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Information Role of Analysts' Target Prices: Event and Intra-Day Analysis

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Abstract

I have documented that target prices subsumed in downgrade recommendations are the most informative while target prices in coverage reiteration are the least informative. The First Call database enables me to extend the analysis to an intraday frequency. Conducting event studies using high frequency data, is even more critical given the advent of information technology systems has dramatically changed the landscape of stock trading. The modified approach to event study is relevant to the fast-changing trading environment in today's capital market. For upgrades, there are significant positive market-adjusted returns lasting 20 minutes; for downgrades, there are significant negative market-adjusted returns lasting 25 to 35 minutes. By constructing portfolios on the basis of target price information measures (*TP/P*, $\Delta TP/TP_{-1}$ and $\Delta TP/P$), I also document that the information subsumed in target price revision is more useful than target price alone. Furthermore, the dramatic rise in trading activity coupled with a shift in order imbalances implies that the market interprets recommendations with target price changes broadly as a liquidity event. More importantly, I find that target prices are informative both unconditionally and conditionally on the type of recommendations and rating revision at intraday frequency. The investors seek out more information from target price revisions when recommendations are unfavourable.

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1. Introduction

Analyst reports typically contain three summary components: an earnings forecast, a buy, sell, or hold recommendation, and a 12-month target price. This price depends on earnings forecast and some accounting ratios. Most of the previous papers focus mainly on the announcement effects of analysts' earnings forecasts and recommendations. This paper studies the impact of analysts' target price revisions on intraday and daily stock returns.

Most previous studies[1] on analyst reports examine revisions in only two of the summary elements: stock recommendations and earnings forecasts. In recent years, security analysts have increasingly disclosed target prices in reports, along with their stock recommendations and earnings forecasts. These target prices provide market investors with analysts' most concise and explicit statement on the magnitude of the firms' expected value. Despite the increasing prominence of target prices, their roles in conveying information to market investors and their value to the formation of equity prices have remained largely unexplored. We extend the research of analysts' information role by incorporating the contents of target price rather than just the individual summary elements such as the stock recommendation.

"Target" or "objective" prices are often mentioned as firm's expected value by analysts in their reports. The difference between the target prices and the recent transaction prices can be used to support the relevant recommendations. For instance, JP Morgan put a report on Alcoa Inc when the price was $36.85 and made a

[1] Beginning from Lee (1986, 1987), studies of financial analyst behavior evolves into a cottage industry. A large body of articles have been devoted to different issues of financial analysts in equities market. For example: Bushan (1989), Barber and Loeffler (1993), Stickel (1995), Womack (1996), Greene and Smart (1999), Liang (1999), Michaely and Womack (1999), Jackson (2005), Frankel, Kothari, and Weber (2006).

conclusion, "We continue to recommend Alcoa Inc with a price target of $48 per share. We believe that the stock is significantly undervalued at current levels."' Target price represents the analyst's valuation of the stock, and it proves that the Buy recommendation as one might anticipate. Understanding the standard wording of recommendations, market participants would perceive that a Buy or Strong Buy recommendation reflects a firm that the analyst believes is currently underpriced, a Hold recommendation representing a fairly priced firm, and a Sell recommendation representing an overpriced firm. Nevertheless, Sell recommendations are rather rare (Womack 1996, Stickel 1998). Hence, market participants tend to perceive Holds as Sells, and Buys as Holds. However, would an analyst announce a target price when he or she believes a stock is overvalued? This could not happen if previously studied optimistic bias in forecasts and recommendations also describes target prices (e.g., McNichols and O'Brien 1997). Theories for this optimistic bias contain a motivation by analysts to "curry favor with management" (Francis and Philbrick 1993) and improve brokerage house relationships (Lin and McNichols 1998). Consequently, it is quite likely that there is an asymmetric use of target prices to support stock recommendations. We would expect that downgrade with downward target price revisions would be the most credible signal.

Gaining an insight into the information role of target prices in financial markets is crucial for several reasons. Firstly, since target prices are often calculated as the product of forecasted earnings and a financial ratio such as an earnings yield (Fernandez (2001), Bradshaw(2002) and Asquith, Mikhail, and Au (2002)), evidence that target prices are informative in conjunction with stock recommendations supports the argument that market participants consider price formation by analyst's recommendations are valuable. Secondly, if target prices subsume incremental

information value, it would indicate that results in previous study on analysts' stock recommendations might be partially attributed to the value that investors place on price targets. Lastly, an exploration into the information role of target prices enables us to evaluate the view that target prices provide little or no value to the investors. Specifically, some argue that stock recommendations may completely contain the information in target prices, because the latter are decided after the stock recommendation and earning forecast have been set. It might also be argued that target prices are uninformative and only serve as vehicle to raise an individual analyst's stature, or that they may not be easily perceived by market participants since they are not necessarily associated with an "end date."

One disadvantage in exploring stock recommendations in isolation is that there are a limited number of recommendation categories. More specifically, although analysts use five distinct recommendations—strong buy, buy, hold, sell, and strong sell, they are generally unwilling to use the two negative ratings (see, e.g., Barber, Lehavy, McNichols, and Trueman, 2001; Mikhail, Walther, Willis, 2004). By incorporating gradations in the analysts' price target, we overcome the disadvantage of limited, discrete recommendation categories.

This paper attempts to address the following research issues that are of interest to both the financial industry and the academia:

1) The relationship between the change of target price and intraday stock returns, and the process by which information of target price revision is reflected in the stock price over a few days;
2) The magnitude of stock returns when target prices are made under four different scenarios: upgrade, downgrade, initiation, and reiteration;
3) The magnitude of stock returns in response to target price revisions when analyst

ratings are reiterated as buy, sell, or hold;

4) Announcement effects of coverage initiation and the differential information content of target price;
5) The information contents of target price changes announced during and outside the regular trading hours;
6) Intraday informative of target price revisions conditionally and unconditionally on the announcement of recommendation (upgrade and downgrade) and change of ratings;

We start our analysis with an investigation of stock price reactions associated with and subsequent to target price announcements. We investigate the 7-day cumulative abnormal returns to target price, particularly when we distinguish between those released with recommendations and those that are released without recommendations. If market participants consider analysts price targets as informative, we should obtain significant price reactions surrounding the announcements. Since target prices are generally announced in conjunction with stock recommendations, we investigate whether target prices are incrementally informative under different recommendation categories (initiation, reiteration, upgrade and downgrade). We would expect to see that target prices are incrementally informative, conditional on contemporaneously issued stock recommendations.

We next examine the intra-daily returns around analysts' target price revisions. Busse and Green (2002) find that profit opportunities dissipate within seconds following the televised broadcast of analyst recommendations. Kim, Lin, and Slovin (1997) examine the intra-daily market reaction to the announcement of an initiation of coverage (an initial buy recommendation) that is published on the *Dow Jones News Wire*. They find that surrounding the opening trade in each market, there is a

statistically significant price reaction (3.5%) to the initiation of coverage, which they contribute to clients of analysts' firms trading on the information advantage before it hits the news wires. The magnitude of abnormal returns is consistent with Womack (1996), nevertheless, Kim, Lin, and Slovin (1997) show that nearly all of the abnormal returns are captured in the opening trade. In our examination of intra-daily returns, we discover that target prices do appear to bring new information to the market.

We establish that analysts' target price revisions have an immediate impact on the market when they are released with stock recommendations. Investors who examine recommendations and have access to analysts' target price should consider both when making investment decisions. We document that analysts' recommendations with target announcements are more valuable than the recommendations alone.

The remainder of this paper proceeds as follows. Section 2 we present a brief review of the related research of our study. Section 3 reports the sample. Section 4 is about the methodology we apply in this paper. Section 5 provides results and analysis. Conclusions are offered in section 6.

2. Related Research and Literature

Financial analysts, serving in brokerage houses, independent research institutes, fund corporations and banks, play important roles in allocating resources in capital markets. They are primary information intermediaries in the market: collecting private information, forecasting firms' prospects, and conducting retrospective analysis that interprets past events (Beaver (1998), p.10). Their labours improve the informational efficiency of the capital markets (Frankel et al. (2006)).

There are hundreds of equity research firms in the US and a study by Johnson (2006) shows that spending on equity research is valued at 10 to 20 billion dollars in 2006. If indeed investment firms and pension funds are willing to pay, directly or indirectly, good money to security analysts, then it is no coincidence that a growing body of literature is devoted to studying the role of analysts in affecting the information efficiency of stock markets.

Lee (1986, 1987) documents that the value of analyst's recommendation is positively related to the cost of information, consistent with Grossman-Stiglitz (1980) theorem. Analysts expend considerable resources to work out the research reports. In a competitive and rational market, this costly activity must be compensated in the form of underwriting fees, trading profits, and commissions from trading (Womack (1996)). Analysts publicly disclose their reports only if the expected benefit of doing so is greater than the cost of reports. For example, Womack (1996) demonstrates that a change of recommendation causes an average price response of 3 to 5 percent over a 3-day horizon. Beneish (1991) and Stickel (1995) demonstrate similar findings with regard to the magnitude of price reaction to analysts' recommendations.

The research by Sorescu and Subrahmanyam (2006) suggests that investors should pay more attention to the revisions by highly rated analysts, especially those who have spent more years in the profession and who are affiliated to prime brokerage houses. Jegadeesh, Kim, Krische, and Lee (2004) construct portfolios every quarter on the basis of consensus recommendation levels and find a 2.3% bias between the performance of most and least favourably recommended portfolios over the six-month horizon.

Juergens (1999) provides intraday evidence of the informativeness of analysts'

recommendations. His research supports the notion that market reacts quickly to analysts' recommendations regardless of whether there is public news. The intraday analysis in Libby, Mathieu, and Robb (2002) show that the quoted bid-ask spreads are wider and depths are reduced before the release of earnings announcement.[2] Green (2006) finds evidence that there is significant information asymmetry prior to analysts' announcements of their ratings. Moreover, subscribers of analyst news services can earn an average two-day return of 1.02%, after controlling for transaction costs.

Papers on the informativeness of analyst's target price, however, are few. Brav and Lehavy (2003) show that target prices significantly affect the market price over and above the issuance of stock recommendations. Bradshaw (2002) uses a sample of 103 sell-side analysts' reports to examine the joint impact of target price and stock rating. He concludes that target prices are positively correlated with analysts' recommendations. Asquith, Mikhail, and Au (2005) study the impact of target price conditional on the release of other information (earnings forecast and recommendations), and find that target prices do provide useful information to the market.

On the other hand, a study by Bonini, Zanetti, and Bianchini (2005) casts doubt on the informativeness of target price. For stocks traded on Borsa Italiana, they find persistent and large errors in the target price in forecasting future stock price. Bradshaw and Brown (2006) also show evidence of the inability of analysts to accurately predict future prices. Thus, the informativeness of target price is still an

[2] The difference between the specialist's posted bid price and ask price for the share in which they specialize, known as the bid–ask spread. The sum of the number of shares available at the bid and ask price is known as quoted depth (Lee, Mucklow, and Ready 1993).

open question and this paper attempts to provide some answers by examining the response of stock price to the release of target price revision.

3. Data and Sample Selection

In this section, we describe the data used in this study. Additionally, we provide the procedures that how we identify the firms and standardize the brokerages' language of recommendations used in this sample. We collect the recommendation information from briefing.com, which is adopted by the online edition of Wall Street Journal. According to the data, there are four kinds of analyst actions: Coverage Initiation, Coverage Reiteration, Downgrades and Upgrades. For the sample of 201,340 observations in the panel A of table 1, there are 46,507 Coverage Initiations, 76,640 Coverage Reiterations, 41,821 Downgrades and 36,372 Upgrades. We separate the data into this category respectively. The time stamps of our data are from Jan, 1997 to Dec, 2006. The recommendation-- Coverage Reiteration is available from Jan, 2000 and it includes the most observations each year. The total number of recommendations increases in each year of the sample. There is a dramatically increase in the number of recommendations per firm between 1999 and 2000, at least twice over the time. The median value of firm size is also reported in the table.

[Insert Table 1 Here]

In panel B, we find one pattern that favourable (buy or hold) recommendations are much more pervasive than unfavourable (sell) ones. The percentage of buy to sell

recommendations in this sample is more than 30 times. This percentage is much bigger than the percentage in upgrade and downgrade. Womack (1996) shows that this ratio at about 7 to 1. Pratt (1993) finds that Zacks Investment Research estimates this ratio at 10 to 1. This pattern is consistent with prior studies. The detailed interpretations of this buy-sell asymmetry can be found in Womack (1996).

We identify the firms by the ticker. It happens that the same ticker represents different firms. The solution we find is merging the data from briefing.com with the data from CRSP by the identical date and ticker to get the cusip and permno. And then we download the event day data (holding-period return) from the CRSP by permno. We also find some firms with two cusips (very few) which means that the firm lists in two different stock exchange markets. We need to consider both of these two stocks. We calculate holding-period abnormal return on a net-of-market basis, where our proxy for the market portfolio is the CRSP value-weighted index.

