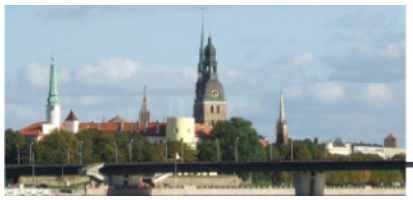

CURRENT ISSUES IN ECONOMIC
AND MANAGEMENT SCIENCES
(International Conference for Doctoral Students)
November 10-12, 2011
Riga, University of Latvia

MARKET PRICE REACTIONS OF ANALYST REVISIONS AND DETERMINING FACTORS ON THE GERMAN STOCK MARKET

Johannes Ruhm
University of Liechtenstein
Fürst-Franz-Josef-Strasse, 9490 Vaduz, Principality of Liechtenstein

Prof., Dr. ***Marco J. Menichetti***
University of Liechtenstein
Chair in Business Administration
Banking and Financial Management
Fürst-Franz-Josef-Strasse, 9490 Vaduz, Principality of Liechtenstein
E-mail: banking@uni.li

Pascal Gantenbein
Department of Financial Management
WWZ – Center for Economic Sciences
University of Basel, Basel, Switzerland
E-mail: pascal.gantenbein@unibas.ch

Keywords: analyst recommendations, stock market, upgrades, downgrades, excess return, investment strategy.
JEL classification: G11, G14.

Abstract

We examine whether analyst recommendations for the German stock market contain new information which, on average, trigger market price adjustments. Our results show that the stock prices react immediately and significantly to changes in the consensus of recommendations. This reaction has a longer lasting effect for downgrades (until event day t_{+5}) than for upgrades (until event day t_{+2}). Moreover, the magnitude of the reaction is -1.54% based on the market-adjusted method and -1.43% for the mean-adjusted method. In terms of percentage reaction, it is larger for downgrades than for upgrades which lead to abnormal returns of only 0.74% and 0.76%, respectively.

Besides the examination of the market reaction the results display that different factors determine the observed abnormal return. The findings show that upgrades to strong buy result in a higher stock price reaction than upgrades to another consensus recommendation level. Furthermore, upgrades with a high consensus recommendation revision have a higher stock price impact than a lower revision. On the other hand, downgrades with a higher delta of the target price revision have a larger negative impact on stock prices than target price revisions with a smaller delta.

1. Introduction

Stock market analysts are an integral part of capital markets and therefore attract a lot of attention, particularly since they're supposed to reduce asymmetric information. Their reports but more especially their recommendations are closely observed by both institutional and individual investors as well as by researchers. It is often hypothesized that analysts can forecast and influence stock price movements by means of their reports and recommendations [1]. For quite a long time, academics have been interested whether analyst recommendations contain useful information that result in market price adjustments. A significant body of research papers records that stock prices react significantly positively to upgrades and significantly negatively to downgrades in the consensus of recommendations [2, 3, 4]. Our research addresses the market price reaction i.e. the stock price movement due to changes in recommendation consensus of analysts and gives evidence on the question whether recommendation revisions do contain new information. Furthermore, we examine the determinants of the market price reaction. Contrary to most existing research focusing mainly on the United States, our contribution provides empirical evidence for Germany. Finally, our sample also captures the effects of the financial crisis after 2007.

This paper is organized as follows. First, an overview of related literature is given. In the subsequent part, we describe our methodology and the selection of the dataset. The features of the selected sample are then outlined in chapter four which provides summary statistics. In section five we present and discuss our results on the market response, while the determinants of abnormal returns are analyzed in chapter six. Finally we conclude our results.

2. Literature Review

Research papers mostly conclude that analyst recommendations contain new information and do in fact add value. An early stream of research mostly concentrated on the information content of recommendations. Most of the findings report a significant market reaction in the wake of consensus revisions. In contrast, the more recent analyses rather concentrate on the determining factors of the abnormal return. Therefore, the comprehensive literature on analyst recommendations can be classified into two main groups that will subsequently be discussed in more detail.

The first group consists of studies that give evidence on the information content of recommendations. The most likely cited paper "Do Brokerage Analysts` Recommendations Have Investment Value?" by Kent L. Womack (1996) [3] examines the price reaction of recommendation changes both at the event time (measured by a three day event window) and in the months before and after the event including a sample of recommendations of fourteen major US brokerage firms in the period of 1989 to 1991. This sample comprises 1.573 recommendation changes made for 822 different companies. Womack documents that during an event window of three days a significant price increase of 3.00% for buy recommendations and a significant price drop of 4.70% on average for sell recommendations can be observed. The mean post event return for buy recommendations hence is modest and short lived whereas it is larger and longer for sell recommendations. The immediate reactions appear to be of permanent nature and imply

that recommendations indeed include valuable information. Therefore, the significant price reactions can be seen as an evidence for market efficiency. Further studies on the information content of recommendations are provided among others by Dimson / Marsh (1984) [5], Elton / Gruber / Grossman (1986) [6], Francis / Soffer (1997) [7], Brav / Lehavy (2003) [8] as well as Michaely / Womack (2003) [9].

