,04	-0,81		[-5,+2]	-0.90%	-5.16	***
	5	-0,04	-0,85		[0, 5]:	-0.78%	-5.39	***
	6	0,04	0,85		[0, 10]:	-0.71%	-3.86	***
	7	0,05	0,88		[0, 20]:	-0.47%	-1.99	**
	8	0,01	0,22		[0, 60]:	0.00%	0.00	
	9	-0,04	-0,89		[0, 120]:	+0.16%	+0.29	
	10	0,01	0,21		[0, 250]:	-0.81%	0.93	

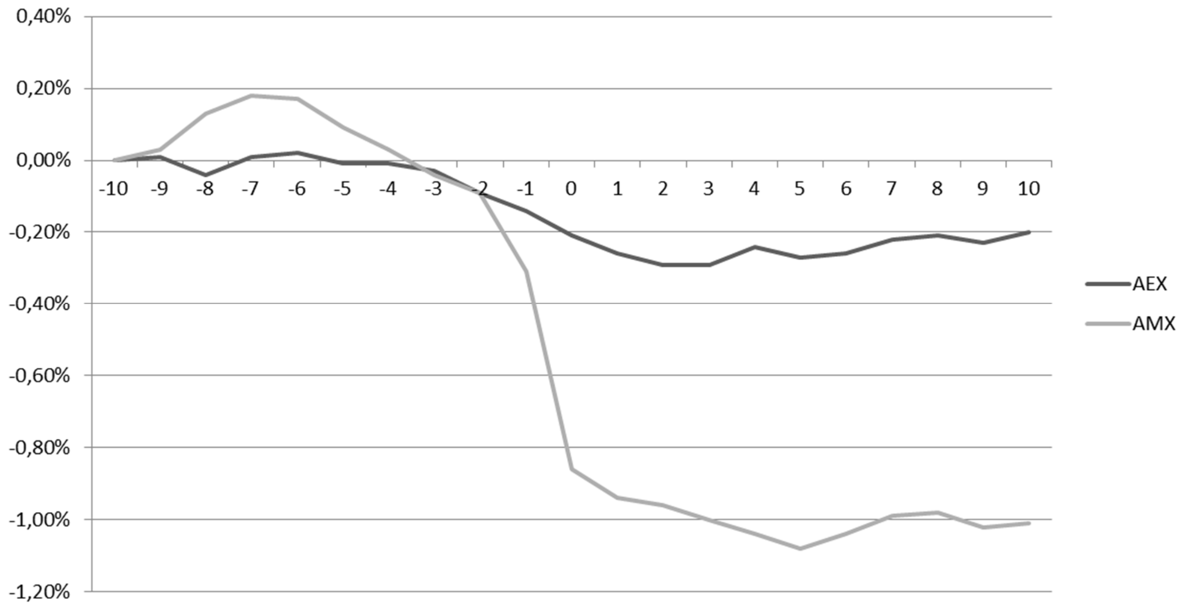

Figure 2.3 Cumulative Average Abnormal Returns for AEX and AMX listed companies for hold recommendations, event window [-10,10]

Table 5.5

Cross-sectional regressions on (cumulative) abnormal volumes of hold recommendations

This table reports the results of cross-sectional regressions on (cumulative) log-transformed relative abnormal volumes for different period intervals for 3341 hold recommendations. The regression is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Liquidity is measured by dividing the total number of shares traded, $volume_{t-1}$, by the average number of shares outstanding, $shares_{t-1}$, expressed in percentages. Number of analysts following stock measures the amount of analysts that revised, confirmed or issued a recommendation in the last 6 months over a particular stock. Number of recommendations on event date is the total number of recommendations that were provided on analist.nl on that day. AMX dummy is a variable that takes the value of 1 if the company is listed on the AMX and o otherwise. Market capitalization is a natural log of the market capitalization of each stock that is recommended measured at $t-1$. The book-to-market equity is measured at $t-1$. T-statistics for variables that are significant at a level of 10 percent or better are shown in bold.