The most common stock rating system consists of the ratings "buy," "hold," and "sell." Brokerage houses use a slightly expanded system to express similar ratings change in our data, such as "buy," "attractive," "neutral," "unattractive," and "sell." The information of the rating system in the briefing.com is far from enough to distinguish the differences among these languages. We find that the database--I/B/E/S which provides the original recommendation of each broker. The variable BTEXT in I/B/E/S represents Broker Text. It is the original recommendation received from the contributor, in their text. I/B/E/S Text - Since many brokers have different ratings, I/B/E/S develops a standard set of recommendations, each with an individual numeric value: 1-Strong Buy, 2-Buy, 3-Hold, 4-Underperform and 5-Sell. Each recommendation collected from the contributors is mapped to one of the I/B/E/S standard ratings. We can translate the different recommendation languages which

used in the original data into the standard ratings on the basis of this principle. We consider both strong buy and buy recommendations as buy in our analysis. Underperform and sell are both considered as sell. Womack (1996) and Green (2006) categorize the recommendation changes based on the same principle. Thus, we can categorize the data we collect from briefing.com into the following recommendation: Buy, Sell, and Hold.

We obtain intra-daily data from the NYSE's Trade and Quote (TAQ) database. We exclude all the transactions outside the regular trading hour (from 9:30 to 16:00). It contains time-stamped transaction data for stocks on the NYSE, ASE and NASDAQ stocks. For the exact time of the release of analyst report, we rely on First Call database. The first time stamp is critical in our intraday event study of target price revisions. We merge this data source with the data we collected from Briefing.com by selecting records that have identical ticker symbol, date, and brokerage house identity. Finally, we can get 7197 observations. The time interval of these observations is from 1999 to 2006.

4. Methodology

In addition to the traditional daily event study, this paper uses event study methods to analyze the price reactions to analysts' announcements at the intraday frequency. The advent of information technology systems has dramatically changed the landscape of stock trading. More and more traders have access to important information these days. Whenever some news hit the wire, the price reaction ought to occur a lot quicker than before, and it is therefore important to examine the price impact tens of minutes before and after the information arrives. For robustness check

and to relate to existing literature, we also conduct the standard event study at the daily frequency.

We use several different sources of historical data in our empirical study. First, we collect the target price information from briefing.com, which is adopted by the online edition of Wall Street Journal. Second, for the event day data (holding-period return), we rely on CRSP - Daily Extract with Time Window database. This query provides daily data for each firm for a selected interval window. To standardize the Brokerage houses' ratings, we depend on the database I/B/E/S which provides the original recommendation of each brokerage house.

For the exact time of the release of analyst report, we rely on First Call database. In this database, the time stamp specifies when the analyst published the report. This time stamp is critical in our intraday event study of target price revisions. We merge these two data sources by selecting records that have identical ticker symbol, date, and brokerage house identity. In calculating intraday abnormal returns, the S&P 500 index cannot be used directly as a benchmark, because the intraday changes of the index are significantly less frequent than the intraday changes for the added stocks. The closest substitute for the S&P 500 index that is traded as a stock and is also very liquid is the SPIDER (SPY) fund[3]. Since this fund is actively traded, it avoids the stale price effect of the S&P 500 index[4]. All the trades recorded on each day are collected from the TAQ Database for the sample of firms and for the SPY. The official US starting time is 09:30 and the official ending time is 16:00. There are also pre- and post-market close trades reported before and after this interval. Since they are

[3]Spider tracks the Standard and Poor's 500 Composite Stock Price Index. It is an ETF (Exchange Traded Fund) that represents ownership in the S&P 500 Index.

[4] See Atchison et al. (1987) for a discussion of the spurious autocorrelation in index returns due to nonsynchronous trading.

executed outside the current market hours (but within the market reporting hours), they are not included in the analysis. We keep those records with a TAQ correction indicator of 0 (regular trade) and when possible a 1 (trade later corrected). We also excluded any transaction with a sale condition of Z, which is a transaction that reported on the tape out of time sequence. Additionally, we construct portfolios to perform cross-sectional analysis, so as to shed light on different price reactions of analysts' most and least favoured stocks.

5. Results and Analysis

5.1 Market Reaction to Target Price Announcements at Daily Frequency

As the beginning of our study, we capture the market impact of target price by examining daily returns. As mentioned above, we collect daily stock returns from the *CRSP* - Daily Extract with Time Window. We calculate holding-period abnormal return on a net-of-market basis, where our proxy for the market portfolio is the *CRSP* value-weighted index. In order to have an in-depth study of the information content of recommendation (coverage initiations and coverage reiterations), we have broken down them into three different subgroups: Buy, Sell, Hold. By differentiating between recommendation categories, we can have a more accurate understanding of which categories have the largest impact on daily returns. Individual brokerage houses use many different means of rating their stocks. We consider both strong buy and buy ratings as buy in our analysis. Underperform and sell are both considered as sell.

Thus, we can categorize the data we collect from *briefing.com* into the following ratings: Buy, Sell, and Hold.

In order to explore the impact of target prices on stock returns, we begin our analysis by examining a 7-day holding period abnormal return around the release of recommendations with target prices. To help understanding the information of target prices, we also calculate the return of stock around the release of recommendations without target prices. One point need to pay attention, some firms may have different recommendations at the same day due to different brokerage houses. It also may have target price of one recommendation, but not have of other recommendations at the same day. We consider it as the one with target price. As a first step in our analysis, we examine the magnitude of stock returns in response to target price revisions when analyst ratings are reiterated and initiated as buy, sell, or hold. Our evidences are supportive of the notion that the market treats an analyst recommendation differently based on whether a recommendation release with or without target price. Table 2 and Table 3 present results of the category and their corresponding holding period abnormal return.

[Insert Table 2 and 3 Here]

We show that the holding period abnormal returns are significantly positive for positive initiations of coverage (buy) and positive reiteration, and significantly negative for negative initiations and reiterations of coverage (sell). Interestingly, it is still significantly negative for neutral initiations and reiterations of coverage (hold). The results are reported in Table 2 and Table 3. In table 2, comparing the different recommendations in the same ratings, we find that the magnitude of returns for

coverage initiation is larger than reiteration for positive rating (buy) at t=0. It is the same at t=1 and t=2. It is smaller than coverage reiteration for negative rating (sell) at t=0, 1, 2 and 3. As to the neutral rating (hold), it is larger than coverage reiteration. Positive rating (buy) released in conjunction with target price earn a larger return than the rating without price target. Neutral ratings (hold) in conjunction with target price earn a larger return than the rating without target price. These results can lead us to draw the following conclusions: recommendation of coverage initiation is more informative (bigger impact on returns) than coverage reiteration; from the panel A and B of figure 1, it can be observed that 7-day cumulative abnormal returns for coverage initiation are bigger than coverage reiteration for all the ratings. It indicates that coverage reiteration associated with price target is the least informative. This finding is consistent with the previous study focused on the information role of stock recommendation. Previous work (e.g., Barber, Lehavy, McNichols, and Trueman (2001)) has documented that recommendation reiterations are the least informative, as is evident in the economically small magnitude of 7-day cumulative return in panel B of figure 1. Positive rating released independently of target prices are less informative (lower impact on returns) than rating released in conjunction with target price, while neutral rating is the opposite. With regard to the negative rating (sell), it depends on the kind of recommendations. If it is coverage initiation, the target price is more informative. If it is coverage reiteration, it is less informative. We perform difference of means tests and median tests to determine differences between event day returns for the above pairs of recommendation. The results are reported in table 5. For each rating of recommendations in the event day, we use two sided student t-statistic test to test the differences of means of the recommendations with and without target price, as well as Wilcoxn sign ranked test to test the differences of median values. The results

are reported in table 5. With the exception of neutral rating of initiation, results of other categories are statistically significant, indicating that there is a significant difference between the returns in the other categories. All theses evidences lend strong support to the point that target price do subsume incremental information for coverage initiation and positive rating of reiteration. Target price subsumed in coverage initiation is more informative than coverage reiteration. For negative rating of coverage reiteration, target price does not provide incremental information since the average return of recommendation with target price is smaller than the recommendation without target price. The test of differences of medians and means (the 6th row of table 5) suggests that they are statistically different from each other.

[Insert Figure 1 Here]

Next we determine the magnitude of the return under upgrades and downgrades when they occur independently or concurrently with the target price. Consistent with the previous studies, we obtain significant positive returns for upgrades and significant negative returns for downgrades. Panel C of Figure 1 shows that investors can earn economically significant abnormal returns during 7-day window around the dissemination of a recommendation in the direction of that recommendation. From the Table 3, it can be seen that there is a significant positive return 4.09% for recommendation upgrades and significant negative return -5.10% for recommendation downgrades at t=0 when the recommendations occur concurrently with the target price. The 4-day holding period return of upgrades 4.79% is larger than the 11-day event window returns of 1.16% (Stickel (1995)) or 3-day returns of 3.0% (Womack (1996)). We also list the recommendations without target price. These

results are also reported in Table 3. At t=0, upgrades released in conjunction with target price earn 4.09%, while upgrades released independent of target price have returns 3.16%. The test (upgrade) reported in table 5 shows that these two returns are statistically different from each other. Downgrades released with (without) target price have return -5.10%(-4.51%). Each of these is statistically significant. The results (downgrade) reported in table 5 also indicate that the means of returns are different from each other. The test of the median values in table 5 still shows that the market response to the target price cannot be overlooked. All of these findings support our previous conclusion that the information subsumed in target price cannot be ignored. Hence, anyone who investigates the impact of analysts' recommendations on market prices should also consider the target prices made by analysts as well. In the following intraday study, we apply this finding in our later study.

[Insert Table 4 Here]

To test for the robustness of this result, we perform the following test. We divide the sample by year, and calculate the holding period abnormal returns at t=0. The results are reported in the Table 4. We plot the Figure 2 based on the data from the Table 4. With the exception of 2002 in upgrades and 2003 in downgrades, the results hold across the remaining years. These results lead us to conclude that analysts' recommendations (upgrades and downgrades) released independently of target prices are less informative (lower impact on returns) than recommendations released in conjunction with target prices.

[Insert Table 5 Here]

[Insert Figure 2 Here]

5.2 Market Reaction to Target Price Announcements at Intra-daily Frequency

In order to more accurately detect the impact of analysts' target prices on stock returns, we examine intra-daily returns surrounding the release time of target price revisions. Revisions data with accurate time stamps can help us to get sharper inferences than in earlier studies.

For the exact time of the release of analyst report, we rely on First Call database. Prior studies consider the time stamps as approximations due to the data constraints. For example, Womack (1996) and Juergens (2000) states that during time periods of their studies, 1989 through 1991 and 1993 through 1996, analysts' report was made available to clients approximately one or two hours until it was available on the First Call system. Juergens (2000) examine the information subsumed in analyst recommendations at approximate time that the information is transmitted to the market. The advent of information technology systems has dramatically improved the data collection and dissemination procedures of First Call. Currently, analysts typically distribute their research directly to First Call after they receive approval from the brokerage house's compliance sector. Our data ranges from 1999 to 2006. We provide a description of the target price in Table 6. In the table 7, we construct one measure of the information content of analysts' target prices denoted by target_change, $\Delta TP/TP_{-1}$, is the difference between the current and previous target price released by the same brokerage house, scaled by the previous target price. The rating_change is the difference between the current and prior rating. The negative

value of the rating_change denotes that the recommendation is upgrade. Panel A of table 6 presents the average target price changes conditional on the associated recommendation revisions. The frequency and the percentage of the observations are also reported in the table. Compared with other rating change, only the observations of rating change -1,-2, 1, and 2 are enough to draw efficient conclusions. The average target price change is consistent with the direction of the rating change. The higher the rating change, the bigger the target price change. For example, an upgrade of 1 has an average target price change of 21.69%, which is smaller than an upgrade of 2 (25.27%). It can be seen that the average target price change is consistently positive for upgrades (negative rating change) and negative for downgrades (positive rating change). Panel B of table 6 reports the average rating changes conditional on the magnitude of the target price change. In Panel B, we can find the same feature of the data. The higher target price change is followed by the bigger rating change. These facts suggest that the target price and recommendations contain much of the same information content. In our later study, we will gain a further insight into the different information role of these two information sources.

[Insert Table 6 Here]

5.2.1 Descriptions of Variable for Target Price Information Measure

To examine the intra-day information content of analysts' target prices, we develop three alternative measures. *TP/P*, is the ratio of the target price to the stock price of the last transaction just before the target price announced. The transaction is just several seconds before the announcement; some are even traded at the time when the

announcements are published. For the stock with the announcement outside the regular market hour, we pick the price of the first transaction traded after 9:30 am. This ratio can be considered as the analysts' stated forecast of the firms' return. Since we intend to explore more accurately the informative of the target price, we choose the price in the intra-day interval to see the reaction of the market. In Brav and Lehavy (2003)'s work, they choose the stock price two days before the announcement to explore the daily and monthly reaction of the market.c $\Delta TP/TP_{-1}$, denoted as the change in the brokerage house target price. It measures the magnitude of the revision on the target price, which can help to explore the reaction of the market in response to target price revisions. $\Delta TP/P$ is used to study whether the released target price relative to the prior target price issued by the same brokerage house contains information.

Table 7 presents the descriptive statistics on the three information measures in detail. The statistics show that the distribution of the Target_change and Target_price are right skewed. The average (median) percentage change of target price is 1.84% (0%), indicating that analysts probably do not revise the target price dramatically. Nevertheless, analysts are rather optimistic about the value of firms in one year since target price measures the analysts' one year expected value of one firm. The target price is 20% higher relative to the stock price on average, indicating that analysts' mean target price for these firms are 20% above the recent trading prices. And the median is 16% higher compared to the stock price. The third column describes the change of target price scaled by the stock price. The average (median) is -12.8% (0%).