The second group of research examines the determining factors of the examined price reaction. The study "The Anatomy of the Performance of Buy and Sell Recommendations" by Scott E. Stickel (1995) [10] investigates the market reaction and their determining factors for a sample of 80 US brokerage firms in the period of 1988 to 1991. In total he analyses 16,957 recommendation changes (8,790 buy and 8,167 sell recommendations) of 1,179 companies. Concerning the information content of the recommendations he observed a mean price increase of 1.16% for an event window of ten days and 3.57% for a longer event window of 125 days as well as a mean price decrease of 1.28% for the short event window and 2.11% for the longer event window. Hence, his findings are in general consistent with those of Womack (1996) [3]. Beyond the market response to recommendations he also tested for the determinants of the price reaction using cross sectional regressions of the abnormal returns. His analysis shows that the strength of recommendation as well as the firm size and the revision of earnings forecasts appear to be permanent. Further studies on the second group of research are provided among others by Krische / Lee (2000) [1], Bradshaw (2002) [11], Brav / Lehavy (2003) [8], Kerl / Walter (2007) [12] and Stickel (2007) [4].

Our paper covers both of the two above mentioned research questions. Moreover combining the two research questions in one paper and working on the German stock market is a fairly new approach.

3. Hypotheses and Methodology

In efficient markets stock prices have to be related to new information. Therefore event studies that capture price changes due to recommendation changes should offer evidence for the semistrong form of market efficiency. If a positive (upgrade) or negative (downgrade) change in analyst recommendations contain new information the price of the respective stock should immediately adjust according to the change. Therefore, the stock price should increase following a recommendation upgrade and decrease following a recommendation downgrade which leads to our first hypothesis:

Hypothesis H1: A recommendation upgrade (downgrade) leads to an immediate increase (decrease) of the stock price.

We test this hypothesis by means of an event study, in which a change in the consensus of the recommendation level indicates an event. As reported, previous research normally finds that upgrades (downgrades) have positive (negative) effects on stock prices. Moreover the findings should be ancillary evidence for the semistrong type of market efficiency and therefore confirm hypothesis H1.

In order to get a further idea of the anatomy of the stock price reaction six parameters are tested using ordinary least square regressions for the hypothesized factors. Apart from company

specific factors like company size (measured by the market capitalization) and the book-to-market ratio of equity also recommendation specific factors are tested. These factors represent the level of consensus recommendation and the dimension of consensus recommendation revisions as Stickel (2004) [4] proposed. In addition, the level of the mean target price as well as the dimension of the mean target price revision is analyzed as a potential factor.

A second hypothesis relates to company size. In general, less information is available for smaller companies and it is also released less frequently. Thus, the impact of an information release is hypothesized to be more intense for a small company than for bigger companies [13]. Analyst recommendations can therefore be seen as the occurrence of new information:

Hypothesis H2: Small companies display a stronger reaction to revisions in consensus recommendations (expressed by upgrades as well as downgrades).

The size of a company is measured by the market capitalization on the day of the event. The observations in our sample need to be ranked by quartiles and divided into two groups (small and big) represented by the two dummy variables SIZE_LOW for small companies and SIZE_HIGH for big companies. We expect the coefficient of the variable SIZE_LOW to be positive for upgrades and negative for downgrades. The coefficient of the variable SIZE_HIGH is expected to be negative for upgrades and positive for downgrades.

According to Fama and French (1992) [14], average returns are positively related to the book-to-market ratio (B/M). It is argued that value stocks bear higher risk because a high B/M signals distress. Hence, negative information on a company classified as a value stock could worsen its situation. Such bad information could be represented by a recommendation downgrade. Furthermore, as Fama and French (1998) [15] argue, also good information provided by a recommendation upgrade cannot improve the situation of a company in distress. Therefore we hypothesize the following:

Hypothesis H3: Companies classified as value stocks display a stronger reaction to downgrades than companies classified as growth stocks. Conversely, growth stocks display stronger reaction to upgrades than value stocks.

The B/M ratio of a company is measured by the book value of equity divided by the market capitalization on the day of the event. Like in the test for the previous hypothesis the sample is ranked by quartiles and divided into two groups represented by the dummy variables BM_LOW for companies with a low B/M ratio (growth stocks) and BM_HIGH for companies with a high B/M ratio (value stocks), respectively. The coefficient of the variable BM_LOW is expected to be positive for upgrades as well as for downgrades. The coefficient of the variable BM_HIGH is expected to be negative for upgrades as well as for downgrades.

The next two factors focus on the recommendation of the analyst itself. The first factor we look at is the strength of recommendation. By issuing e.g. a buy recommendation, the analyst signals that in his eyes the respective stock is undervalued by the market. Thus a strong buy must be an even stronger signal. As a consequence the information included in this recommendation is richer in content and should lead to a stronger price reaction of the valued stock. This proposition should likewise also be true for a sell and a strong sell recommendation which pro-

vide the opinion that a stock is overvalued. Therefore, a downgrade to a strong sell should lead to a sharper price reaction relative to a downgrade to a pure sell recommendation.

Hypothesis H4: Upgrades to strong buy have a greater positive price effect than upgrades to buy or an inferior recommendation. Downgrades to strong sell have a larger negative price effect than downgrades to sell or a superior recommendation.

In order to test hypothesis H4 two dummy variables need to be implemented. The variable STRONGBUY is set equal to one if the upgrade is to a strong buy and otherwise equal to zero. Moreover, the variable STRONGSELL is set equal to one in case of a downgrade to strong sell and otherwise equal to zero. The coefficients of the variable STRONGBUY as well as the coefficient of the variable STRONGSELL are expected to be positive for upgrades and negative for downgrades.

