Who Trades on and Who Profits from Analyst Recommendations?

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June 10, 2013

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Abstract

Using a proprietary database that identifies institutional and individual trades, we find stark differences between institutions and individuals in the amount they trade, the direction of their trades, the timing of their trades, and the way they attempt to profit from sell-side analyst recommendation changes. Institutions tend to trade in the direction of the recommendation change before it is released and then reverse their trades on the announcement date. This "buy the rumor and sell the fact" trading strategy is consistent with tipping and generates short-term profits for institutions, particularly for upgrades. Unlike institutions, individuals mainly trade after recommendation changes and on average they profit by holding positions longer. Overall, the volume of individual trading around analyst recommendation changes is dwarfed by institutional trading volume.

JEL classification: G14, G18, G23, G24

Keywords: Analyst recommendations, institutional trading, individual trading

1. Introduction

Sell-side analysts are important information providers in security markets. Analysts produce a variety of outputs such as earnings forecasts and stock recommendations. Much of the literature has referred to the audience for the information produced by analysts as "investors." Of course, this a broad term that includes a variety of investor types with different skills, motives, and horizons. In this paper we attempt to open this black box and study how different types of investors react to and profit from sell-side analysts' outputs. Specifically, we use a proprietary dataset to positively identify the daily buy and sell volume of institutions and individuals, and we focus our attention on recommendation changes as a main output of analysts.

In our analysis we seek the answers to three different but related questions. First, we ask which types of investors trade based on analyst recommendations, focusing on trading before, on the day of, and after a recommendation change. On one hand, institutions such as mutual funds and hedge funds subscribe to sell-side research and are therefore likely to respond to analyst recommendations in their trading activity. On the other hand, sell-side research is widely disseminated in the public media, on popular websites, and through discount brokerage interfaces, making it available to individual investors as well. Moreover, individual investors who are likely less informed may view analyst recommendations as containing more new information than institutional investors who conduct their own research independently. Thus, the identity of the audience of sell-side analysts is not clear a priori.

Second, we look closely at the direction of trades of each type of investors. In particular, we ask whether institutions and individuals trade in the direction of the recommendation change or against it, before, during, and after the recommendation announcement. Critically, analysts may distribute their reports and recommendations to different investors at different points in time. For example, institutions may be receiving tips about analyst recommendations a few days before they become available to the public (Irvine, Lipson, and Puckett, 2007), whereas individual investors may not receive such tips. These differences may affect both the timing and the direction of trades. Third, we ask who profits from analyst recommendations. Is it institutions, which are commonly perceived as savvy and sophisticated, or is it

individuals, who are often portrayed as naïve? We further consider the trade horizon: Do institutions or individuals trade for long horizons or take short-term profits in a speculative manner?

To answer these questions we use a proprietary dataset that identifies the daily buy and sell volume by institutions and individuals on the New York Stock Exchange (NYSE). We study the volume of trade, the direction of trade (buy minus sell trade imbalance), and the profits of these two groups of investors during the days preceding recommendation changes, on the day of the recommendation change, and in the days following the recommendation change. Our results show stark differences between institutions and individuals in the amount they trade, the direction of their trades, the timing of their trades relative to the recommendation date, and the way they attempt to profit from recommendation changes.

Our first set of results focuses on the trading activity of the two groups of investors as measured by their abnormal volume (volume in excess of their typical trading volume). We find that both institutional and individual trading volume spike around analyst upgrades, suggesting that both types of investors respond to upgrades. This pattern is repeated for downgrades among institutions but less so for individuals. In terms of relative magnitudes, we find that institutions are much more active than individuals in trading based on analyst recommendations. Institutional abnormal volume around analyst upgrades dwarfs that of individuals by a factor of about twenty, and institutional abnormal volume around analyst downgrades is about eight times that of individuals.

Next we focus our attention on the direction and timing of trades of both types of investors. For this purpose we use the investor group's abnormal trade imbalance, measured as their buy minus sell trade imbalance in excess of their typical trade imbalance. The results here are quite surprising. We find that institutions are contrarian traders when it comes to upgrades. Institutions appear to buy into stocks during the four days before they are upgraded (in line with tipping before analysts initiate positive coverage of stocks in Irvine, Lipson, and Puckett, 2007) and then sell these stocks on the day of the upgrade. Thus, when it comes to upgrades, institutions appear to "buy the rumor and sell the fact," pocketing short-term speculative profits. The converse trading pattern is not significant for downgrades,

perhaps because short sale constraints restrict institutions' ability to execute the corresponding strategy to "sell the rumor and buy the fact" surrounding analyst downgrades.