[Insert Table 7 Here]

5.2.2 Intra-daily Returns

Since we have documented that the recommendations in presence of target price would be more informative, we will focus on the investors' reaction to recommendation in conjunction with target price in our following analysis. As a first step in the analysis of intra-daily reaction, we use the return proxy for the investors' reaction to the news. There are two kinds of the report due to the timing of the analyst report: regular market hour (from 9:30 am to 16:00 pm) and outside of the regular market hour (16:00 pm to 9:30 am of the next day). Roughly 75% (5517 out of 7197) of the analyst reports in the sample are released outside the regular market hour. This finding is consistent with the work of Green (2006). As a first step in the analysis of intra-daily returns, we separate the data into the upgrade and downgrade. We calculate intra-daily returns for the 5-minute intervals in 40-minute after the recommendation release. The 5-minute intra-daily market-adjusted returns are calculated by using the following equations:

$$r_{i,t+5} = \log(P_{i,t+5}) - \log(P_{i,t}) \qquad (1)$$

$$r_{spy,t+5} = \log(P_{spy,t+5}) - \log(P_{spy,t}) \qquad (2)$$

$$r_{market\_adjust} = r_{i,t+5} - r_{spy,t+5} \qquad (3)$$

Where $r_{i,t+5}$ is the 5-minute return for each stock *i*, $r_{spy,t+5}$ is the 5-minute return for the SPY, $P_{i,t+5}$, $P_{spy,t+5}$ is the price from the trade at time t+5, t is the time when the target price is released, r_{market_adjust} is the market-adjusted return for each stock *i*.

A 5 minute grid is constructed using previous-tick method which means if there is no transaction at that time grid, the nearest previous transaction record is used. The

first observation of the day occurring just after 9:30 was used for the 9:30 grid time. From this grid, 5 minute market-adjusted intraday log returns are constructed. For recommendations that are released after the market closes or before the open, post-release returns are the returns from the first 40 minutes of trading after the next sequential open.

Table 8 and 9 reports the results of intra-daily market-adjusted returns of recommendations in the presence of target price. Using the above equations, if the report is published during the market hour, we compute intra-daily market-adjusted returns for the 5-minute intervals over the period beginning 40 minutes prior and ending 40 minutes subsequent to the firm's target price announcement; if the report is published after the market closes or before the open, we compute the overnight return and intra-daily market-adjusted returns for the 5-minute intervals over the period 40 minutes subsequent to the firm's target price announcement. Panel A of figure 3 plots the cumulative market-adjusted returns for the 5-minute intervals over the period 40 minutes following the announcement. It can be observed there is a significant upward trend of return for upgrade and downward trend of return for downgrade.

[Insert Figure 3 Here]

For the sample of announcements published outside the trading hour, the overnight market-adjusted return is 3.31% (p-value<0.0001) for upgrade recommendation and -5.26% (p-value<0.0001) for downgrade recommendation. We find a statistically positive and significant abnormal return of 0.18% for upgrade, and statistically negative return of -0.66% for downgrade at time t=5. The pattern of the return persists

for 20 minutes for upgrade and 35 minutes for downgrade. The pattern and levels of significance are more pronounced for downgrade. For the sample of announcements published outside the trading hour, we find a similar pattern with the first sample: statistically positive and significant return of 0.11% (p-value<0.0001) for upgrade and statistically negative return of -0.12% (p-value<0.0001) for downgrade. The pattern and levels of significance are less obvious than the sample of announcements published outside the trading hour. It can be seen that there are also significant pre-recommendation release time returns. From -40 to -5, the pattern and levels of returns are more pronounced than the post-recommendation time returns. Most of the pre-release time returns are significant at traditional confidence levels. It is probably that there exists information leakage before the announcements. For example, institutional investors pay fees to the brokerage to use the database and are more likely to know the detailed information of analysts' report. Green (2006) document that early access to stock recommendation benefits brokerage firm clients with information in advance to trade. Besides, First Call's primary customers are brokerage firms and institutional investors. The incremental investment value can be perceived as the compensation for the fees paid to the brokerage by clients.

[Insert Table 8 Here]

[Insert Table 9 Here]

In this part of study, our goal is to investigate which target price information measure is the most informative at intraday frequency. We have developed three information measures: TP/P, $\Delta TP/TP_{-1}$ and $\Delta TP/P$. We calculate the market-adjusted

return around each announcement and present mean returns for portfolios sorted by the magnitude of the related information content measure of target price. Raw cumulative return is calculated as the difference between price change from t=-35,-30…40 relative to time t=-40. These results are reported in table 10, 11 and 12. From the results reported in table 10, it can be seen that the average raw returns around target price revisions are raising in the favorableness of the target price revisions. The pattern is consistent at each time t. It can be observed that the 80-minute market adjusted returns of the portfolios range from -4.44% to 2.20% with target price revisions ranging from -52% to 67%. At the insignificant target price revisions (quintile=6), the portfolio's performance is statistically and economically insignificant while the target price revision only equals 2%. This pattern is also pronounced in the portfolios ranked on the basis of $\Delta TP/P$. While the mean 80-minute market adjusted returns increase in the percentage of TP/P ranging from -1.73% to -0.65%, the pattern and levels of significance are less pronounced than the other two information measures. With the exception of quintile 1,2 and 3 (the 3 smallest TP/P), all the other portfolios are statistically and economically insignificant, indicating that this information measure is not so useful as the other two measures. Consequently, we believe that the information subsumed in target price revision is more useful than target price alone. Investors are more likely to respond to the information contained in the target price revision. Which measure is the most informative among the other two measures? Figure 4 plots average market buy-and-hold market returns for the period beginning forty minutes prior and ending forty minutes subsequent to the firm's target price announcement. We can see that the measure $\Delta TP/TP_{-1}$ is more informative than measure $\Delta TP/P$ since it has a big cumulative market-adjusted return.

[Insert Table 10 Here]

[Insert Table 11 Here]

[Insert Table 12 Here]

[Insert Figure 4 Here]

5.2.3 Trading Activity surrounding the Announcements

In the following analysis, we link the announcement of information to volume and order imbalance through analysis of the impact of recommendations. There is a considerable literature on the presence of intra-daily patterns in market variables, including returns, volume, and spreads (Harris (1986), Smirlock and Starks (1986), Jain and Joh (1988)). There are also some studies trying to incorporate different measures of information, like public news announcements from news wire services (Brock and Kleidon (1992), Mitchell and Mulherin (1994), and Berry and Howe (1994)), to explain these regularities existed in financial markets. Green (2006) studied the change of trading activity (volume and order imbalance) due to the announcement of recommendation published outside the trading hour. He found that there is a dramatic increase of trading volume following the recommendations (upgrade and downgrade). Additionally, dollar order imbalances are negative for 10 to 30 minutes subsequent to a downgrade recommendation; the pattern and magnitude of significance are less appreciable than for upgrades. He focused on the recommendation released outside the regular trading hour. It raises an interesting question concerning the impact on trading activity before and after the announcements if the recommendations are disseminated during the market hour. The timing of recommendations available in First Call database enables us to study this

issue. If information arrival is non-random in nature, the trading activity should behave the same. If the increased trading activity is motivated by recommendations changes, we would expect to see more buyer-initiated trades following upgrades and the opposite for downgrades. More trading volumes would also be predicted due to the arrival of the information.

To measure the percentage of order imbalance, we use the tick test.[5] Lee and Ready (1991) shows that "tick test" provides the best way to classify the trades as buys or sells given that quotes are often recorded before the trade that triggered them and that traders are usually inside the spread. The tick rule classification is on the basis of price movements relative to previous transactions[6]. The rule classifies a trade as a buyer-initiated (seller-initiated) if the transaction is above (below) the previous trade. If there is no price change but the preceding change was uptick (downtick), then the trade is classified as a buy (sell). Using alternative rules[7] such as Ellis, Michaely, and O'Hara (2000) or excluding trades inside the posted quotes, which may be harder to classify correctly, does not appreciably change the results.[8]

[5] Finucane(2000) documents that tick test can provide better estimates of effective of effective spreads and signed volume than Lee and Ready's (1991) method. He employs data that identifies trade direction and compares actual trade direction to the direction predicted by the tick test, Lee and Ready's (1991) algorithm, and the reverse tick test. He finds that tick test and Lee and Ready's (1991) can correctly identify trade direction more than 83% of the time. But researchers using the tick test to classify trades can achieve results that are close to the results which can be achieved using quote-based algorithm. Additionally, he also shows that, in at least some applications, the tick test could provide more accurate measures than quote-based methods.

[6] Tick rule has been used by researchers such as Holthausen, Leftwich, and Mayer (1987), Lyons (1995) and Sias and Starks (1997) e.t.c.

[7] Two other alternative methods: the quote method, which classifies trade direction by comparing trade prices to quotes; Lee and Ready's (1991) method, which employs the tick test for trades at the middle of the spread and quotes to infer all other trades.

[8] Green(2006) uses Ellis, Michaely, and O'Hara (2000) algorithm to clarify the order. He shows that employing alternative approaches such as Lee and Ready (1991) or excluding trades insides the posted quotes, which may not be easy to classify correctly, does not significantly improve the results.

To determine the impact of recommendations with target price on order flow, I measure order imbalances in dollars, *IMBAL_DOLLAR*, defined as the dollar value of purchases minus the dollar value of sales, as well as percentage order flow, *IMBAL*, takes the form:

$$IMBAL_{it} = \frac{Buys_{it} - Sells_{it}}{Buys_{it} + Sells_{it}},$$

$$IMBAL\_DOLLAR_{it} = Buys_{it} \times P_t - Sells_{it} \times P_t$$

Where $Buys_{it}$ and $Sells_{it}$ are the number of buyer-initiated and seller-initiated transactions during time interval *t* (5 minutes) around announcement *i*. P_t is the price of the stock. Therefore, $IMBAL_{it}$=1 indicates all trades are buyer-initiated and $IMBAL_{it}$=-1 indicates all trades are seller-initiated.

Table 13 reports the results regarding percentage and dollar order imbalances 40 minutes before and after the announcement of recommendations with target price. It can be seen that there is a significant increase in buyer-initiated trading surrounding upgrades on event day, and the magnitude of the increase is relatively big comparing to the percentage of previous and next day. There is also a considerable increase in average dollar order imbalance. As to downgrades, there is a significant decrease in buyer-initiated trading around downgrades in the event day. During the -5 to 5 interval, on average order imbalance percentage is 0.22% on trading day 5 minutes before the announcement of recommendation change and decline to -1.99% five minutes after a downgrade, whereas this percentage of the other two days are 6.35% and 3.75% respectively. The average order imbalance also decline from 12.10 to -1.97. The dramatic declining trend persists in the following 15 minutes. While percentage of order imbalances is not generally negative following a downgrade, it is

rather small compared to the results of previous and next day, which indicates that there is much less buyer-initiated trading due to the negative information arrival.

[Insert Table 13 Here]

Table 14 reports data on trading volume surrounding recommendation coupled with target price revisions. The average trading volume during the first five minutes of trading subsequent to recommendation changes is 23,678 shares per minute for upgrades and 23,221 shares per minute for downgrades. Throughout the 80 minutes surrounding the recommendation in the event day, the volume and dollar volume remain roughly twice as large as on the previous day. The results of trading dollar volume are similar. The results in Table14 provide additional evidence that market participants perceive the report of analyst valuable and trade correspondingly. There is a significant increase in the trading volume and dollar volume, indicating that the announcements boost the trading behavior greatly. The analysts' efforts achieve their goal to convince investors to buy or sell stocks following their reports. Panel B and C of Figure 3 shows abnormal volume surrounding the announcements of recommendation with target price revisions. The abnormal volume is calculated as the result of the difference between the volume in the event day and the mean volume of previous and next day. It can be seen that the abnormal volume is economically significant associated with the pronounced cumulative market-adjusted returns. The levels and pattern are similar among the upgrade and downgrade recommendations.

[Insert Table 14 Here]

[Insert Figure 3 Here]

The dramatic rise in trading activity coupled with a shift in order imbalances suggests that the market interprets recommendations with target price changes broadly as a liquidity event. Although not all market participants may be informed the recommendation changes, they may still consider the relatively large price change and increased trading as an opportunity to unwind a position. Additionally, the increase in trading activity can also boost the income of the brokerage house. Our findings can also be perceived as a strong support to Grossman and Stigliz (1980). Brokerage houses spend hundreds of millions of dollars analyzing stock and trying to persuade investors that some stocks are more or less attractive than others. Hence, the information is not without cost. In a competitive and rational world, brokerage's activity should be compensated by commensurate expected profits in other forms, like underwriting fees, trading profits, and commissions from stock trading. Our evidence of increasing trading volume and dollar volume do support this view.

5.2.4 Unconditional Intraday Informativeness of Target Prices

In this section of analysis, we will explore whether there exists significant market response to the information content of target price announcements surrounding those announcements. We calculate the abnormal return around each announcement and present mean returns for portfolios ranking based on the magnitude of the three target price information content measures (TP/P, $\Delta TP/TP_{-1}$, $\Delta TP/P$). Market-adjusted return is calculated as the difference between the firm buy-and-hold return and the buy-and-

hold return on SPYDER[9] over the period beginning forty minutes prior to through forty minutes following the announcement of target price. These results are reported in Figure 4.