Furthermore, Stickel (1995) [10] argues that revisions in recommendations that skip a rank have a greater impact on stock prices. The change of recommendation consensus (delta) is therefore calculated by subtracting the previous recommendation consensus from the actual recommendation consensus at a specific date. The delta measures the intensity of a change in the recommendation consensus. A positive delta signals an upgrade of the recommendation consensus whereas a negative delta signals a downgrade of the recommendation consensus. The greater the magnitude of delta the greater the impact on the stock price is expected to be.

Hypothesis H5: Positive (negative) recommendation revisions with a higher delta have a greater positive (negative) impact on stock prices than recommendation revisions with a smaller delta.

To test this hypothesis the whole sample needs to be ranked by quartiles and divided into two groups (low and high) represented by the two dummy variables DELTA_LOW for small changes in recommendation consensus and DELTA_HIGH for larger changes in recommendation consensus. The coefficient of the variable DELTA_LOW is expected to be negative for upgrades as well as for downgrades. The coefficient of the variable DELTA_HIGH is expected to be positive for upgrades as well as for downgrades.

In addition to their recommendations analysts often set target prices. These should reflect the fair value of a company and can be seen as an unambiguous statement on the expected value of a company in the analyst's eyes, as Brav and Lehavy (2003) [8] argue. Hence, the target price has a similar function as the level of the recommendation issued by the analyst. A target price above the stock price shows that in the analyst's view the stock is undervalued. The higher (lower) the target price compared to the current price, the greater the valuation difference.

Hypothesis H6: Upgrades with a high target price compared to the current stock price have a greater positive price impact than low target prices. Downgrades with a low target price compared to the current stock price have a greater negative price effect than higher target prices.

In order to test hypothesis H6 the sample has to be ranked by quartiles and divided into two groups (low and high) represented by the dummy variables TARGET_LOW (which stands for a low proportion of the target price compared to the current price) and TARGET_HIGH for high proportions, respectively. According to the hypothesis the coefficient of the variable TARGET_LOW should be negative for upgrades and positive for downgrades. The coefficient of the variable TARGET_HIGH is assumed to be positive for upgrades and negative for downgrades.

Similar to the delta of the recommendation consensus the revision of the target price (delta target price) is calculated by subtracting the previous proportion of target price and current stock price from the actual proportion of target price and current stock price. The delta of the target price measures the strength of a change in target price. A stronger revision in target price should result in a greater price reaction than smaller revisions because of larger prospect changes. This can be applied for positive changes as well as for negative changes in delta.

Hypothesis H7: Positive (negative) target price revisions with a higher delta have a greater positive (negative) impact on stock prices than target price revisions with a smaller delta.

To test this hypothesis the observations in our sample have to be ranked by quartiles and divided into two groups (low and high) represented by the two dummy variables DELTATARGET_LOW for small changes in target price and DELTATARGET_HIGH for large changes in target price. The coefficient of the variable DELTATARGET_LOW is assumed to be negative for upgrades as well as for down-grades. The coefficient of the variable DELTATARGET_HIGH is expected to be positive for up-grades as well as for downgrades.

The primary data examined in this paper are taken from Reuters Knowledge for the period of 1999 to the end of 2008. Like this, the sample captures various economic cycle situations such as the internet bubble around 2000/2001 and the subsequent boom as well as the impacts of the worldwide economic crises in the wake of the subprime crisis in 2007. The sample comprises of recommendations about German companies that are constituents of the DAX, MDAX or SDAX. Consequently the selected market guarantees a representative sample size.

To measure the impact of changes in recommendation consensus an event study according to Wells (2004) [16] is implemented. A change in the recommendation consensus of a certain company in the examined sample identifies an event (t). Four different event windows reaching from day t_{-1} to t_{+3} (5 days), t_{-1} to t_{+8} (10 days), t_{-1} to t_{+18} (20 days) and t_{-1} to t_{+28} (30 days) are used to assess the temporary as well as the permanent effects. These different event windows should also capture longer lasting effects [3]. The inclusion of the day before the event (t_{-1}) captures the price reactions prior to the event. Such a significant price reaction, taking place before the event, might be due to traders with superior information. In addition to the event and the event window the normal stock return has to be defined. Following MacKinley (1997) [17] and Henderson (1990) [18] we concentrate on the market-adjusted model and the mean-adjusted model. For the use of this article the normal return for the mean-adjusted model is calculated

within an estimation period of 180 trading days prior to the event window. The sample comprises companies either included in the DAX, MDAX or SDAX. Each of the three indices can be seen as a market. Therefore, the affiliation of a company to an index determines the market. Consequently the normal return for the market-adjusted model is calculated using the respective index of a company included in the sample. All abnormal returns are aggregated across all companies and throughout time. Moreover, the various abnormal returns have to be tested statistically. The result of these tests ascertains whether the abnormal returns as well as the aggregated abnormal returns are significantly different from zero. This step is carried out by using a parametric t-test as well as the nonparametric Wilcoxon signed rank test (Rank test). Due to the fact that prior literature [18, 19, 20] states that the parametric t-test is the best choice to test the significance, the results of t-test will have a higher weight. The results of the Wilcoxon signed rank test will serve as additional evidence. In order to analyze the determinants of the abnormal return the anatomy of these returns is analyzed by means of ordinary least square (OLS) regressions including six different factors. In a first step, each factor is regressed separately followed by a multifactor regression including all factors.

4. Sample Statistics

As mentioned above, the primary data is taken from Reuters Knowledge for the period from 1998 to 2008. In order to calculate the abnormal return for the mean adjusted method stock price data of 180 trading days prior to the first event is needed. Therefore, the examination period starts in 1998 and is reduced by one year resulting in a final data period of ten years starting on January 1, 1999 and ending on December 31, 2008.