The trade imbalances and timing of individuals are markedly different. Abnormal trade imbalances of individuals on days surrounding recommendation changes are flat. It appears that individuals are not tipped by analysts, and they do not take short-term profits on the recommendation change day. This difference between the trading patterns of individuals and institutions may reflect that individual trading is dominated by a large number of small traders (rather than high net worth individuals) who have no special relations with analysts or the brokers who employ them.

In our next set of results we show how each group of investors benefits from trading based on analyst recommendations. It is widely documented that analyst recommendation changes are accompanied by abnormal short-term returns in the direction of the recommendation change (e.g., Womack, 1996; Loh and Stulz, 2011; and Kecskes, Michaely, and Womack, 2010). The issue here is different. We ask whether institutions and/or individuals are more likely to trade based on a recommendation change when the subsequent realized returns are larger. In other words, we are asking whether institutions and/or individuals are savvy enough to trade more when their trades actually end up generating abnormal returns.[1] To answer this question, it is not enough to observe that abnormal returns on the day of an upgrade (downgrade) are positive (negative) on average. Rather, we explore whether some investors (institutions or individuals) can actually foresee the cases in which returns turn out to be higher for an upgrade or lower for a downgrade.[2] Note that the fact that individual investors do not exhibit abnormal trade imbalance on average does not mean that they do not profit/lose from their trades. The question is whether institutional or individual investors are more active in trades that end up being more profitable.

[1] This point is a standard "winner's curse" argument dating back to Rock (1986). In his model a group of privileged investors buys more of an IPO when it is underpriced and avoids overpriced IPOs. Thus, despite the fact that IPOs are correctly priced on average, one group of investors benefits and another group of investors loses from investing in IPOs.

[2] Jegadeesh, Kim, Kirsche, and Lee (2004) show that the value of analyst recommendations depends on the characteristics of the underlying firm.

Our results show that institutions are "short-term savvy." They identify the subset of stocks whose prices are expected to rise more upon upgrades, and they buy more into these stocks and less into others during the four days preceding the recommendation change. On the day of the recommendation change the institutions then exploit the jump in price and reap the short-term profit. Thus, our results show that institutions are sophisticated not only in their "buy the rumor sell the fact" strategy, but also in when they exercise it and when they avoid it. Importantly, our results indicate no abnormal returns for institutions over the subsequent three months, suggesting that institutions' focus and main source of profit from analyst recommendations are short-term. The results for individuals are notably different. In particular, we find that individuals buy more into upgraded stocks that generate abnormal returns over the next three months. Thus, individuals appear to be more interested in longer-term returns.

A possible concern is that our results are not driven by analyst recommendation changes per se, but rather they are attributable simply to large price changes. For example, it may be that institutions are savvy enough to "buy the rumor and sell the fact" for a variety of news events that yield a sharp change in price. Our research design addresses this concern in two ways. First, we exclude from our sample all recommendation changes associated with earnings announcements and all recommendation changes that show clustering among several analysts. This mitigates the concern that an underlying news event rather than the recommendation change itself is driving the results (Altinkilic and Hansen, 2009). Second, we supplement our analysis with a placebo test in which we replicate our analyses for days exhibiting abnormal returns without any analyst recommendation changes. The results for this placebo sample are different from those we find for our actual sample of recommendation changes. Most notably, the "buy the rumor and sell the fact" pattern that institutions exhibit around actual analyst upgrades does not appear around the placebo upgrades: Institutional investors exhibit no significant buying before the placebo upgrades, and they significantly buy (rather than sell) on the day of placebo upgrades. We conclude that the trading patterns we identify in our main tests are likely attributable to recommendation changes and not to other information events.

Our results contribute to our understanding of the behavior of both sell-side analysts and investors. It is important to understand the identity of the investors to whom analysts are talking, who is attentive to their outputs, and who trades and profits based on their recommendations. This information has far-reaching academic and policy implications. For example, it is often argued that institutions are sophisticated and are able to undo any biases of sell-side analysts such as those related to investment banking (e.g., Lin and McNichols, 1998; Michaely and Womack, 1999). Individuals, on the other hand, are often portrayed as suffering from chronic naïveté placing them on the losing sides of trades. Our results paint a more nuanced picture. It appears that institutions profit from analyst recommendations, not through their superior skill, but via a contrarian strategy associated with early tipping that yields speculative short-term profits. In contrast, individuals benefit from the long-term investment value associated with analyst recommendations changes.