The evidence in Figure 4 evinces that mean market-adjusted returns surrounding target price revisions are increasing in the favorableness of the target price and its revision. For instance, the average return for portfolio ranked on the basis of the percentage of published target price to the stock price of the latest transaction before the announcement of target price, TP/P, varies from an average of -1.73% for the least favorable target price revision to -0.65% for the most favorable one. This feature is much more obvious when we construct the portfolios on the basis of other two target price revisions. As to $\Delta TP/TP_{-1}$, the biggest gap in returns is observed, with mean returns varying from -4.44% to 2.20% for the least and most favorable revisions, respectively. The return of portfolios ranked on $\Delta TP/P$ also ranges from -3.84% to 1.82%.

[Insert Figure 4 Here]

These findings at intraday frequency are consistent with the findings of Brav and Lehavy's (2003) work regarding the daily informativeness of target prices. Combining these findings with those findings in the previous literature of a significant positive (negative) intraday price reaction to favorable (unfavorable) stock recommendations (e.g., Green (2006) and Juergens (2000)) supports the view that

[9] Spyder tracks the Standard and Poor's 500 Composite Stock Price Index. It is an ETF (Exchange Traded Fund) that represents ownership in the S&P 500 Index.

market participants consider analyst price targets as informative signals concerning the value of a firm. Additionally, it raises an intriguing question concerning the incremental information content of target prices in the presence of recommendation. This question motivates us to investigate whether target price revisions are incrementally informative at intraday frequency.

5.2.5 Intraday Informativeness of Target Prices Conditional on Stock Recommendation and Recommendation Revisions

Table 15 reports the regression results relating intraday returns to types of recommendations (*UPGRADES* and *DOWNGRADES*), the magnitude of recommendation changes (*RATING_CHANGE*), and the target price revision measure ($\Delta TP/TP_{-1}$). We begin our analysis with the announcements out of the regular trading time (16:00 PM~ 9:30 AM next day). Market-adjusted return (R) is calculated as the difference between the firm buy-and-hold return and the buy-and-hold return on the SPYDER[10] over the period from 16:00 previous day to 40 minutes following the open of the market (10:10). Our goal is to explore the informativeness of target prices disseminated out of the regular market hour. Additionally, we also obtain the result of the announcement disseminate during the regular market hour. The return (R) is computed as the difference between he firm buy-and-hold return and the buy-and-hold return on the SPYDER over the period from forty minutes prior to through forty minutes following the announcement of target price. In the table 15, Panel A reports the regression results of announcement released out of the market hour, while Panel B reports the results announcement released during the market hour.

[10] Spider tracks the Standard and Poor's 500 Composite Stock Price Index. It is an ETF (Exchange Traded Fund) that represents ownership in the S&P 500 Index.

[Insert Table 15 Here]

Firstly, we regress market-adjusted returns (R) on two recommendation revision categories, recommendation revision, *RATING_CHANGE*, and target price revisions $\Delta TP/TP_{-1}$. Our purpose is to investigate whether target price revisions are informative, controlling for recommendation and recommendation revisions. The regression formula takes the following form

$$R = \alpha_1 \, UPGRADES + \alpha_2 \, DOWNGRADES + \beta \left(RATING\_CHANGE \right) + \gamma \left(\frac{\Delta TP}{TP_{-1}} \right) + \varepsilon$$

Where the indicator variable-*UPGRADES* (*DOWNGRADES*) equals 1 if recommendation is upgrade (downgrade) and 0 otherwise.

The results of the regression are provided in column 1 of Panel A and Panel B indicate that target price revisions are positively and significant related to returns (γ=0.105 and 0.030 respectively), controlling for the information in the stock recommendation and change of rating. Additionally, we observe that the coefficients of α_2 are informative as well since both of the coefficients are economically and statistically significant. The coefficients of α_1 are not economically and statistically significant. This pattern is consistent in both of the two regressions. We can understand that market participants more intend to rely on the information contained in target prices when issuing positive recommendation. Both of the signs of upgrade indicator are positive indicate that investors' responses to positive recommendation are positive, while these evidences of downgrade are more significant.

The coefficients of rating change are not economically and statistically significant, indicating that the magnitude of rating change is not informative when controlling for

the information in target prices and recommendations. It can be observed that among the two regressions the coefficients of target price revisions are economically and statistically significant, indicating that target price subsumes additional information compared to the other two information sources: type of recommendation and change in rating. The coefficients α_1 and α_2 and their expected ordering ($\alpha_2<\alpha_1$) demonstrate that the recommendation revisions are incrementally informative.

Another interesting question is whether the market response to target price revisions identical when recommendations are positive or negative, whether the market response identical after favorable and unfavorable target price revisions. This question motivate us to conduct two more sets of regressions to investigate whether the regression results-and, in particular, the conclusion about the informativeness of target price revisions-are sensitive to the type of recommendation and target price revision. Firstly, we run the regression conditional on the direction of the recommendation revision (columns 2-3). Secondly, the regression is conditional on the sign of the target price revision (columns 4-6).

In the first set of regression, we condition on the type of recommendation (upgrades and downgrades). It can be observed that target price revisions are related to larger returns when analysts issue recommendation downgrades (Panel A: γ=0.216 and Panel B: 0.045 respectively) compared to upgrades (Panel A: γ=0.029 and Panel B: 0.021 respectively). The asymmetric reaction is consistent with the view that, provided that analysts' unwilling (Womack (1996), Stickel (1995)) to put unfavorable recommendation revisions on firms, market participants would perceive downgrades as a more credible signal of information.

Consider second the regression results when we condition on the sign of target price revisions (columns 4-6). Our motivation is to have a further understanding of the relation between returns and target price revisions in these specific settings. It can be seen that the slope coefficient of negative target price revisions (column 5) is economically larger than that of positive revisions (column 4). We also find that the information conveyed in rating change is still not obvious. The estimated coefficients are not economically and statistically significant across the three groups. The magnitude of coefficients is consistent with the results in columns 2-3.

When target prices are revised upward (column 4), the estimated coefficient becomes larger. It indicates that market-adjusted returns associated with recommendation upgrades become larger when such revision coincides with positive target price revisions. However, we cannot find this pattern in recommendation downgrades. When target prices are revised downward (column 5) investors will choose to rely on the information contained in the target price revision. It can be viewed that the coefficients of target price revisions is the economically largest among all the regressions and the coefficients of recommendations become less economically and statistically significant (except for upgrades of the first regression). Hence, we believe that target price revision is the most informative when unfavorable recommendations in the presence of downward target price revisions. From the results in column 6, we find that the recommendations are the most economically and statistically significant if analyst maintains his previous price target. All the results above are consistent in panel A and panel B.

In conclusion, the evidence presented in table 15 demonstrates that target prices are informative, both unconditionally and conditional on stock recommendation and change of ratings. We find that target price revisions are deemed more informative at

intraday level when they are negative and when associated with recommendation downgrades. We also find that the recommendations are most informative when there is no target price revision.

6. Conclusions

Using a database collected from the briefing.com, this paper provides evidence on the information role of target price. The data of target price ranges from 1999 to 2006. In addition to the traditional daily event study, our paper uses event study methods to analyze the price reactions to analysts' announcements at the intraday frequency. The results can be summarized as follows:

1) In the event study, we find that target price provide incremental information value to analysts' recommendation for the evidence that the investors' reaction to recommendation coupled with the release of target price is more significant. Consistent with our prediction, target price subsumed in downgrade recommendation is the most informative while the target price in coverage reiteraton is the least informative. Investors can earn economically significant abnormal returns during 7-day window around the dissemination of a recommendation in the direction of that recommendation.
2) We also explore the difference of the magnitude of stock returns in response to target price revisions when analyst ratings are reiterated or initiated as buy, sell, or hold. Positive rating (buy) released in conjunction with target price earn a larger return than the rating without price target. Neutral ratings (hold) in conjunction with target price earn a larger return than the rating without

target price. With regard to the negative rating (sell), it depends on the kind of recommendations. If it is coverage initiation, the target price is more informative. If it is coverage reiteration, it is less informative. Comparing the different recommendations in the same ratings, we find that the magnitude of returns for coverage initiation is larger than reiteration for positive rating (buy) in the event day. The pattern persists in the following two days. It is smaller than coverage reiteration for negative rating (sell) 3 days subsequent to the announcements, indicating a larger reaction from investors. As to the neutral rating (hold), it is larger than coverage reiteration.

3) First Call database enables us to extend our analysis at intraday frequency. It is well documented that the market open is quite different from the rest of the trading day in terms of higher volatility, returns, and trading volume (Harris (1986), Jain and Joh (1988)). Hence, we separate our data of sample into announcement released during and outside the regular trading hour. The pattern of investors' reaction to recommendations with target price is consistent among the two samples: for upgrade, there is a significant positive return lasting 20 minutes; for downgrade, there is a significant negative return lasting 25 to 35 minutes. The pattern and levels of reaction are more pronounced in the sample of recommendations released outside the market hour.

4) We find that mean market-adjusted abnormal returns surrounding target price revisions are increasing in the favorableness of the target price revision. We develop three target price information measures: TP/P, $\Delta TP/TP_{-1}$, $\Delta TP/P$ to help us to study the investors' reaction to target price at intraday frequency. We document that the market-adjusted returns of portfolios ranked on the

basis of the magnitude of the last two information measures are more economically and statistically significant than the first measure, indicating that the information subsumed in target price revision is more useful than target price alone. Investors are more likely to respond to the information contained in the target price revision. Additionally, $\Delta TP/TP_{-1}$ is more informative than $\Delta TP/P$.

5) More importantly, we find that target prices are informative both unconditionally and conditional on the type of recommendations and rating revision at intraday frequency. The target price revisions are more informative at intraday level when they are negative and when associated with recommendation downgrades. The investors seek out more information from target price revisions when recommendations are unfavorable. We also find that the recommendations are most informative when there is no target price revision.

To conclude, there is strong evidence that target prices do provide incremental value to the recommendation, not only at the daily level but also at the intraday level. Anyone who investigates the impact of analysts' recommendations on market prices should also consider the target prices made by analysts as well.

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Table 1

The primary source of target price used in this study is collected from briefing.com, which is adopted by the online edition of Wall Street Journal. Table 1 provides a summary description of the analysts' recommendations we collected from briefing.com. Panel A provides data on the characteristics of the analysts' recommendations used in this study. The sample consists of 201,340 recommendations that were issued by the analysts between 1999 and 2006. The numbers of observations are presented for the entire sample period as well as on a year-by-year basis. Market capitalization (median), in millions of dollars, is as of month-end in the sample. Panel B reports the number of observation categorized by the ratings and target price.

Panel A

	Total	1999	2000	2001	2002	2003	2004	2005	2006
Coverage Reiteration	76,640	—	13,825	17,088	13,162	7,255	9,028	7,907	8,375
Coverage Initiation	46,507	7,102	8,189	6,329	4,916	4,263	5,078	5,471	5,159
Downgrade	41,821	4,111	5,326	6,713	5,672	4,770	4,859	4,791	5,579
Upgrade	36,372	4,933	4,264	4,137	4,184	4,397	4,523	5,004	4,930
Number of firms	7,258	4,015	4,085	3,711	3,332	3,127	3,437	3,747	3,920
Market cap(mean)	9,499.72	8,186.22	12,586.34	10,973.05	8,901.00	7,859.30	8,486.35	8,328.84	8,450.08
Market cap(median)	1,603.51	1,232.13	1,861.72	1,694.50	1,416.12	1,467.63	1,639.92	1,682.50	1,671.92
Number of Recommendations Per firm	28	4	8	9	8	7	7	6	6

Panel B

		Buy		Hold		Sell	
Recommendation	Total	With Target Price	Without Target Price	With Target Price	Without Target Price	With Target Price	Without Target Price
Coverage Reiteration	76,640	43,792	18,657	8,354	3,913	1,401	523
Coverage Initiation	46,507	20,061	11,557	4,836	8,541	801	711

Table 2

Panel A and panel B report the average daily holding period abnormal returns (raw returns less the CRSP value-weighted market return over the 7 days centered on the recommendation announcement day 0), for coverage initiation and coverage reiteration. Buy, hold and sell fraction is in brackets. No target price represents the holding period abnormal return (raw returns less the CRSP value-weighted market return) of stock around the release of recommendations without target prices. The second column is the holding period abnormal return (raw returns less the CRSP value-weighted market return) of stock around the release of recommendations with target prices. T-value is calculated using the Newey-West heteroskedasticity and autocorrelation-consistent (HAC) rule.