Using the consensus of recommendations instead of only single analyst recommendations reflects the views of all analysts covering a specific stock. As this figure is reported in a variety of financial websites as well as several financial databases, investors have easy access to this information. The recommendations can be generally expressed with “buy”, “hold” and “sell”. Furthermore, the phrase “strong” is used to intensify the buy or sell recommendation. These expressions are converted by the brokerage houses into a five point scale. For the use of this analysis the recommendation phrases refer to certain numbers on the five point recommendation scale. A “strong buy” refers to a recommendation consensus higher than 1.5, a “buy” has to be equal or below 1.5 but above 2.5, a “hold” has to be equal or lower than 2.5 but better than 3.5, a “sell” has to be equal or worse than 3.5 but better than 4.5 and a “strong sell” has to be lower than 4.5 on the five point scale. Especially the classification of the “strong” recommendations is important because they are used as determining factors for hypothesis H4. Some studies expand their definition of strong sell to sell because these recommendations are rather seldom issued. Due to the size of the gathered sample this step is not necessary.

As some papers had problems with the size of their sample we chose the German market for our analysis because it is one of the largest and most liquid markets in Europe. The companies are selected regarding to their affiliation to the three German main indices DAX, MDAX, and SDAX on the date of December 31, 2008 which leads to a sample of 129 companies. On the company level the main selection criterion is the availability of a recommendation consensus. After controlling for this criterion, the number of companies is reduced to 127

due to missing consensus recommendations for two companies creating 20703 events. Further selection criteria are the availability of a mean target price as well as the share price and the market capitalization. After controlling for these three criteria the number of companies is once again reduced to 126. The reduced number of companies as well as the adjustments of the selection criteria produces a total of 14,471 events. The following table provides an overview of the number of events derived from the examined sample. Nevertheless, the sample leads to a representative group for the examination due to the selected time horizon as well as the selected market.

5. Market Response

In order to analyze the market reaction to revisions in recommendation consensus the data set is split into positive (upgrades) and negative (downgrades) consensus recommendation revisions. Table 1 shows the results for upgrades. It can be observed that there is an abnormal return on the day prior to the event day. With respect to all four statistical tests the picture is rather unclear. One could conclude that the market does not react significantly to upgrades on the day prior to the event day. Additionally, it can be observed that the effects are at least a higher significant from the event day t until event day t_{+2}. The days following event day t_{+2} offer mixed results. The abnormal returns of the remaining event days change their sign rather frequently. Regarding the mean cumulated abnormal return it can be observed that three out of four event windows show highly significant results for both models as well as for both statistical tests. Similar results can be observed for downgrades. Table 2 depicts the results for downgrades in recommendation consensus. Contrary to the upgrades the event day prior to the event day t shows a highly significant market reaction for both models and both statistical test which is an unequivocal sign for insider activity. The abnormal returns for the following four event days are highly significantly different from zero. Event day t_{+4} shows highly significant values except the t-test for the mean-adjusted model. Also the effects on the following day (event day t_{+5}) are significantly different from zero with at least a high significant abnormal return for each model and test. Equal to upgrades the event days thereafter show a mixed picture with both significant and non significant statistics. The same behavior of abnormal returns can be observed which is that abnormal returns start with a rather low magnitude compared to the event day, reach the peak on the event day t and get subsequently lower again. All mean cumulative abnormal returns representing the four event windows show highly significant abnormal returns.

Table 1

Significance test of AR for upgrades

	Market-adjusted model			Mean-adjusted model		
	Mean	t-test	Rank-test	Mean	t-test	Rank-test
t_{-01}	0.06%	1.71 *	1.05	0.05%	1.42	0.67
t	0.40%	11.29 ***	11.90 ***	0.43%	11.09 ***	11.47 ***
t_{+01}	0.16%	4.09 ***	2.30 **	0.18%	5.13 ***	6.66 ***
t_{+02}	0.12%	3.54 ***	2.69 ***	0.10%	3.07 ***	3.02 ***
t_{+03}	0.02%	0.42	0.75	0.05%	1.23	2.18 **
t_{+04}	-0.14%	-4.15 ***	3.50 ***	-0.07%	-2.18 **	1.76 *
t_{+05}	-0.03%	-0.83	1.70 *	0.00%	0.14	0.66
t_{+06}	0.11%	3.10 ***	1.07	0.08%	2.56 **	0.96
t_{+07}	-0.02%	-0.48	1.21	0.03%	1.04	0.53
t_{+08}	-0.13%	-3.92 ***	3.81 ***	-0.09%	-2.75 ***	2.46 **
t_{+09}	0.03%	1.00	1.76 *	0.04%	1.24	0.49
t_{+10}	0.05%	1.40	1.92 *	0.03%	0.86	1.74 *
t_{+11}	-0.11%	-3.09 ***	4.16 ***	-0.03%	-0.93	1.29
t_{+12}	-0.11%	-3.16 ***	3.81 ***	-0.05%	-1.56	1.54
t_{+13}	0.12%	3.46 ***	1.08	0.11%	3.50 ***	2.29 **
t_{+14}	0.06%	1.88 *	1.09	0.05%	1.48	1.75 *
t_{+15}	-0.07%	-2.23 **	2.21 **	-0.06%	-2.09 **	1.32
t_{+16}	-0.07%	-2.08 **	2.62 ***	-0.06%	-1.82 *	1.38
t_{+17}	-0.07%	-2.10 **	2.75 ***	-0.06%	-1.71 *	1.60
t_{+18}	0.00%	0.08	0.14	0.00%	0.08	0.58
t_{+19}	-0.01%	-0.28	1.85 *	-0.02%	-0.66	1.37
t_{+20}	0.01%	0.18	1.07	-0.04%	-1.20	2.24 **
t_{+21}	-0.07%	-2.20 **	2.95 ***	-0.05%	-1.58	1.03
t_{+22}	-0.09%	-2.65 ***	2.42 **	-0.04%	-1.47	1.13
t_{+23}	0.00%	0.07	0.00	0.02%	0.80	0.27
t_{+24}	0.02%	0.73	0.40	0.08%	2.65 ***	2.44 **
t_{+25}	-0.07%	-2.11 **	3.45 ***	-0.01%	-0.27	1.39
t_{+26}	0.03%	0.78	0.60	0.06%	1.92 *	1.90 *
t_{+27}	0.07%	1.89 *	0.05	0.07%	1.99 **	0.74
t_{+28}	0.02%	0.53	0.60	0.05%	1.44	0.36
$CAR(t_{-01},t_{+03})$	0.75%	10.63 ***	11.02 ***	0.80%	10.31 ***	13.05 ***
$CAR(t_{-01},t_{+08})$	0.54%	6.01 ***	7.51 ***	0.77%	7.56 ***	10.11 ***
$CAR(t_{-01},t_{+18})$	0.37%	3.23 ***	4.38 ***	0.73%	5.17 ***	7.34 ***
$CAR(t_{-01},t_{+28})$	0.27%	1.97 **	3.43 ***	0.85%	4.92 ***	6.93 ***
	***, **, * indicate statistical significane at the 1%, 5% and 10% level					