This is the first paper to provide a complete and detailed analysis of how institutions and individuals differ in the way they trade on and profit from analyst recommendations. We owe this to the NYSE dataset, which enables us to positively identify both groups of traders. It is important to note that individual trades are not the complement of institutional trades, since a third category, market makers (including specialists, dealers, and non-designated market makers), also plays an active role in equity trading. In other words, it is not possible to back out individual trades from total trades and institutional trades alone. Thus, a database that identifies both institutional and individual trades is essential to an analysis that seeks to compare institutions and individuals.

Prior papers in this literature provide interesting and important results that serve as a starting point to our analysis. Irvine, Lipson, and Puckett (2007) are the first to identify institutional abnormal buying activity before analysts initiate stock coverage with a “buy” recommendation. They are also the first to attribute this activity to “tipping.” However, the dataset available to Irvine et al. (2007) contains information only about a subset of institutional trades and no information about individual trades. This constraint prevents them from analyzing individual trading patterns and comparing the trading of institutions and individuals. Furthermore, Irvine et al. (2007) examine only initiations of analyst coverage,

while our study examines all analyst recommendation changes. The additional dimensions of our data and the broader scope of our investigation yield findings that extend beyond Irvine et al. (2007) in several important ways. First, we are able to provide a thorough comparison between the trading behavior of institutions and individuals. Second, among institutions we find contrarian trading activity, which turns out to be unique to recommendation changes and is not found in analyst coverage initiations. Thus, while the "buy the rumor" part of our findings is consistent with Irvine et al. (2007), the "sell the fact" component is new as is the entire comparison between individuals and institutions.[3] Third, we show not only who is trading around recommendation changes but also who profits from those recommendation changes.

Two other related papers use institutional trading data from Abel/Noser to examine institutional trading around analyst recommendation changes.[4] Goldstein, Irvine, Kandel, and Wiener (2009) find that institutions who are clients of the broker that issues a recommendation change make higher profits. In a study of whether analysts follow institutional investors or vice versa, Busse, Green, and Jegadeesh (2012) find that institutions are net sellers prior to analyst downgrades but find no evidence of net buying prior to analyst upgrades. Our larger dataset potentially reconciles the Irvine et al. (2007) results with those of Busse et al. (2012), as our analysis of all active institutional trading reveals evidence of tipping before analyst upgrades as well as before analyst initiations.

Malmendier and Shantikumar (2007) take a different empirical approach to identifying individual versus institutional trades. They use Trade and Quote (TAQ) data to identify large and small trades and then attribute large trades to institutions and small trades to individuals. They find that small trades are less likely to discount the recommendations of analysts that are expected to be biased (affiliated analysts). The advantage of our dataset is that it allows us to clearly identify the source of trade without making assumptions about different traders' trade sizes. This is especially important since the introduction of

[3] When we repeat our analysis on analyst coverage initiations we confirm Irvine et al.'s (2007) results. This is reassuring since our dataset is quite different from theirs. Irvine et al.'s (2007) dataset includes trades by 120 institutional clients of Plexus from March 31, 1996 to December 31, 1997 and March 31, 2000 to December 31, 2000. Our dataset includes all institutional and individual trades on the NYSE from January 1, 1999 to June 30, 2010.

[4] Puckett and Yan (2011) estimate that the Abel/Noser dataset, later known as Ancerno, captures approximately 10% of institutional trading.

decimalization (trading in pennies rather than in sixteenths of a dollar) in 2000 and the growing use of computerized trading algorithms to break up institutional trades, both of which undermine the assumption that small trades are necessarily coming from individuals in recent years.

The remainder of the paper is organized as follows. In section 2 we describe our sample and data. Section 3 presents our results, and Section 4 discusses the placebo test. Section 5 details robustness checks, and Section 6 concludes.

2. Data, Methodology, and Sample

In this section we detail our data sources, discuss how key variables are defined, and then present descriptive statistics for our sample.