Dependant variable	**CAR[-10,-1]**	**CAR[-5,-1]**	**AR[0]**	**CAR[0,5]**	**CAR[0,10]**
Constant	-0.082	-0.495	-1.46	-1.440	3.155
	(-0.04)	(-0.27)	(-1.23)	(-0.69)	(1.23)
Liquidity	**-1.123**	**-1.015**	-0.190	**-0.470**	**-0.560**
	(-4.44)	(-5.10)	(-1.47)	(-2.08)	(-1.99)
Number of analysts following stock	0.001	0.003	**0.017**	**0.028**	**0.037**
	(0.07)	(0.23)	(2.22)	(2.12)	(2.24)
Number of recommendations on event date	0.015	-0.013	**-0.051**	-0.040	-0.062
	(0.45)	(-0.50)	(-2.95)	(-1.33)	(-1.64)
AMX Dummy	0.488	-0.101	-0.379	**-1.126**	**-1.997**
	(0.70)	(-0.18)	(-1.07)	(-1.81)	(-2.58)
Control Variables					
Market Capitalization	0.100	0.119	0.067	-0.039	**-0.552**
	(0.37)	(0.56)	(0.49)	(-0.16)	(-1.85)
Book-to-Market Equity	**-0.597**	-0.1256	-0.015	**0.572**	**0.601**
	(-1.72)	(-0.46)	(-0.08)	(1.84)	(1.56)
Observations	1086	1086	1086	1086	1086
R-squared	0.0218	0.0295	0.0318	0.0265	0.0199

Table 5.6

Cross-sectional regressions on (cumulative) abnormal returns of hold recommendations

This table reports the results of cross-sectional regressions on (Cumulative) abnormal returns for different period intervals for 3341 hold recommendations. The regression is conducted using a market model with day of the week dummy variables as benchmark with an estimation window of [-120,-21] which amounts to 100 trading days. Liquidity is measured by dividing the total number of shares traded, $volume_{t-1}$, by the average number of shares outstanding, $shares_{t-1}$, expressed in percentages. Number of analysts following stock measures the amount of analysts that revised, confirmed or issued a recommendation in the last 6 months over a particular stock. Number of recommendations on event date is the total number of recommendations that were provided on analist.nl on that day. AMX dummy is a variable that takes the value of 1 if the company is listed on the AMX and o otherwise. Market capitalization is a natural log of the market capitalization of each stock that is recommended measured at $t-1$. The book-to-market equity is measured at $t-1$. T-statistics for variables that are significant at a level of 10 percent or better are shown in bold.

Dependant variable	**CAR[-10,-1]**	**CAR[-5,-1]**	**AR[0]**	**CAR[0,5]**	**CAR[0,10]**
Constant	-0.805	0.360	-0.157	1.174	**3.718**
	(-0.63)	(0.34)	(-0.24)	(1.18)	(3.09)
Liquidity	**-1.292**	**-1.302**	**0.094**	**0.138**	0.023
	(-12.16)	(-14.88)	(1.73)	(1.66)	(0.23)
Number of analysts following stock	0.005	**0.013**	0.004	**0.018**	**0.025**
	(0.62)	(1.88)	(1.06)	(2.80)	(3.31)
Number of recommendations on event date	0.006	-0.006	0.004	0.006	0.017
	(0.48)	(-0.59)	(0.61)	(0.67)	(1.49)
AMX Dummy	0.405	0.075	**-0.688**	**-1.39**	**-1.906**
	(1.03)	(0.23)	(-3.44)	(-4.53)	(-5.13)
Control Variables					
Market Capitalization	0.138	-0.025	-0.047	**-0.283**	**-0.611**
	(0.93)	(-0.21)	(-0.62)	(-2.44)	(-4.35)
Book-to-Market Equity	-0.232	-0.041	**0.273**	**0.589**	**0.781**
	(-1.14)	(-0.25)	(2.63)	(3.72)	(4.07)
Observations	3341	3341	3341	3341	3341
R-squared	0.0449	0.0640	0.0111	0.0166	0.0160