Panel A: Coverage initiation												
	Buy				Hold				Sell			
	Target Price		No Target Price		Target Price		No Target Price		Target Price		No Target Price	
Relative day(t)	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value
-3	0.16%	4.36	0.17%	3.51	0.01%	0.13	0.01%	0.20	-0.01%	-0.09	-0.03%	-0.24
-2	0.19%	4.95	0.11%	2.24	0.01%	0.25	-0.04%	-0.70	-0.14%	-1.35	-0.05%	-0.33
-1	0.18%	4.58	0.28%	5.40	-0.01%	-0.20	0.01%	0.24	-0.23%	-2.91	0.02%	0.14
0	1.62%	33.72	1.13%	17.06	-0.28%	-5.59	-0.34%	-6.64	-1.67%	-13.29	-1.19%	-8.19
1	0.29%	7.72	0.61%	10.98	-0.14%	-2.92	-0.10%	-2.22	-0.57%	-4.81	-0.35%	-3.24
2	0.05%	1.27	0.05%	0.94	-0.11%	-2.17	-0.07%	-1.63	-0.09%	-0.80	-0.16%	-1.21
3	0.02%	0.50	0.01%	0.26	-0.07%	-1.21	-0.08%	-1.84	-0.03%	-0.33	-0.29%	-2.12
Panel B: Coverage reiteration												
-3	0.09%	4.02	0.04%	0.79	-0.03%	-0.94	0.08%	0.99	-0.20%	-2.81	0.39%	1.19
-2	0.10%	4.15	-0.02%	-0.30	0.01%	0.38	0.01%	0.15	-0.14%	-1.71	-0.16%	-0.82
-1	0.12%	3.75	0.04%	0.73	-0.04%	-0.62	-0.36%	-3.35	-0.48%	-3.32	-0.39%	-1.51
0	0.70%	19.34	0.45%	7.20	-0.51%	-7.44	-1.14%	-7.88	-1.11%	-5.51	-1.96%	-5.56
1	0.10%	4.30	0.16%	3.34	0.00%	-0.02	-0.27%	-2.87	-0.23%	-2.87	-0.68%	-3.02
2	-0.02%	-0.71	0.04%	0.84	-0.02%	-0.52	-0.07%	-0.89	-0.03%	-0.37	-0.10%	-0.62
3	0.03%	1.56	0.03%	0.73	0.01%	0.45	0.05%	0.61	0.03%	0.33	-0.01%	-0.04

Table 3

This table reports the average daily holding period abnormal returns (raw returns less the CRSP value-weighted market return over the 7 days centered on the recommendation announcement day 0), for upgrade and downgrade. No target price represents the holding period abnormal return (raw returns less the CRSP value-weighted market return) of stock around the release of recommendations without target prices. The second column is the holding period abnormal return (raw returns less the CRSP value-weighted market return) of stock around the release of recommendations with target prices. T-value is calculated using the Newey-West heteroskedasticity and autocorrelation-consistent (HAC) rule.

	Upgrade				Downgrade			
	Target Price		No Target Price		Target Price		No Target Price	
Relative day(t)	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value
-3	-0.03%	-0.78	0.02%	0.52	0.06%	1.48	-0.05%	-1.76
-2	-0.06%	-1.74	-0.15%	-3.99	-0.01%	-0.11	-0.02%	-0.42
-1	0.30%	5.75	0.34%	7.28	-0.89%	-10.75	-0.80%	-15.16
0	4.09%	59.98	3.16%	49.68	-5.10%	-47.31	-4.51%	-63.05
1	0.43%	12.90	0.83%	15.79	-0.30%	-6.87	-0.73%	-15.35
2	0.11%	3.63	0.22%	7.13	-0.12%	-2.84	-0.16%	-5.03
3	0.16%	5.56	0.12%	4.23	-0.06%	-1.34	-0.08%	-2.79

Table 4

In this table, we divide the sample of upgrade and downgrade by year, and calculate the holding period abnormal returns at t=0. T-value is calculated using the Newey-West heteroskedasticity and autocorrelation-consistent (HAC) rule.

	Upgrade				Downgrade			
	Target Price		No Target Price		Target Price		No Target Price	
Year	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value	Holding period abnormal return	t-value
1999	4.46%	11.55	2.12%	12.62	-5.16%	-9.69	-3.45%	-14.09
2000	4.69%	22.14	4.06%	19.49	-7.05%	-20.77	-6.93%	-30.21
2001	4.08%	20.04	3.86%	19.05	-5.10%	-15.77	-4.98%	-28.13
2002	3.61%	22.75	3.75%	12.31	-5.92%	-22.01	-5.78%	-26.32
2003	4.82%	22.64	3.91%	19.45	-3.96%	-21.78	-4.09%	-27.49
2004	3.68%	26.47	3.15%	27.05	-4.70%	-18.40	-4.06%	-28.21
2005	3.69%	27.28	3.22%	32.37	-4.98%	-17.86	-3.59%	-28.02
2006	3.92%	25.31	2.64%	27.00	-3.87%	-16.74	-2.97%	-25.76

Table 5

This table reports the result of testing the differences of the mean and median abnormal holding period abnormal returns of the recommendations with and without target price at t=0 (event day). Wilcoxon sign-ranked test is used to test the differences of medians between the recommendations with and without target price (null hypothesis: difference is 0). Two sided student *t*-statistic test is used to test the differences of mean values (null hypothesis: difference is 0).

Recommendation		Wilcoxn	P-value	Ttest	P-value
Coverage Initiation	Buy	-10.06	0.00	-7.67	<.0001
	Hold	1.17	0.24	-1.01	0.31
	Sell	2.61	0.01	2.68	0.01
Coverage Reiteration	Buy	-4.41	0.00	-4.16	<.0001
	Hold	-3.41	0.00	-4.52	<.0001
	Sell	-3.50	0.00	-1.99	0.05
Upgrade		15.14	0.00	-12.05	<.0001
Downgrade		-6.94	0.00	5.78	<.0001

Table 6

For the exact time of the release of analyst report, we rely on First Call database. We merge our data with the First Call data sources by selecting records that have identical ticker, date, and brokerage house identity. Finally, we can get 7197 observations according to our principle. The time interval of these observations is from 1999 to 2006.The rating_change is the difference between the current and prior rating. I/B/E/S standardizes the ratings into five categories, each with an individual numeric value: 1-Strong Buy, 2-Buy, 3-Hold, 4-Underperform and 5-Sell. I.e. The rating change of downgrading from hold to sell is 2(=5-3). Target_change, ΔTP/TP (-1), is the percentage change in the brokerage house target price. Frequency equals to the number of the observations appear in the dataset. The percentage is the result of dividing the frequency by the total number of the observations. Panel A provides the information of the target change sorted by the change of rating. In Panel B, we separate the change of target price into ten intervals and obtain the average rating change respectively.

Panel A: Average Target Price Change			
Rating_change	Frequency	Percentage	Target_change
-4	17	0.24%	53.57%
-3	1	0.01%	-6.67%
-2	1043	14.49%	25.27%
-1	2357	32.75%	21.69%
0	3	0.04%	51.39%
1	2620	36.40%	-16.84%
2	1094	15.20%	-18.44%
3	38	0.53%	-7.16%
4	23	0.32%	-29.34%
5	1	0.01%	-28.57%
Total	7197	100.00%	1.84%
Panel B: Average Rating Change			
Target_change	Frequency	Percentage	Rating_change
less than -80%	17	0.24%	1.67
from -80% to -60%	132	1.83%	1.38
from -60% to -40%	487	6.77%	1.29
from -40% to -20%	1034	14.37%	1.23
from -20% to 0%	2006	27.87%	0.70
from 0% to 20%	1962	27.26%	-0.63
from 20% to 40%	975	13.55%	-1.09
from 40% to 60%	329	4.57%	-1.17
from 60% to 80%	121	1.68%	-1.28
bigger than 80%	134	1.86%	-1.32
Total	7197	100.00%	0.07

Table 7

Descriptive Statistics on Measures of the Information Content of Target Price

This table reports the general statistics on the three target price information measures. (1) the magnitude of the change in the brokerage house target price revision denoted ΔTP/TP (-1), (2) the ratio of the target price to the stock price(the last transaction just before the target price announced) represented by TP/P,(3) the change in the target price, deflated by the stock price denoted ΔTP/P. For each column, we delete the missing variable if any of the measure is missing value.

	Target_change (ΔTP/TP (-1))	**Target_price (TP/P)**	**Change_price (ΔTP/P)**
Mean	1.84%	1.20	-12.81%
Max	400.00%	18.88	238.51%
75th percentile	17.86%	1.27	17.97%
Median	0.00%	1.16	0.00%
25th percentile	-17.65%	1.06	-23.98%
Min	-91.7%	32.3%	-1012.05%
Std.Dev	32.92%	0.35	66.05%
N	7197	7197	7197

Table 8

Intraday Market-adjusted Returns Following Recommendations with Target Price Changes Released out of the Market Hour

The table reports average return for 40 minutes following the market release of analyst stock target price change. The announcement is published outside of the market hour (16:00~9:30). Return and p-value are reported. The data consists of 5517 observations. It includes 2640 upgrade and 2877 downgrade. The average percentages of the three information measures are also reported respectively.

	Upgrade		Downgrade	
	Return	P-value	Return	P-value
16:00~9:30	3.31%	<.0001	-5.26%	<.0001
9:35	0.18%	0.00	-0.66%	<.0001
9:40	0.07%	0.01	-0.12%	0.00
9:45	0.04%	0.08	-0.13%	<.0001
9:50	0.07%	<.0001	-0.13%	<.0001
9:55	0.02%	0.20	-0.09%	<.0001
10:00	0.04%	0.01	-0.06%	0.01
10:05	0.03%	0.05	-0.04%	0.02
10:10	0.02%	0.17	-0.02%	0.25
Target_change	0.23		-0.17	
Rating_change	-1.30		1.30	
Target_price	1.24		1.15	
Change_price	0.19		-0.40	

Table 9

Intraday Market-adjusted Returns Following Recommendations with Target Price Changes Released during the Market Hour

The table reports average return for 40 minutes at 5 minutes interval before and after the market release of analyst stock target price revisions. The announcement is published during the market hour. Return and p-value are reported. The data consists of 1680 observations. It includes 778 upgrades and 902 downgrades.

	Upgrade		Downgrade	
	Mean	P-value	Mean	P-value
-40	0.08%	0.02	-0.08%	0.03
-35	0.14%	0.01	-0.17%	0.01
-30	0.12%	0.00	-0.18%	0.00
-25	0.17%	0.01	-0.39%	0.00
-20	0.28%	<.0001	-0.23%	0.00
-15	0.20%	0.00	-0.35%	<.0001
-10	0.20%	<.0001	-0.33%	0.00
-5	0.28%	<.0001	-0.33%	<.0001
5	0.11%	<.0001	-0.12%	0.00
10	0.08%	0.00	-0.09%	0.00
15	0.08%	0.00	-0.08%	0.00
20	0.04%	0.09	-0.06%	0.03
25	0.03%	0.15	-0.05%	0.08
30	0.02%	0.37	-0.03%	0.20
35	0.03%	0.11	-0.03%	0.12
40	0.01%	0.68	0.01%	0.59
Target_change	0.23		-0.19	
Rating_change	-1.38		1.41	
Target_price	1.26		1.17	
Change_price	0.18		-0.47	

Table 10

Intraday Cumulative Returns of the Stock Following the Target Revisions ($\Delta TP/TP_{-1}$) Released during the Market Hour

The data consists of 1680 target price revisions between 1997 and 2006 which is released during the regular market hour. On the basis of the magnitude of target revisions, we construct deciles portfolios. Market adjusted cumulative return is calculated as the difference between market adjusted return from t=-35,-30…40 relative to time t=-40. The cumulative returns and the t-value are presented for each portfolio.

	1st Quintile		2nd Quintile		3rd Quintile		4th Quintile		5th Quintile		6th Quintile		7th Quintile		8th Quintile		9th Quintile		10th Quintile	
	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value
-40	-0.18%	-1.76	0.08%	0.83	-0.17%	-1.18	-0.11%	-1.99	0.04%	1.12	0.00%	-0.02	0.10%	1.75	0.05%	1.18	0.18%	2.56	-0.04%	-0.44
-35	-0.49%	-2.81	-0.28%	-0.93	-0.32%	-1.77	-0.15%	-2.22	0.06%	1.37	0.04%	0.54	0.15%	2.40	0.06%	1.02	0.39%	2.71	0.24%	1.03
-30	-0.77%	-3.90	-0.66%	-1.70	-0.25%	-1.43	-0.37%	-1.96	0.04%	0.81	0.04%	0.45	0.25%	3.03	0.18%	1.55	0.45%	2.76	0.41%	1.66
-25	-1.63%	-3.02	-1.13%	-2.38	-0.54%	-2.30	-0.52%	-2.67	-0.14%	-1.01	0.04%	0.36	0.35%	3.71	0.17%	1.14	0.65%	2.61	0.73%	1.96
-20	-2.04%	-3.57	-1.37%	-2.84	-0.85%	-2.83	-0.62%	-3.05	-0.13%	-0.92	0.06%	0.48	0.46%	4.17	0.27%	1.66	1.28%	3.48	0.98%	2.27
-15	-2.51%	-3.88	-2.08%	-3.62	-1.07%	-3.04	-0.84%	-3.64	-0.28%	-1.06	0.09%	0.65	0.58%	4.46	0.58%	2.94	1.44%	3.98	1.14%	2.37
-10	-3.18%	-4.20	-2.33%	-3.89	-1.40%	-3.77	-1.11%	-4.33	-0.26%	-1.21	0.13%	0.92	0.82%	5.27	0.74%	3.49	1.49%	4.31	1.35%	2.43
-5	-3.56%	-4.60	-2.68%	-4.45	-1.81%	-4.35	-1.10%	-3.41	-0.70%	-2.20	0.17%	1.15	1.02%	5.95	0.79%	3.76	1.76%	4.58	1.68%	2.99
5	-3.67%	-4.67	-2.81%	-4.62	-2.01%	-4.57	-1.19%	-3.63	-0.87%	-2.56	0.18%	1.12	1.14%	6.31	0.88%	4.00	1.95%	4.86	1.78%	3.10
10	-3.77%	-4.77	-2.81%	-4.60	-2.08%	-4.74	-1.29%	-3.72	-0.97%	-2.72	0.12%	0.68	1.21%	6.41	1.05%	4.54	1.91%	4.80	1.92%	3.35
15	-3.93%	-4.86	-2.80%	-4.54	-2.08%	-4.64	-1.36%	-3.97	-1.05%	-2.88	0.18%	1.00	1.26%	6.17	1.01%	4.29	1.98%	4.82	1.97%	3.50
20	-4.18%	-5.11	-2.86%	-4.49	-2.11%	-4.62	-1.33%	-3.82	-1.06%	-2.88	0.17%	0.92	1.31%	6.31	0.98%	4.08	1.96%	4.88	2.11%	3.65
25	-4.28%	-5.08	-3.03%	-4.72	-2.09%	-4.63	-1.38%	-3.95	-1.04%	-2.88	0.23%	1.25	1.36%	6.28	1.00%	4.09	1.98%	4.90	2.09%	3.65
30	-4.36%	-5.21	-3.12%	-4.76	-2.08%	-4.62	-1.35%	-3.77	-1.03%	-2.94	0.22%	1.17	1.42%	6.44	0.98%	3.94	1.96%	4.91	2.16%	3.77
35	-4.47%	-5.31	-3.14%	-4.81	-2.06%	-4.58	-1.35%	-3.70	-1.05%	-3.00	0.22%	1.09	1.44%	6.82	0.98%	3.83	1.95%	5.01	2.23%	3.84
40	-4.44%	-5.21	-3.18%	-4.84	-1.94%	-4.20	-1.35%	-3.78	-1.03%	-2.95	0.20%	0.94	1.43%	6.94	1.02%	4.00	1.91%	4.87	2.20%	3.84
Target_change	-0.52		-0.32		-0.21		-0.13		-0.06		0.02		0.10		0.18		0.29		0.67	

Table 11

Intraday Cumulative Returns of the Stock Following the Information Measure *ΔTP/P* Released during the Market Hour

The data consists of 1680 target price revisions between 1997 and 2006 which is released during the regular market hour. On the basis of the magnitude of measure, we construct deciles portfolios. Market adjusted cumulative return is calculated as the difference between market adjusted return from t=-35,-30…40 relative to time t=-40. The cumulative returns and the p-value are presented for each portfolio.