Our analysis uses analyst stock recommendation data from the Thomson Financial Institutional Brokers Estimate (I/B/E/S) U.S. Detail File,[5] data on institutional and individual daily buy and sell transaction volume from the NYSE Consolidated Equity Audit Trail Data (CAUD) database, stock data from the Center for Research in Securities Prices (CRSP) and Compustat databases, and institutional holdings data from the Thomson Financial 13F quarterly holdings database. We also use information on analyst rankings from Institutional Investor annual All-Star Analyst rankings. Our sample period is 1999 to mid-2010, and our sample includes all NYSE-listed domestic common stocks for which there are analyst recommendation changes in I/B/E/S within our sample period, as defined below.

2.1. Analyst recommendation changes

We define analyst recommendation changes based on the three-tier scale of buy, hold, and sell adopted by most analyst firms in 2002. We convert recommendations from the less common five-tier scale (strong buy, buy, hold, sell, strong sell) to the three-tier scale before identifying recommendation changes, so that our assessment of recommendation changes is not contaminated by the widespread change from five-tier to three-tier rating scales in 2002 prompted by the Global Analyst Research

[5] The data we use were pulled in early 2012 and so reflect the corrections Thomson made in 2007 in response to the findings of Ljungqvist, Malloy, and Marston (2009) that previous versions of the I/B/E/S database had been altered.

Settlement (Kadan, Madureira, Wang, and Zach, 2009). We define our recommendation changes as upgrades or downgrades within the three-tier scale for which the previous recommendation was issued by the same brokerage firm within the past year, to minimize the possibility of stale forecasts. We use the date and time stamps in I/B/E/S to identify the exact day of the recommendation change (the event day). To ensure that the recommendation date we consider is the relevant one in terms of the trading activity that follows, if a recommendation is released after 4:00 pm, we designate the next trading day as the recommendation change day.

To separate the effect of analyst recommendation changes from firm-specific news (Altinkilic and Hansen, 2009), we apply two screens similar to Loh and Stulz (2011). First, we remove recommendation changes that occur on the same day as or the day following earnings announcements. Second, we remove recommendation changes on days when multiple analysts issue recommendations for the same firm, as clustering in recommendation changes may reflect the release of firm-specific news (Bradley, Jordan, and Ritter, 2008). Together these filters remove about 28% of the analyst recommendation changes in our sample period.

2.2. Investor-type trading volume and trade imbalance

We use proprietary data from the NYSE that allow us to precisely identify the trading activity of individual and institutional investors. The dataset includes eleven and a half years of daily buy and sell volume for all domestic common stocks listed on the NYSE, with buy and sell volume reported separately for individual and institutional investors. The buy and sell volumes are aggregated across all individual and all institutional traders each day. The dataset does not identify separate traders within each investor category or trades within the day, although within the institutional category, daily buy and sell volume is further separated into program trades and non-program trades. The NYSE defines program trades as the trading of a basket of at least 15 NYSE securities valued at $1 million or more. We exclude program trades from our measures of institutional trading volume in order to focus on active institutional investor

trading, which is more likely to be attentive to analyst recommendations.[6] The dataset was constructed from the NYSE's CAUD files, which are the result of matching trade reports to the underlying order data. CAUD contains information on all orders that execute on the NYSE, including both trades that are executed electronically and those that are executed manually (by floor brokers).

CAUD has two main advantages compared to other databases providing information on institutional trading. First is its coverage. CAUD covers a large portion of trading in NYSE stocks and is therefore likely to provide a representative picture of trading.[7] Second is the separate identification of individual and institutional trading. CAUD is one of the few databases that identify individual and institutional trading separately; because of the presence of market makers, individual volume is not simply the complement of institutional volume. Since in this paper we are asking who trades on and profits from analyst recommendation, this feature of CAUD is crucial for us. One disadvantage of CAUD is that it does not reveal the trader type at a more detailed level. We cannot distinguish between institutional trading by mutual funds, hedge funds, or other types of institutions.

For each trade, CAUD shows the executed portion of the underlying buy and sell orders along with an account-type variable that identifies whether the trader who submitted an order is an institutional investor, an individual investor, or a market maker. Providing the account type classification is mandatory for brokers, although it is not audited by the NYSE on an order-by-order basis.[8] Because CAUD reports the buyer and seller for each trade based on actual order data, the classification of buy and sell volume in our data set is exact, and thus we do not have to rely on trade classification algorithms such as Lee and Ready (1991).