Source: own calculations based on data from Reuters Knowledge following Stickel (1995) [10]

Table 2

Significance test of AR for downgrades

	Market-adjusted model			Mean-adjusted model		
	Mean	t-test	Rank-test	Mean	t-test	Rank-test
t_{-01}	-0.26%	-6.04 ***	6.06 ***	-0.23%	-5.09 ***	4.47 ***
t	-0.57%	-13.01 ***	15.82 ***	-0.59%	-12.44 ***	14.20 ***
t_{+01}	-0.22%	-5.66 ***	9.46 ***	-0.24%	-6.80 ***	7.64 ***
t_{+02}	-0.10%	-2.70 ***	4.15 ***	-0.10%	-2.85 ***	3.98 ***
t_{+03}	-0.17%	-4.22 ***	5.77 ***	-0.13%	-3.52 ***	4.81 ***
t_{+04}	-0.13%	-3.20 ***	5.24 ***	-0.06%	-1.64	3.61 ***
t_{+05}	-0.09%	-2.30 ***	2.99 ***	-0.07%	-2.03 ***	2.32 **
t_{+06}	0.00%	-0.04	2.23 **	0.00%	0.08	2.37 **
t_{+07}	-0.09%	-2.24 ***	3.41 ***	-0.03%	-0.93	1.83 *
t_{+08}	-0.17%	-4.83 ***	5.31 ***	-0.09%	-2.77 ***	2.66 ***
t_{+09}	-0.06%	-1.69 ***	3.19 ***	-0.01%	-0.28	1.54
t_{+10}	0.04%	0.92	1.52	0.05%	1.40	0.61
t_{+11}	-0.06%	-1.80 ***	2.91 ***	-0.01%	-0.37	1.71 *
t_{+12}	-0.04%	-1.09	2.91 ***	0.03%	0.84	0.13
t_{+13}	0.02%	0.55	1.73 *	0.01%	0.41	0.92
t_{+14}	0.02%	0.50	0.22	-0.01%	-0.42	0.82
t_{+15}	-0.10%	-2.68 ***	4.53 ***	-0.09%	-2.56 ***	4.46 ***
t_{+16}	-0.09%	-2.65 ***	3.30 ***	-0.10%	-3.07 ***	3.62 ***
t_{+17}	-0.03%	-0.83	1.30	-0.01%	-0.19	0.21
t_{+18}	-0.06%	-1.57	2.24 **	-0.03%	-0.92	0.58
t_{+19}	-0.11%	-3.13 ***	4.91 ***	-0.08%	-2.55 ***	3.42 ***
t_{+20}	0.00%	0.00	0.87	-0.03%	-0.90	1.04
t_{+21}	0.00%	-0.06	2.19 **	0.02%	0.59	0.93
t_{+22}	-0.12%	-3.38 ***	3.64 ***	-0.08%	-2.55 ***	2.17 **
t_{+23}	-0.07%	-1.88 ***	2.30 **	-0.02%	-0.49	0.68
t_{+24}	-0.06%	-1.65 ***	3.38 ***	-0.02%	-0.46	1.87 *
t_{+25}	-0.02%	-0.43	2.28 **	0.04%	1.16	0.04
t_{+26}	-0.03%	-0.89	1.44	0.01%	0.27	0.50
t_{+27}	0.02%	0.44	0.71	-0.01%	-0.16	1.44
t_{+28}	0.00%	-0.07	1.91 *	0.02%	0.61	0.53
$CAR(t_{-01},t_{+03})$	-1.32%	-15.71 ***	17.33 ***	-1.30%	-14.35 ***	14.61 ***
$CAR(t_{-01},t_{+08})$	-1.80%	-17.40 ***	18.57 ***	-1.55%	-13.47 ***	13.36 ***
$CAR(t_{-01},t_{+18})$	-2.17%	-16.51 ***	16.65 ***	-1.72%	-11.02 ***	10.19 ***
$CAR(t_{-01},t_{+28})$	-2.57%	-16.58 ***	16.70 ***	-1.86%	-9.96 ***	8.93 ***
	***, **, * indicate statistical significane at the 1%, 5% and 10% level					