	1st Quintile		2nd Quintile		3rd Quintile		4th Quintile		5th Quintile		6th Quintile		7th Quintile		8th Quintile		9th Quintile		10th Quintile	
	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value
-40	-0.08%	-0.66	-0.05%	-0.79	-0.17%	-1.20	-0.09%	-1.83	0.06%	1.45	-0.01%	-0.28	0.07%	1.57	0.09%	1.77	0.15%	1.99	-0.02%	-0.20
-35	-0.25%	-1.48	-0.51%	-1.64	-0.37%	-2.08	-0.12%	-1.90	0.08%	1.71	0.02%	0.32	0.11%	1.92	0.16%	2.34	0.54%	2.20	0.06%	0.45
-30	-0.45%	-2.09	-0.87%	-2.25	-0.43%	-2.48	-0.34%	-1.81	0.07%	1.41	0.03%	0.29	0.21%	2.48	0.28%	2.40	0.63%	2.53	0.18%	1.15
-25	-1.30%	-2.32	-1.41%	-3.04	-0.69%	-3.07	-0.48%	-2.50	-0.09%	-0.60	0.02%	0.24	0.25%	2.42	0.34%	2.36	0.84%	2.68	0.49%	1.52
-20	-1.77%	-3.02	-1.54%	-3.25	-1.04%	-3.61	-0.58%	-2.90	-0.07%	-0.47	0.05%	0.38	0.35%	3.08	0.71%	2.42	1.28%	3.28	0.67%	1.99
-15	-2.23%	-3.36	-2.13%	-3.77	-1.39%	-4.07	-0.75%	-3.25	-0.28%	-1.09	0.08%	0.55	0.49%	3.70	0.99%	3.29	1.44%	3.56	0.84%	2.19
-10	-2.81%	-3.61	-2.47%	-4.20	-1.72%	-4.81	-1.06%	-4.08	-0.24%	-1.15	0.13%	0.90	0.65%	4.48	1.14%	3.82	1.60%	3.80	1.00%	2.18
-5	-3.12%	-3.93	-3.02%	-4.91	-1.89%	-4.75	-1.28%	-4.06	-0.50%	-2.06	0.17%	1.11	0.87%	5.49	1.33%	4.02	1.72%	4.15	1.34%	2.77
5	-3.23%	-4.00	-3.30%	-5.23	-1.92%	-4.76	-1.43%	-4.36	-0.62%	-2.46	0.17%	1.07	0.96%	6.20	1.49%	4.26	1.88%	4.27	1.43%	2.94
10	-3.32%	-4.09	-3.23%	-5.13	-2.04%	-5.05	-1.56%	-4.40	-0.70%	-2.62	0.11%	0.65	1.03%	6.37	1.60%	4.43	1.92%	4.41	1.55%	3.23
15	-3.42%	-4.11	-3.27%	-5.04	-2.05%	-5.16	-1.67%	-4.74	-0.76%	-2.83	0.17%	0.96	1.07%	6.08	1.58%	4.30	1.91%	4.51	1.67%	3.40
20	-3.61%	-4.28	-3.33%	-5.00	-2.11%	-5.06	-1.64%	-4.65	-0.79%	-2.98	0.16%	0.88	1.07%	6.09	1.56%	4.25	1.94%	4.60	1.79%	3.54
25	-3.77%	-4.36	-3.43%	-5.11	-2.11%	-5.15	-1.67%	-4.77	-0.80%	-2.93	0.22%	1.18	1.15%	6.19	1.57%	4.23	1.95%	4.68	1.79%	3.53
30	-3.81%	-4.43	-3.54%	-5.15	-2.13%	-5.26	-1.64%	-4.59	-0.79%	-2.94	0.21%	1.12	1.19%	6.32	1.56%	4.24	1.89%	4.48	1.88%	3.75
35	-3.88%	-4.49	-3.57%	-5.18	-2.13%	-5.30	-1.63%	-4.52	-0.83%	-3.04	0.21%	1.05	1.21%	6.78	1.56%	4.20	1.95%	4.53	1.90%	3.79
40	-3.84%	-4.39	-3.49%	-5.01	-2.13%	-5.28	-1.60%	-4.61	-0.83%	-3.00	0.19%	0.90	1.22%	6.82	1.56%	4.23	1.97%	4.51	1.82%	3.76
Change_price	-1.70		-0.54		-0.31		-0.17		-0.07		0.02		0.10		0.18		0.28		0.52	

Table 12

Intraday Cumulative Returns of the Stock Following the Information Measure *TP/P* Released during the Market Hour

The data consists of 1680 target price revisions between 1997 and 2006 which is released during the regular market hour. On the basis of the magnitude of measure, we construct deciles portfolios. Market adjusted cumulative return is calculated as the difference between market adjusted return from t=-35,-30…40 relative to time t=-40. The cumulative returns and the p-value are presented for each portfolio.

	1st Quintile		2nd Quintile		3rd Quintile		4th Quintile		5th Quintile		6th Quintile		7th Quintile		8th Quintile		9th Quintile		10th Quintile	
	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value	Cumulative	T_value
-40	-0.14%	-1.79	-0.02%	-0.45	0.01%	0.19	-0.13%	-0.90	0.01%	0.25	0.04%	0.75	-0.03%	0.75	0.06%	0.76	0.04%	0.56	0.08%	0.73
-35	0.15%	0.66	-0.15%	-1.63	-0.11%	-0.79	-0.16%	-0.88	-0.04%	-0.55	-0.10%	-0.36	0.02%	-0.36	0.04%	0.46	0.02%	0.20	0.03%	0.16
-30	-0.15%	-0.48	-0.21%	-2.10	-0.02%	-0.19	-0.33%	-1.38	-0.11%	-1.08	0.03%	0.09	0.16%	0.09	-0.05%	-0.43	0.03%	0.22	-0.02%	-0.08
-25	-0.54%	-1.31	-0.39%	-2.50	-0.08%	-0.58	0.00%	-0.01	-0.22%	-1.52	-0.02%	-0.05	-0.01%	-0.05	-0.08%	-0.50	-0.06%	-0.22	-0.57%	-1.16
-20	-0.23%	-0.43	-0.54%	-2.64	-0.37%	-1.75	-0.15%	-0.35	-0.03%	-0.20	0.04%	0.12	0.19%	0.12	-0.08%	-0.41	0.08%	0.28	-0.81%	-1.59
-15	-0.44%	-0.79	-1.07%	-3.55	-0.48%	-2.02	-0.23%	-0.47	-0.04%	-0.18	-0.01%	-0.03	0.21%	-0.03	0.09%	0.42	0.09%	0.33	-0.98%	-1.59
-10	-0.79%	-1.21	-1.29%	-3.62	-0.52%	-2.21	-0.42%	-0.80	-0.09%	-0.36	0.04%	0.10	0.09%	0.10	0.09%	0.33	0.12%	0.41	-0.89%	-1.37
-5	-1.12%	-1.65	-1.31%	-3.66	-0.62%	-2.57	-0.37%	-0.69	-0.22%	-0.76	0.04%	0.10	0.18%	0.10	0.06%	0.20	0.18%	0.49	-1.00%	-1.42
5	-1.15%	-1.68	-1.38%	-3.88	-0.67%	-2.64	-0.36%	-0.66	-0.32%	-1.05	0.07%	0.17	0.31%	0.17	0.05%	0.16	0.22%	0.54	-1.08%	-1.49
10	-1.19%	-1.74	-1.42%	-3.95	-0.81%	-2.87	-0.41%	-0.74	-0.34%	-1.05	0.05%	0.11	0.33%	0.11	0.12%	0.38	0.26%	0.66	-0.96%	-1.31
15	-1.32%	-1.93	-1.54%	-4.21	-0.82%	-2.98	-0.50%	-0.90	-0.29%	-0.89	0.01%	0.03	0.35%	0.03	0.11%	0.36	0.39%	0.94	-0.86%	-1.13
20	-1.45%	-2.07	-1.59%	-4.19	-0.87%	-3.02	-0.51%	-0.94	-0.31%	-0.96	-0.08%	-0.18	0.45%	-0.18	0.16%	0.52	0.35%	0.83	-0.80%	-1.01
25	-1.50%	-2.19	-1.58%	-4.15	-0.95%	-3.28	-0.50%	-0.93	-0.32%	-1.00	-0.09%	-0.20	0.49%	-0.20	0.15%	0.48	0.39%	0.94	-0.87%	-1.06
30	-1.59%	-2.30	-1.56%	-4.06	-0.95%	-3.16	-0.56%	-1.02	-0.35%	-1.04	-0.09%	-0.21	0.46%	-0.21	0.13%	0.40	0.46%	1.08	-0.79%	-0.98
35	-1.73%	-2.46	-1.53%	-3.98	-0.93%	-3.08	-0.49%	-0.90	-0.35%	-1.05	-0.14%	-0.31	0.44%	-0.31	0.15%	0.46	0.45%	1.07	-0.75%	-0.93
40	-1.73%	-2.46	-1.53%	-3.82	-0.88%	-3.00	-0.54%	-1.00	-0.34%	-1.03	-0.12%	-0.27	0.41%	-0.27	0.15%	0.45	0.41%	1.00	-0.65%	-0.79
Target_pr	0.83		0.99		1.05		1.10		1.15		1.19		1.23		1.30		1.40		1.88	

Table 13 Order Imbalance surrounding Recommendations with Target Price Revisions

The table reports measures of trading activity during a three-day window surrounding the recommendation with target price revisions. The data consists of 778 upgrade and 902 downgrade recommendations.

Panel A Average percentage order imbalance

This table reports the mean percentage order imbalance taken the form as (number of buys – number of sells)/(number of buys + number of sells).

	Upgrade			**Downgrade**		
	Previous Day	Event Day	Next Day	Previous Day	Event Day	Next Day
-40	4.13%	8.00%	6.44%	7.16%	2.32%	1.14%
-35	6.35%	6.92%	8.07%	6.27%	0.00%	-1.06%
-30	5.26%	6.67%	4.85%	8.61%	-0.05%	3.48%
-25	7.11%	7.24%	8.84%	4.59%	0.68%	1.82%
-20	4.02%	9.17%	5.12%	6.02%	2.84%	3.96%
-15	4.01%	10.32%	6.77%	8.28%	2.32%	6.54%
-10	3.07%	9.70%	5.77%	8.96%	1.77%	3.36%
-5	0.37%	9.92%	9.12%	4.22%	0.22%	1.97%
5	2.67%	7.62%	5.52%	6.35%	-1.99%	3.79%
10	3.44%	9.34%	5.92%	3.23%	2.65%	2.55%
15	5.28%	8.47%	5.51%	6.34%	1.46%	1.58%
20	0.51%	6.24%	5.30%	4.26%	0.85%	1.62%
25	5.97%	7.12%	7.09%	5.78%	0.11%	3.73%
30	2.44%	4.36%	4.51%	5.07%	2.62%	4.58%
35	0.48%	4.83%	2.81%	4.64%	3.01%	1.91%
40	2.31%	4.88%	4.62%	3.28%	0.73%	2.96%

Panel B Average Dollar Order Imbalance (in $thousands per minutes)

This table reports the mean dollar order imbalance defined as (dollar value of buys – dollar value of sells).