We construct daily measures of institutional and individual trading volume and trade imbalance for each stock, and we standardize the measures by the trading volume on the NYSE in the same stock the

[6] Program trades are often part of index arbitrage strategies or rule-based algorithms that trade a basket of stocks for reasons that are unrelated to analyst recommendations (Boehmer and Kelley, 2009).
[7] Prior to 2007, over 80% of trading in NYSE-listed stocks occurs on the NYSE and is therefore captured by CAUD. We perform robustness checks for the early versus latter part of the sample period, when more trading occurs off the NYSE.
[8] Kaniel, Saar, and Titman (2008) point out that any abnormal use of the individual investor designation by brokers in hopes of gaining advantages is likely to draw attention, preventing abuse of the system.

same day. Specifically, we define Raw Trading Volume for stock *i*, investor type *x* (institutional or individual), on day *t* as:

$$Raw\ Trading\ Volume_{i,x,t} = \frac{\left(SharesBought_{i,x,t} + SharesSold_{i,x,t}\right)/2}{\left(SharesBought_{i,t} + SharesSold_{i,t}\right)/2} \quad (1)$$

where $SharesBought_{i,x,t}$ and $SharesSold_{i,x,t}$ are the number of shares of stock *i* bought and sold, respectively, by investor type *x* on day *t*, and $SharesBought_{i,t}$ and $SharesSold_{i,t}$ are cumulated across all buys and sells of stock *i* on day *t* on the NYSE. Similarly, we define Raw Trade Imbalance for stock *i*, investor type *x*, on day *t* as:

$$Raw\ Trade\ Imbalance_{i,x,t} = \frac{SharesBought_{i,t} - SharesSold_{i,t}}{\left(SharesBought_{i,t} + SharesSold_{i,t}\right)/2} \quad (2)$$

To isolate the abnormal trading volume and abnormal trade imbalance surrounding analyst recommendation changes, we identify a benchmark period for each recommendation change. Our benchmark period is days -45 to -11 and +11 to +45 relative to the day of the analyst recommendation change. We calculate the Benchmark Trading Volume for stock *i*, investor type *x*, with analyst recommendation change on day *t* as the average Raw Trading Volume over days t-45 to t-11 and t+11 to t+45. Similarly, we calculate the Benchmark Trade Imbalance for stock *i*, investor type *x*, with analyst recommendation change on day *t* as the average Raw Trade Imbalance over days t-45 to t-11 and t+11 to t+45.

Our main variables of interest are the abnormal trading volume and abnormal trade imbalance for each investor type and recommendation change, defined as:

$$Abnormal\ Trading\ Volume_{i,x,t} = Raw\ Trading\ Volume_{i,x,t} - Benchmark\ Trading\ Volume_{i,x,t} \quad (3)$$

and

$$Abnormal\ Trade\ Imbalance_{i,x,t} = Raw\ Trade\ Imbalance_{i,x,t} - Benchmark\ Trade\ Imbalance_{i,x,t} \quad (4)$$

To calculate the benchmark period volume and imbalance, and thus the abnormal volume and imbalance for each recommendation change, we require at least 45 days of data before and after the recommendation change, reducing our sample from the eleven and a half years (January 1, 1999 to July 1, 2010) for which we have CAUD data to recommendation changes occurring between March 10, 1999 and April 22, 2010.

2.3. Abnormal stock returns

We collect daily stock returns and value-weighted market returns from CRSP and define a firm's abnormal stock return for stock *i* on day *t* as:

$$Abnormal\ Return_{i,t} = Return_{i,t} - ValueWeighted\ Market\ Return_t\ , \qquad (5)$$

where $Return_{i,t}$ is the return for stock *i* on day *t* and $Value\text{-}Weighted\ Market\ Return_t$ is the CRSP value-weighted market return on day *t*. We calculate cumulative abnormal returns as the sum of daily abnormal returns.