Source: own calculations based on data from Reuters Knowledge following Stickel (1995) [10]

Overall, the findings show that stock prices react with a relatively high significance prior to the event day t. We can therefore conclude that some market participants may receive the new information earlier than others and therefore have a time advantage which they can exploit. Another factor leading to this result may be the nature of consensus calculation used in this study. Because the consensus includes several recommendations which are released during the entire day it is likely that the consensus is published towards the end of the day. Obviously individual analyst recommendations are published during the entire day. Market participants following individual analyst recommendations which are also included in the consensus but probably published earlier than the consensus may cause the abnormal return prior the event day. Both upgrades and downgrades show a significant reaction on the event day t, t_{+1} and t_{+2}. Therefore, hypothesis H1 can be confirmed. The results clearly show that upgrades lead to an increase and downgrades to a decrease in stock prices. Beyond that it is necessary to mention that according to the existing literature the effect of downgrades lasts longer than the effect of upgrades.

In order to get a more detailed picture of the market reaction figure 1 and 2 illustrate the accumulation of mean abnormal returns for the individual event days graphically. Figure 1 shows that the most intense market reaction takes place during the first days of the event window respectively from event day t_{-1} till event day t_{+2}. This reaction results in a cumulated mean abnormal return of 0.76% on event day t_{+2}. This is nearly the same for both the market-adjusted and the mean-adjusted model. Although there is a peak with 0.91% on event day t_{+14} within the mean-adjusted model the cumulated mean abnormal return more or less levels out after the intense rise. Moreover it can be observed that there is a difference between the two models beginning around event day t_{+3}. Nevertheless the direction of both models is nearly the same for the following event days.

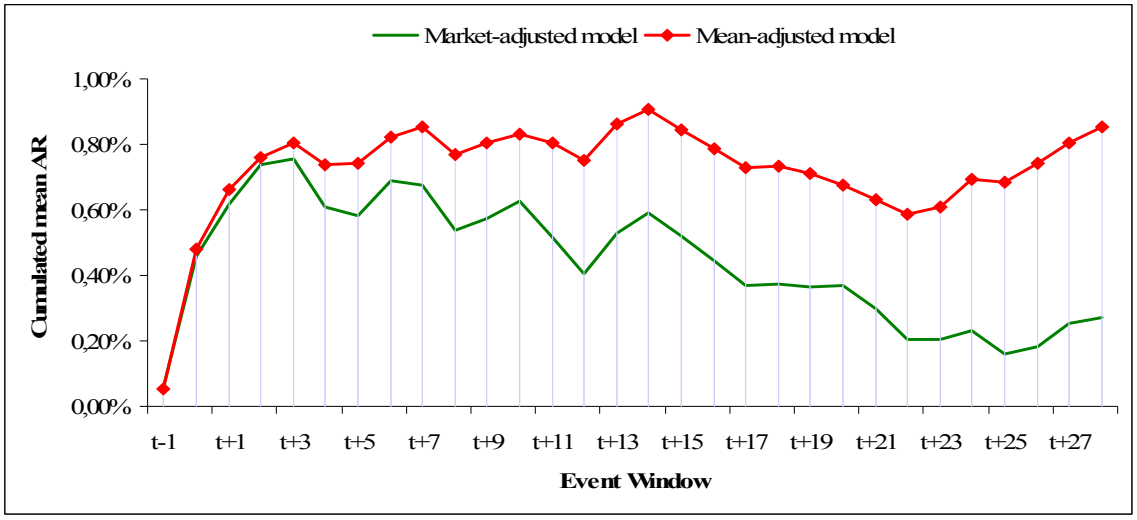

Figure 1. Cumulated mean abnormal return for upgrades

Source: own calculations based on data from Reuters Knowledge following Green (2006) [21], p. 9.

Obviously figure 2 shows that downgrades in recommendation consensus create a negative stock price reaction with a strong and sharp decline during the first days of the event window. Until event day t_{+3} both models nearly proceed parallel. After this event day, the levels of the two models change whereas the market-adjusted model proceeds on a lower level than the mean-adjusted model, but the rather rectified deployment remains. These observations support the result of the significance test displayed in table 1 and 2. The intense reaction in the early event window indicates new information resulting in a positive market reaction for upgrades and a negative market reaction for downgrades even on the day prior to the event. Moreover, the magnitude of the market reaction to downgrades is higher than the reaction to upgrades.