	Upgrade			Downgrade		
	Previous Day	Event Day	Next Day	Previous Day	Event Day	Next Day
-40	16.33	59.38	49.72	4.72	10.77	26.92
-35	-1.22	96.75	22.59	31.29	-7.26	9.67
-30	13.87	116.00	50.14	26.39	-24.86	0.94
-25	28.81	85.88	45.19	18.91	-56.59	30.58
-20	-9.40	82.45	20.09	32.16	2.31	12.16
-15	28.57	70.08	34.70	2.77	-36.68	40.00
-10	14.74	61.87	46.17	31.65	-20.51	32.65
-5	10.83	45.55	52.26	20.16	12.10	13.31
5	-5.28	32.77	28.67	15.08	-1.97	20.76
10	8.43	42.00	-15.89	23.21	-24.12	22.88
15	32.79	80.74	10.25	17.39	-27.43	-1.45
20	9.33	36.89	8.00	15.23	-10.00	-5.60
25	-3.97	58.15	16.34	13.47	-2.03	11.37
30	-0.14	54.41	10.36	24.01	15.17	9.39
35	-6.19	29.97	17.22	8.00	-19.22	-2.15
40	1.86	42.78	10.89	5.36	10.38	7.29

Table 14 Trading Activity surrounding Analyst Recommendation with Target Price Revisions

The table reports measures of trading activity surrounding the release of analyst stock recommendation changes. Panel A reports the mean volume of trading for the period beginning forty minutes prior and ending forty minutes subsequent to recommendation changes at 5-minute interval. Panel B reports the mean dollar volume of trading for the period beginning forty minutes prior and ending forty minutes subsequent to recommendation changes at 5-minute interval. The data consists of 778 upgrade and 902 downgrade recommendation.

Panel A: Average volume (in shares per minute)

	Upgrade			**Downgrade**		
	Previous Day	Event Day	Next Day	Previous Day	Event Day	Next Day
-40	7,933.97	22,520.56	12,864.13	7,820.11	24,085.70	12,473.36
-35	8,001.43	23,295.75	11,743.76	7,574.73	22,539.25	11,442.95
-30	9,152.97	22,709.59	12,458.41	7,240.32	22,493.38	12,491.18
-25	8,820.75	19,692.52	11,190.43	6,923.91	21,888.57	11,217.58
-20	9,624.76	19,854.32	13,235.70	8,316.93	21,071.51	10,607.57
-15	9,743.58	25,471.14	14,660.77	8,129.68	22,957.40	10,359.61
-10	9,991.90	24,295.70	11,827.52	8,274.34	22,171.51	10,455.39
-5	10,590.43	22,340.18	11,861.82	8,342.34	22,484.94	9,827.02
5	11,989.25	23,678.02	11,647.77	8,671.97	23,221.42	10,800.74
10	11,400.42	20,812.36	12,334.54	8,300.97	24,021.25	9,947.19
15	10,836.99	20,025.26	11,427.06	8,079.15	20,819.15	9,425.14
20	8,752.40	17,531.77	11,619.66	8,062.10	20,427.37	9,503.71
25	9,214.49	17,818.47	10,374.25	7,679.16	18,982.61	9,491.21
30	8,394.07	17,326.73	9,854.95	6,942.09	17,759.24	8,924.69
35	9,324.55	15,227.76	9,206.54	7,194.10	17,672.91	8,487.84
40	8,955.35	15,096.55	8,256.16	6,950.85	16,121.51	8,775.35

Panel B: Average dollar volume (in $thousands per minute)

	Upgrade			Downgrade		
	Previous Day	Event Day	Next Day	Previous Day	Event Day	Next Day
-40	237.09	577.18	295.64	202.67	585.33	293.44
-35	234.81	620.31	306.20	209.58	541.59	274.86
-30	291.51	787.22	339.14	202.30	548.73	315.49
-25	281.73	593.02	317.30	192.72	542.55	277.63
-20	294.30	607.67	364.72	223.22	509.52	266.04
-15	291.84	648.29	343.45	202.97	573.99	259.37
-10	278.01	600.42	308.28	213.85	553.05	271.07
-5	280.17	580.03	293.52	212.91	572.95	255.63
5	300.64	579.15	282.92	204.60	602.43	251.18
10	303.60	542.04	344.08	216.99	585.38	239.55
15	280.63	540.01	271.54	203.14	513.28	228.44
20	237.40	451.56	281.71	205.82	488.28	230.58
25	239.76	469.14	256.45	192.45	465.19	230.85
30	225.99	433.97	245.46	172.81	440.37	217.55
35	252.11	389.61	229.56	185.11	434.96	226.16
40	261.02	387.91	206.63	182.12	396.09	219.22

Table 15: Intraday Relative Informativeness of Analyst Target Price, Stock Recommendation Type, and Magnitude of Rating Change

Panel A reports the regression results of the return of the recommendation released out of the market hour, which consists of 2640 upgrade and 2877 downgrade. Market-adjusted abnormal return (R) is calculated as the difference between the firm buy-and-hold return and the buy-and-hold return on the SPYDER over the period from 16:00 previous day to 40 minutes following the open of the market (10:10).Panel B reports the regression of the return of the recommendation announced in the market hour, which consists of 778 upgrade and 902 downgrade. The market-adjusted abnormal return (R) is computed as the difference between the firm buy-and-hold return and the buy-and-hold return on the SPYDER over the period from forty minutes prior to through forty minutes following the announcement of target price. The table reports regression results in which the dependent variable is the return surrounding the target price announcements and the independent variables are indicator variables for analyst recommendations, the magnitude of recommendation revision, and target price revisions. The recommendation indicator variables equal 1 for the relevant recommendation and 0 otherwise. The recommendation categories are upgrades and downgrades. The magnitude of recommendation revision is measured as the difference between current rating and previous rating. Target price revision is computed as the percentage change in the brokerage house current and prior target price scaled by the prior target price.

Panel A:

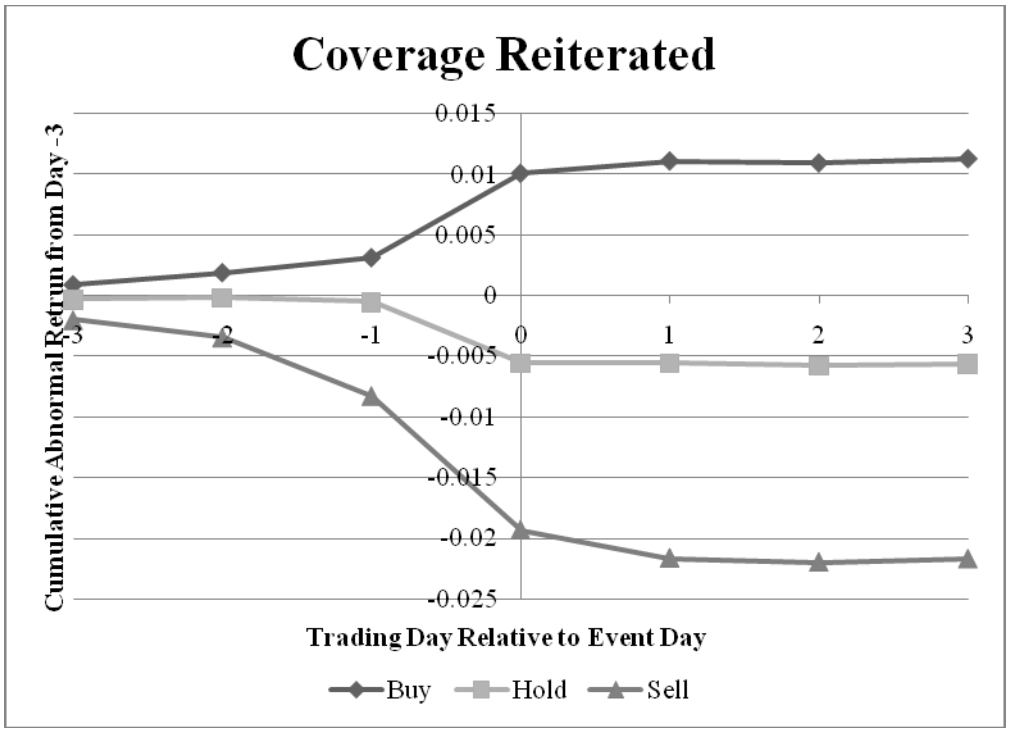
Variable	All Observations	Direction of Recommendation Revision		Sign of Target Price Revision		
		Upgrades	Downgrades	Positive	Negative	Zero
	(1)	(2)	(3)	(4)	(5)	(6)
α_1 (Upgrade indicator)	0.006	0.024		0.030	0.053	0.044
	0.82	7.9		9.5	2.08	5.48
α_2 (Downgrade indicator)	-0.038		-0.017	-0.023	0.024	-0.034
	-5.18		-1.33	-6.1	1.36	-4.44
β(Recommendation revision)	-0.005	-0.005	-0.007	-0.001	-0.008	0.002
	-0.98	-2.1	-0.78	-0.53	-0.69	0.33
γ(Price target revision)	0.105	0.029	0.216	0.025	0.347	
	11.03	8.01	10.75	6.3	10.31	
Adjusted R^2	9.2%	33.0%	9.3%	30.6%	10.4%	28.4%
N	5,517	2,641	2,876	2,752	2,310	455

Panel B

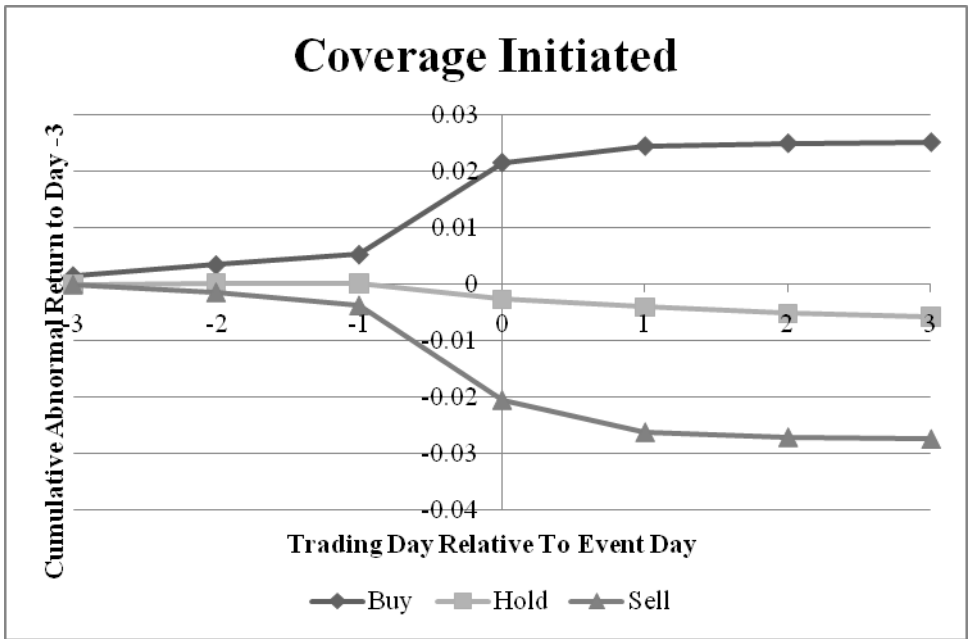
Variable	All Observations	Direction of Recommendation Revision		Sign of Target Price Revision		
		Upgrades	Downgrades	Positive	Negative	Zero
	(1)	(2)	(3)	(4)	(5)	(6)
α_1 (Upgrade indicator)	0.004	0.011		0.014	0.013	0.017
	1.03	2.22		2.77	1.17	2.4
α_2 (Downgrade indicator)	-0.012		-0.006	-0.016	0.004	-0.009
	-2.76		-0.95	-2.61	0.48	-1.15
β(Recommendation revision)	-0.005	-0.002	-0.008	0.000	-0.010	-0.002
	-2.07	-0.74	-1.95	-0.07	-2.1	-0.44
γ(Price target revision)	0.030	0.021	0.045	0.019	0.068	
	5.48	3.7	4.47	3.08	4.33	
Adjusted R^2	14.0%	14.8%	14.0%	14.6%	14.6%	23.1%
N	1,680	778	902	769	794	117

Figure 1 **7-day Average Excess Returns for All Recommendations.** Average excess returns for coverage reiterated (Panel A), coverage initiated (Panel B) and upgrade and downgrade (Panel C) for 7 days centered on the recommendation event date (t= -3 to 3). The holding period abnormal returns equal to the raw returns less the CRSP value-weighted market return.