2.4. Descriptive statistics

Panel A of Table 1 presents basic descriptive statistics for the stocks in our sample. Because our sample is restricted to firms covered by at least one analyst, the stocks in our sample are rather large, with an average market capitalization $6.490 billion. The average number of analysts covering a firm in our sample is seven (with a median of six), and the average percentage of institutional holdings is 67%. On average, institutional trading accounts for 59% of the volume in our sample, while individual trading accounts for only about 5%. Thus on average (non-program) institutional trading is about 12 times the volume of individual trading.[9] Clearly, institutional trading volume dwarfs that of individuals in these stocks on the NYSE. As for trade imbalance, a priori it is not clear we should expect either group of investors to be net buyers or sellers. We observe that institutions are net buyers in our sample while individuals are net sellers, with average raw trade imbalances of 0.9% and -1.3% respectively.

[9] Institutional program trades account for another 21% of trading volume on average, and the remaining 15% is executed by market makers, including specialists.

Panel B summarizes the distribution of analyst recommendation changes by year. Overall, there are about five percent more downgrades than upgrades in our sample (15,907 downgrades versus 15,101 upgrades). We also note considerable variation in the number of recommendation changes over time, so we include year fixed effects in all subsequent analyses.

[Table 1 here]

3. Results

Our main interest is in who trades on analyst recommendation changes and who benefits from them. To explore these questions we study the trading and accumulation of shares by individuals and institutions before, on the day of, and following analyst recommendation changes. In the first two subsections we examine trading volume and imbalances, then in the third subsection we examine how trade imbalances are related to price changes. Robustness checks are discussed in Section 5.

3.1. Institutional versus individual trading volume

Figures 1 and 2 provide a first look at institutional and individual trading volume surrounding analyst recommendation changes. Figure 1-A (2-A) shows the average Raw Trading Volume for institutions and individuals over the period from 45 days before to 45 days after an upgrade (downgrade); Figure 1-B (2-B) shows the average Abnormal Trading Volume in the days immediately surrounding an analyst upgrade (downgrade). Because the orders of magnitude for institutions and individuals are very different, we use separate scales for the two groups of investors (left vs. right axis of the graphs).

[Figure 1 here]

[Figure 2 here]

Both institutional and individual trading volumes appear to spike around analyst upgrades. For downgrades we observe a spike in institutional volume and some increase in volume for individuals. Critically, in selecting these recommendation changes we have removed all earnings announcement dates and dates of clustered stock recommendations from multiple analysts. Thus the spike in volume around

recommendation changes is likely associated with the recommendation change itself, not other news such as earnings announcements, mergers, or macroeconomic news.

To determine the statistical significance of the volume patterns displayed in Figures 1 and 2, we conduct analyses of the following form:

$$Volume_{i,x,t+k} = \alpha + \sum_{m=1}^{11} \delta_n YearDummy_{m,t} + \varepsilon_{i,x,t+k} \ , \qquad (6)$$

where $Volume_{i,x,t+k}$ is the abnormal trading volume for investor-type *x* (institutions or individuals) in stock *i* with a recommendation change on day *t*. The variable *k* takes values in {-4, 0, 4}. When k = 0 we are focusing on the volume on the day of the recommendation change (day *t*); when k = -4 we are focusing on the four days prior to the recommendation change (days *t*-4 to *t*-1); and when k = 4 we are focusing on the four days following the recommendation change (days *t*+1 to *t*+4). The variable of interest in this analysis is the intercept, α, which measures the abnormal volume related to the specific time period we are interested in (day of the recommendation change or four days preceding or following it). A positive intercept corresponds to a positive amount of abnormal volume. $YearDummy_{m,t}$ are year fixed effects to control for the variation in the number of recommendation changes over time observed in Table 1 and market changes over time. To adjust for potential cross-sectional correlation and idiosyncratic time-series persistence, we use standard errors double-clustered on stock and date in this and all subsequent analyses (Thompson, 2011).

Table 2 presents the regression results separately for upgrades (Panel A) and downgrades (Panel B). The results show clearly that volume is significantly higher on the recommendation change day (Day 0) for both institutions and individuals and for upgrades and downgrades. Note, however, that the Day 0 abnormal volumes for the two groups of investors differ by an order of magnitude. For example, for upgrades the Day 0 institutional abnormal volume is 0.0246 (2.46%, column (2)), more than 20 times individual abnormal volume of 0.0012 (0.12%, column (5)). On Days -4 to -1 and +1 to +4, institutions exhibit abnormal volume on average, but individuals do not (columns (1) and (3) versus (4) and (6)) and the difference between the two groups is significant.