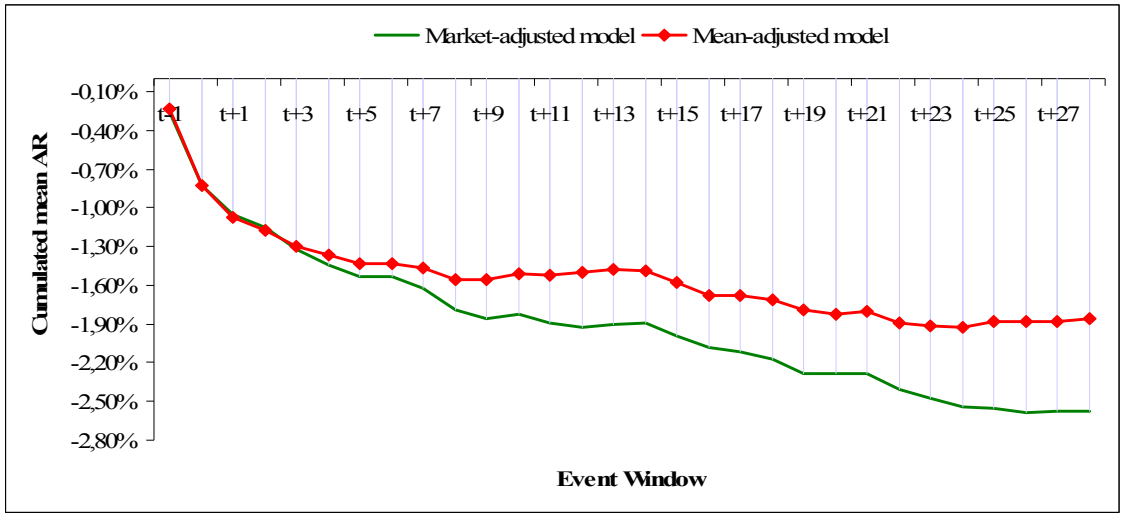

Figure 2. Cumulated mean abnormal return for downgrades

Source: own calculations based on data from Reuters Knowledge following Green (2006) [21], p. 9.

The following two tables summarize and outline the main findings to answer the question which determinants drive the abnormal returns. The signs for the dummy variables can either take the position of a plus (significant coefficient in line with the predicted sign) or a minus (coefficient is either not significant or not in line with the predicted sign). Changing signs within a column are separated using a slash.

Table 3 shows that except for the four event windows in the multi factor model within the mean-adjusted model, the result of the dummy variable STRONG_BUY has significant coefficients with the expected sign. Furthermore, the dummy variables DELTA_LOW and DELTA_HIGH are the first determinants which show significant coefficients in both the market-adjusted and the mean-adjusted model as well as in the distinction between the single and multi factor regressions. It can be observed that the market-adjusted model displays significant values in every case. On the other hand, the mean-adjusted model shows significant coefficients within the single factor model for the first three event windows as well as for the first two event windows within the multi factor model. Therefore, it can be concluded that hypothesis H5 is valid for the first two event windows ($CAR(t_{-1},t_{+3})$ and ($CAR(t_{-1},t_{+8})$ but not for the other ones.

Table 3

Final summary of OLS regressions for upgrades

Upgrades	Market adjusted method		Mean adjusted method	
	Single factor model	Multi factor model	Single factor model	Multi factor model
SIZE_LOW	+/---	----	++++	--/++
SIZE_HIGH	----	----	++++	-/+++
BM_LOW	++++	+/-/++	----	----
BM_HIGH	++++	++++	----	----
STRONG_BUY	++++	++++	++++	----
DELTA_LOW	++++	++++	+++/-	++/--
DELTA_HIGH	++++	++++	+++/-	++/--
TARGET_LOW	----	----	--/++	--/++
TARGET_HIGH	----	----	-/+++	-/+++
DELTATARGET_LOW	----	----	----	----
DELTATARGET_HIGH	----	----	----	----

Source: own calculations

Overall, it can be summarized that upgrades to strong buy have a greater positive price effect than upgrades to buy or an inferior recommendation. Furthermore, positive recommendation revisions (upgrades) with a higher delta have a greater positive impact on stock prices than recommendation revisions with a smaller delta.

Table 4 summarizes the results for downgrades. Compared to all other dummy variables, DELTATARGET_LOW and DELTATARGET_HIGH display a distinct finding. Each event window for both normal return models as well as both regression models shows significant coefficients which are in line with the predicted sign.

Table 4

Final summary of OLS regressions for downgrades

Downgrades	Market adjusted method		Mean adjusted method	
	Single factor model	Multi factor model	Single factor model	Multi factor model
SIZE_LOW	++++	++++	++++	+++/-
SIZE_HIGH	++++	--/++	+++/-	----
BM_LOW	++++	++++	----	----
BM_HIGH	++++	++++	+/---	----
STRONG_SELL	-/+/--	----	----	----
DELTA_LOW	----	----	----	----
DELTA_HIGH	----	----	----	----
TARGET_LOW	++++	--/++	+/---	----
TARGET_HIGH	++++	++++	++/--	++/--
DELTATARGET_LOW	++++	++++	++++	++++
DELTATARGET_HIGH	++++	++++	++++	++++

Source: own calculations

To summarise, it can be stated that only hypothesis H7 can be confirmed for downgrades. Therefore, it can be concluded that negative target price revisions with a higher delta have a greater negative impact on stock prices than target price revisions with a smaller delta.

6. Summary and Conclusion

Our event study documents an immediate and highly significant reaction for both upgrades and downgrades in recommendation consensus. Additionally, it can be observed that the reaction for downgrades lasts longer (until event day t_{+5}) than for upgrades (event day t_{+2}). Consequently, it can be concluded that the revisions in consensus recommendation do contain new information which is consistent with semistrong market efficiency.