Panel A



Panel B


Coverage Initiated
Cumulative Abnormal Return to Day -3
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
-0.04
-3
-2
-1
0
1
2
3
Trading Day Relative To Event Day
Buy
Hold
Sell

Panel C

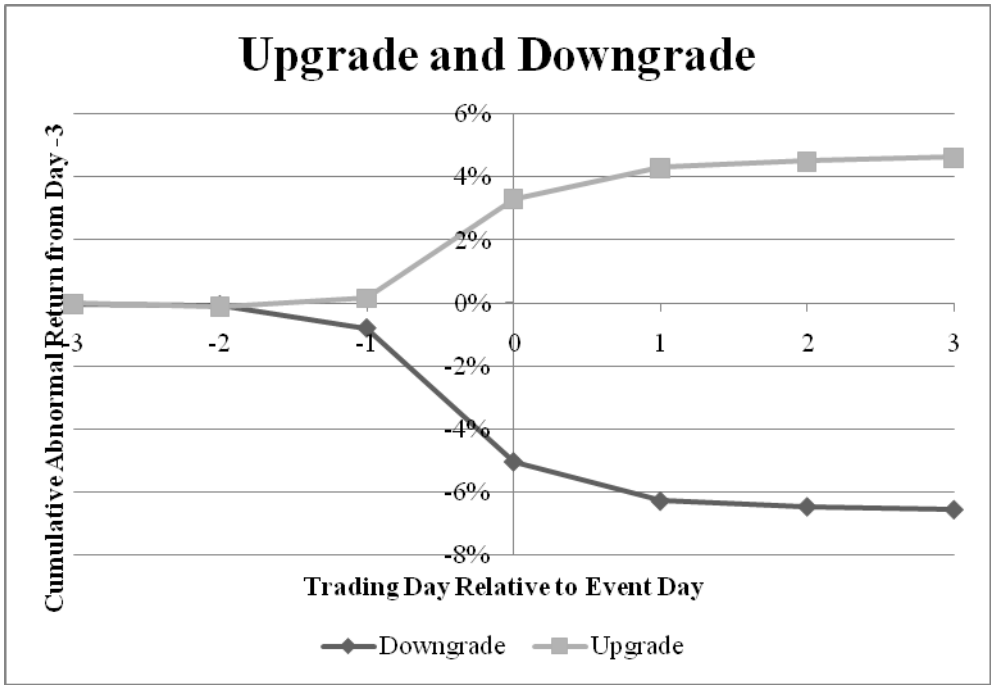
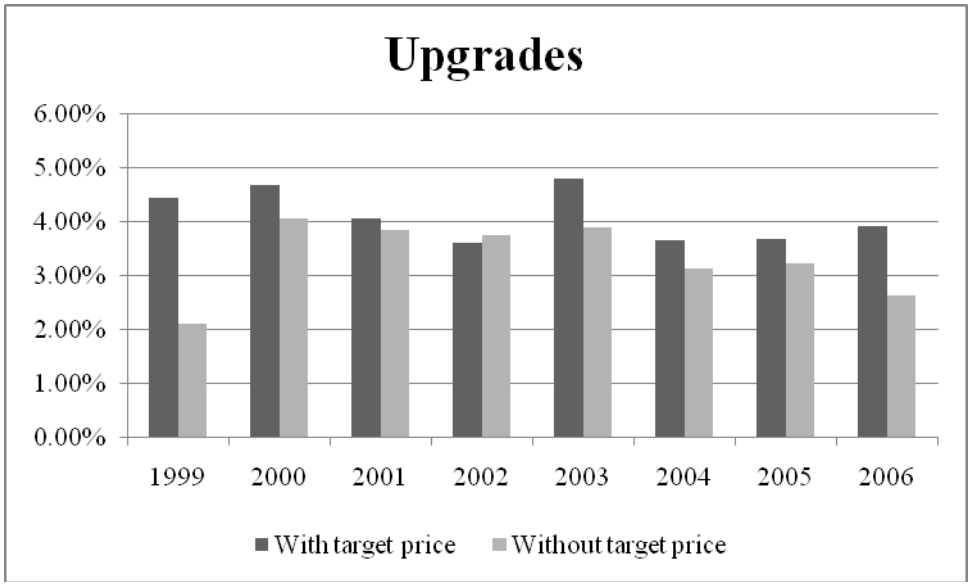

Upgrade and Downgrade
Cumulative Abnormal Return from Day -3
6%
4%
2%
0%
-2%
-4%
-6%
-8%
-3
-2
-1
0
1
2
3
Trading Day Relative to Event Day
Downgrade
Upgrade

Figure 2 Excess Returns for Upgrade and Downgrade with and without Target Price by Year

Average excess returns for upgrade (Panel A) and downgrade (Panel B) with and without target price in the event day. We divide the sample of upgrade and downgrade by year, and calculate the holding period abnormal returns in the event day. The holding period abnormal returns equal to the raw returns less the CRSP value-weighted market return.

Panel A



Panel B

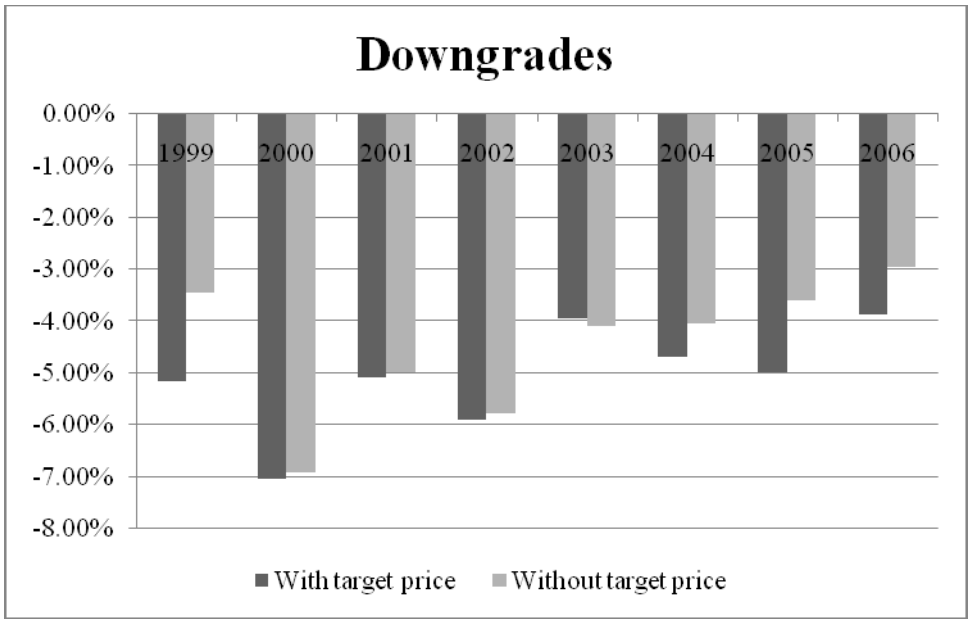
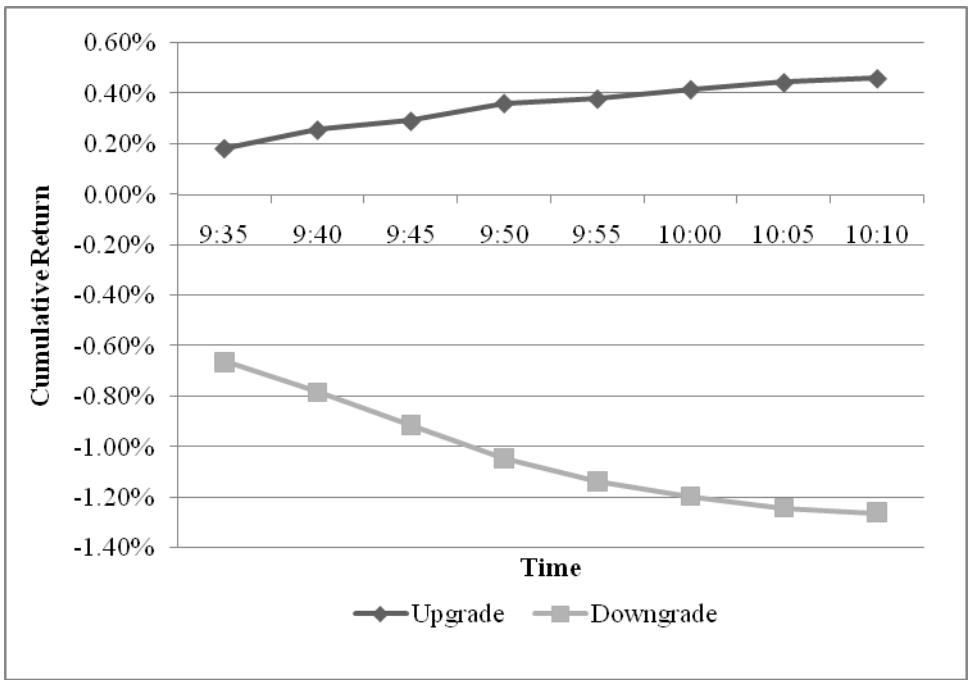

Downgrades
0.00%
-1.00%
-2.00%
-3.00%
-4.00%
-5.00%
-6.00%
-7.00%
-8.00%
1999
2000
2001
2002
2003
2004
2005
2006
With target price
Without target price

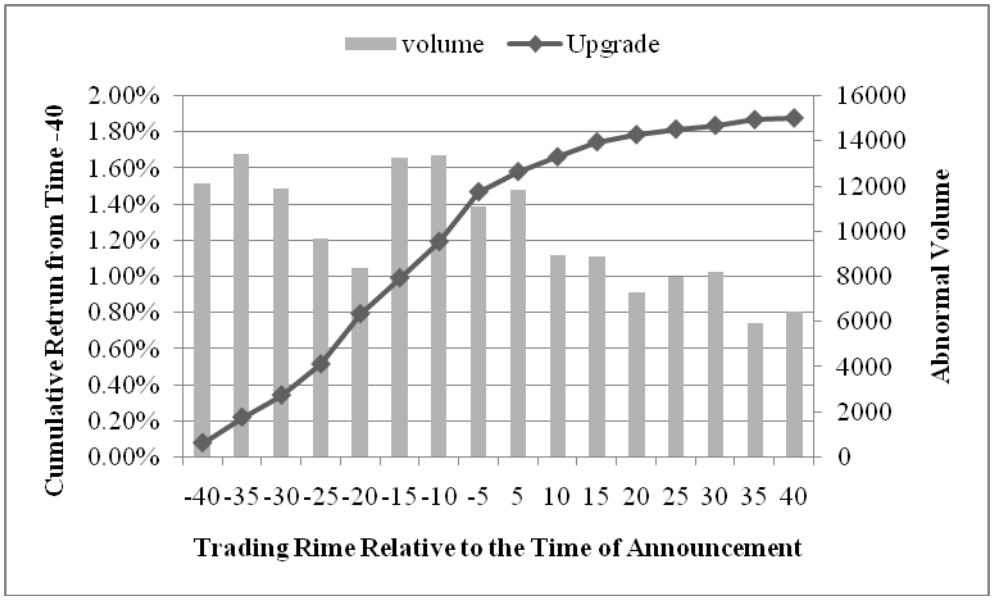
Figure 3 Intraday Cumulative Market-adjusted Abnormal Returns surrounding the Announcement of Recommendation with Target Price

Panel A plots the cumulative market-adjusted abnormal returns for the 5-minute intervals over the period 40 minutes following the announcement. Panel B and C report plot mean cumulative market-adjusted abnormal return and volume for upgrade and downgrade with target price revisions. Mean returns for stocks upgrade (Panel B) and downgrade (Panel C) for 80 minutes centered on the announcement event time (t=-40 to 40). The abnormal volume is calculated as the result of the difference between the volume in the event day and the mean volume of previous and next day.

Panel A



Panel B-Upgrade Recommendation with Target Price Revisions-Return and Volume



Panel C-Downgrade Recommendation with Target Price Revisions-Return and Volume

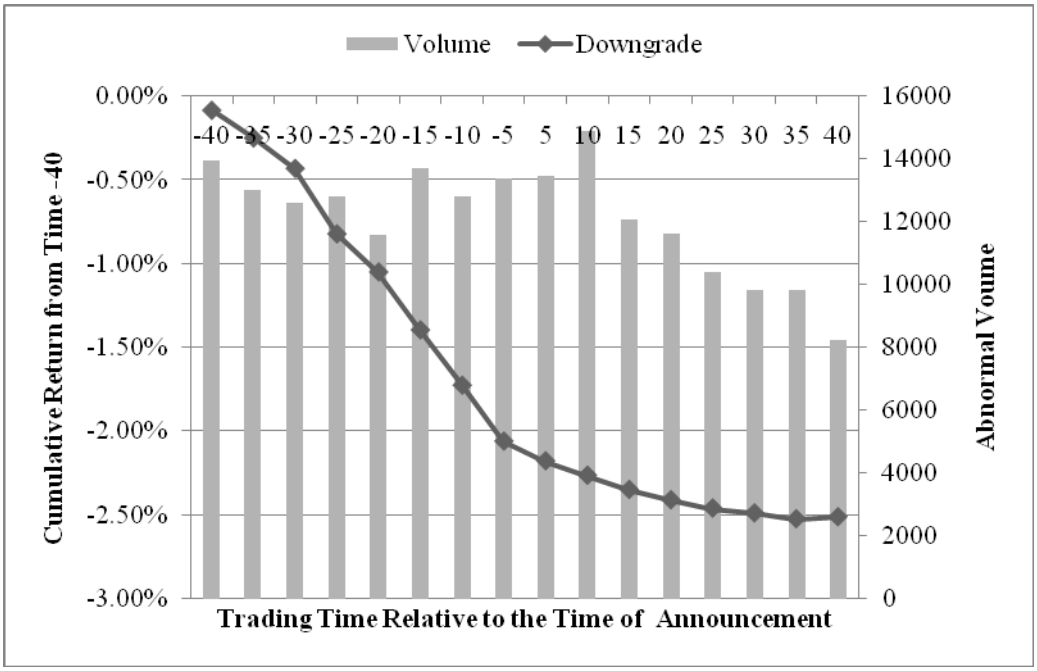


Figure 4 **Mean Market-adjusted Abnormal Return around Announcement of Target Prices.** This figure plots average market buy-and-hold market-adjusted abnormal returns for the period beginning forty minutes prior and ending forty minutes subsequent to the firm's target price announcement for deciles portfolios sort on the basis of three target price information measures. Market-adjusted abnormal return is calculated as the difference between the firm buy-and-hold return and the buy-and-hold return on the SPYDER. The information content measures are (1) the magnitude of the change in the brokerage house target price revision denoted $\Delta TP/TP_{-1}$, (2) the ratio of the target price to the stock price(the last transaction just before the target price announced) represented by TP/P,(3) the change in the target price, deflated by the stock price denoted $\Delta TP/P$.