[Table 2 here]

We next examine what types of recommendation changes institutional and individual investors trade on most, with regressions of the following form:

$$Volume_{i,x,t+k} = \alpha + \sum_{j=1}^{4} \beta_j FirmCharacteristic_{j,i,t} + \sum_{j=1}^{4} \gamma_j RecCharacteristic_{j,i,t} + \sum_{m=1}^{11} \delta_n YearDummy_{m,t} + \varepsilon_{i,x,t+k}\,, \qquad (7)$$

where $FirmCharacteristic_{j,i,t}$ includes: *FirmSize*, which is the log of the firm's market capitalization in the year of the recommendation change; *Book-to-market,* the log of the firm's book-to-market ratio in the year of the recommendation change; *InstitutionalOwnership,* the percentage of shares held by institutions as of the previous quarter-end; and *NumberofAnalysts*, the number of analysts covering the stock in the year of the recommendation change. $RecCharacteristic_{j,i,t}$ includes: *All-starAnalyst,* an indicator variable that is equal to one if the analyst making the recommendation change is ranked as an All-star analyst by Institutional Investor in the prior year, else zero; *ConcurrentEarningsForecast,* an indicator variable that is equal to one if the analyst announces an earnings forecast with the recommendation change, else zero; *Post-GlobalSettlement,* an indicator variable that is equal to one for recommendation changes made on or after September 1, 2002, else zero; and *BigBroker*, an indicator variable that is equal to one for recommendation changes issued by the 10 largest broker/dealers, else zero. The remaining variables are as defined for equation (6).

Table 3 presents the results from regressing abnormal volume on these characteristics separately for analyst upgrades (Panel A) and downgrades (Panel B). Institutions have elevated trading volume before, on, and following analyst upgrades and downgrades (significant positive intercepts in columns (1), (2), and (3)), but less so for larger firms (significant negative coefficients on firm size). In contrast, individuals have higher trading volume before and after recommendation changes for larger firms (significant positive coefficients on firm size, columns (4) and (6)). Both institutions and individuals appear to trade more surrounding recommendation changes that are accompanied by a concurrent

earnings forecast (positive coefficients on concurrent earnings forecast), though the abnormal volume of institutional investors is more than double that of individuals. Finally, All-star analysts' recommendations appear to attract institutional volume on the day of the recommendation change, but not individual volume.

[Table 3 here]

3.2. Institutional versus individual trade imbalances

Figures 3 and 4 present the average trade imbalances surrounding analyst recommendation changes. First consider Figure 3 which shows analyst upgrades. Panels A and B show that both institutional and individual trade imbalances are quite flat until four to five days before the upgrades. In the time period -4 to -1 we see a significant increase in positive imbalance by institutions. That is, institutions are net buyers of stocks in the four days prior to upgrades. This behavior is consistent with analysts tipping their institutional clients (Irvine, Lipson, and Puckett, 2007). Strikingly, however, on the day of the recommendation change (day 0), we observe a sharp dip in institutional imbalance (both raw and abnormal). Indeed, on day 0 institutions switch from being net buyers to net sellers of upgraded stocks. And in the few days following the upgrade, institutions move to the net buying side once again. Thus, institutions appear to be buying on "rumors" or "tips" provided to them during the few days preceding the recommendation, and then taking short-term profits on the day of the recommendation, giving rise to "buy the rumor, sell the fact" behavior. Figure 4 (especially 4-B) suggests similar but less pronounced behavior of institutions around downgrades. Institutions appear to be net sellers preceding the downgrade and then reverse to a net buying position on the day of the downgrade, only to become net sellers again in the days following the recommendation change. The smaller magnitudes of the effects for downgrades vs. upgrades may be explained by short-sale constraints. Institutional investors can relatively easily respond to imminent upgrades by buying the recommended stocks. By contrast, downgrades can only be traded upon if the institution already holds a particular stock or through a short-sale. Short sales are often costly, and many institutions are prohibited from selling short by their own policies.

[Figure 3 here]

[Figure 4 here]

The trade imbalance patterns of individuals in Figures 3 and 4 tell a very different story. The abnormal imbalances of individual investors on the days surrounding recommendation changes appear to be rather flat around upgrades (Figure 3) and exhibit a slight upward trend following downgrades (Figure 4). Unlike institutions, individuals do not seem to be tipped prior to the recommendation changes, and they do not appear to be taking profits on the day of the recommendation change.