The magnitude of the reported market reaction is consistent with previous studies, documenting a significantly asymmetric reaction of a mean cumulated abnormal return of 0.74% (market-adjusted method) or 0.76% (mean adjusted-method) for upgrades within an event window of four days (t_{-1} until t_{+2}) and -1.54% (market-adjusted method) or -1.43% (mean-adjusted method) for downgrades within an event window of seven days (t_{-1} until t_{+5}). Furthermore, the results also indicate that there is a post recommendation drift. However, due to the fact that the significance test does not show a clear picture the post recommendation drift cannot be approved. In addition, it can be argued that the post recommendation drift is triggered by other events taking place in the meantime or in other words that the observed abnormal return has different reasons than the revision in recommendation consensus. Besides the examination of the market reaction the results display that factors like the level of the recommendation, the magnitude of the revision in recommendation as well as the magnitude of the target price revision are determining factors of the observed abnormal return. The findings show that up-grades to strong buy result in a higher stock price reaction than upgrades to another consensus recommendation level. Furthermore, high consensus recommendation revisions have a higher stock price impact than lower revisions. On the other hand, downgrades with a higher delta of the target price revision have a larger negative impact on stock prices than target price revisions with a smaller delta. These findings are partly consistent with the findings of Stickel (1995) [10]. It can be concluded that the German stock market is to some extent inefficient.

References

1. Susan D. Krische, Charles M.C. Lee. The information content of analyst stock recommendations, *Working Paper, Johnson Graduate School of Management, Cornell University,* December 2000.
2. Brad Barber, Reuven Lehavy, Maureen McNichols, Brett Trueman. Can investors profit from the prophets? Security analyst recommendations and stock returns, *The Journal of Finance,* Vol. LVI, No. 2, April 2001, pp. 531-563.
3. Kent L. Womack. Do brokerage analysts' recommendations have investment value? *The Journal of Finance,* Vol. LI, No. 1, March 1996, pp. 137-167.
4. Scott E. Stickel. Analyst Incentives and the Financial Characteristics of Wall Street Darlings and Dogs, *The Journal of Investing,* Vol. 16, Issue 3, fall 2007, pp. 23-32.

5. Elroy Dimson, Paul Marsh. An Analysis of Brokers and Analysts Unpublished Forecasts of UK Stock Returns, *The Journal of Finance*, Vol. XXXIX, No. 5, December 1984, pp. 1257-1292.
6. Edwin J. Elton, Martin J. Gruber, Seth Grossman. Discrete Expectational Data and Portfolio Performance, *The Journal of Finance*, Vol. XLI, No. 3, July 1986, pp. 699-713.
7. Jennifer Francis, Leonard Soffer. The Relative Informativeness of Analysts` Stock Recommendations and Earnings Revisions, *Journal of Accounting Research*, Vol. 35, No. 2, autumn 1997, pp. 193-211.
8. Alan Brav, Reuven Lehavy. An Empirical Analysis of Analysts Target Prices: Short-term Informativeness and Long-term Dynamics, *The Journal of Finance*, Vol. LVIII, No. 5, October 2003, pp. 1933-1967.
9. Roni Michaely, Kent L. Womack. Brokerage Recommendations: Stylized Characteristics, Market Responses and Biases, *Advances in Behavioral Finance II, Princeton University Press,* 2005, pp. 389-422.
10. Scott E. Stickel. The anatomy of the performance of buy and sell recommendations, *Financial Analysts Journal,* Vol. 51, Issue 5, September-October 1995, pp. 25-39.
11. Mark T. Bradshaw. The Use of Target Prices to Justify Sell-Side Analysts Stock Recommendations, *Accounting Horizons*, Vol. 16, No. 1, March 2002, pp. 27-41.
12. Alexander G. Kerl, Andreas Walter. Never judge a book by its cover. What security analysts have to say beyond recommendations, Financial Markets and Portfolio Management, Vol. 22, No. 4, October 2008, pp. 289-321.
13. Rowland Kwame Atiase. Market Implications of Predisclosure Information: Size and Exchange Effects, *Journal of Accounting Research*, Vol. 25, No. 1, spring 1987, pp. 168-176.
14. Eugene F. Fama, Kenneth R. French. The Cross-Section of Expected Stock Returns, *The Journal of Finance,* Vol. XLVII, No. 2, June 1992, pp. 427-465.
15. Eugene F. Fama, Kenneth R. French. Value versus Growth: The International Evidence, *The Journal of Finance,* Vol. LIII, No. 6, December 1998, pp. 1975-1999.
16. William H. Wells. A beginner's guide to event studies, *Journal of insurance Regulation*, Vol. 22, Issue 4, summer 2004, pp. 61-70.
17. A. Craig MacKinley. Event Studies in Economics and Finance, *Journal of Economic Literature,* Vol. XXXV, March 1997, pp. 13-39.
18. Glenn V. Jr. Henderson. Problems and solutions in conducting event studies, *The Journal of Risk and Insurance,* Vol. 57, Issue 2, June 1990, pp. 282-306.
19. Michael A. Berry, George W. Gallinger, Glenn V. Jr. Henderson. Using Daily Stock Returns in Event Studies and the Choice of Parametric Versus Nonparametric Test Statistics, *Quarterly Journal of Business and Economics*, Vol. 29, Issue 1, winter 1990, pp. 70-85.
20. Thomas Dyckman, Donna Philbrick, Jens Stephan. A Comparison of Event Study Methodologies Using Daily Stock Returns: A Simulation Approach, *Journal of Accounting Research,* Vol. 22, Supplement 1984, pp. 1-30.
21. T. Clifton Green. The Value of Client Access to Analyst Recommendations, *Journal of Financial and Quantitative Analysis,* Vol. 41, No. 1, March 2006, pp. 1-24.