To determine the statistical significance of the trade imbalance patterns displayed in Figures 3 and 4, we conduct analyses of the following form:

$$Imbalance_{i,x,t+k} = \alpha + \sum_{m=1}^{11} \delta_n YearDummy_{m,t} + \varepsilon_{i,x,t+k} \ , \qquad (8)$$

where $Imbalance_{i,x,t+k}$ is the abnormal trade imbalance for investor-type *x* (institutions or individuals) in stock *i* with a recommendation change on day *t*. The variable *k* takes values in {-4, 0, 4}, as in Equation (6). The variable of interest in this analysis is the intercept, α, which measures the abnormal trade imbalance related to the specific time period we are interested in (day of the recommendation change or four days preceding or following it). A positive (negative) intercept corresponds to excess buying (selling) activity relative to the benchmark period.

[Table 4 here]

Table 4 presents the regression results separately for upgrades (Panel A) and downgrades (Panel B). Consider Panel A first. The results for institutional investors show abnormal buying activity during the four days prior to an upgrade (column (1)), and then abnormal selling activity on the day of the upgrade (column (2)). These results are consistent with "buying the rumor and selling the fact." In the four days following the upgrade we see no abnormal activity by institutions (column (3)). Institutions appear to accumulate shares of upgraded stocks before the upgrade is announced, presumably based on rumors or tips. Then, on the day of the upgrade they become contrarian, selling their shares and taking short-term profits. The results in Panel B reveal that this behavior is unique to upgrades. For downgrades we observe no significant selling activity preceding the recommendation change date and no significant

contrarian trading on the day of the downgrade. The graphical pattern observed in Figure 4-B is too weak to be identified statistically, possibly because short-selling constraints prevent many institutions from trading early on tips or rumors related to downgrades.

Turning to individuals, Panels A and B of Table 4 indicate that individuals do not follow the same trading patterns as institutions. They do not seem to be trading on rumors or tips before the recommendation change, and their abnormal imbalance is not significant before, on the day of, or following recommendation changes (columns (4), (5), and (6)). Moreover, comparing the imbalances of individuals to those of institutions we find a significant difference for upgrades before and on the day of the recommendation change.

To determine how the characteristics of a recommendation change affect the net buying or selling of institutions and individuals around analyst recommendation changes, we run regressions of the following form:

$$Imbalance_{i,x,t+k} = \alpha + \sum_{j=1}^{4} \beta_j FirmCharacteristic_{j,i,t} + \sum_{j=1}^{4} \gamma_j RecCharacteristic_{j,i,t} + \sum_{m=1}^{11} \delta_n YearDummy_{m,t} + \varepsilon_{i,x,t+k} \ , \quad (9)$$

where $FirmCharacteristic_{j,i,t}$ includes *FirmSize*, *Book-to-market*, *InstitutionalOwnership*, and *NumberofAnalysts*; and $RecCharacteristic_{j,i,t}$ includes *All-starAnalyst*, *ConcurrentEarningsForecast*, *Post-GlobalSettlement*, and *BigBroker*, all as defined in Equation (7). As in prior equations, the variable *k* takes values in {-4, 0, 4}.

The regression results, presented in Table 5, shed light on the contrarian trading of institutions and on the absence of such behavior for individuals. Institutions net sell on the day analyst upgrades are announced, and even more so if the upgrade is of a smaller firm (significant positive coefficient on *Firm size*, column (2) in Panel A), or if the announcement is accompanied by an earnings forecast (significant

negative coefficient on *Concurrent earnings forecast* in column (2)). Table 5 also provides new insight into the behavior of individuals, who appear to be net buyers prior to analyst upgrades of smaller firms and firms with low institutional ownership (positive intercept and significant negative coefficients on *Firm size* and *Institutional ownership*, column (4) in Panel A.) Panel B shows that even conditioning on characteristics of analyst downgrades, neither institutions nor individuals exhibit significant changes in their net buying around analyst downgrades.

[Table 5 here]

3.3. Who benefits from analyst recommendation changes?

In order to better understand the trading patterns of institutional and individual investors, we next examine how the pattern of investor buy-sell imbalances is related to stock returns. Figures 5 and 6 show that abnormal returns spike on the day of the recommendation change, with positive abnormal returns occurring on the day of upgrades (Figure 5) and negative abnormal returns occurring on the day of downgrades (Figure 6). Each graph shows the net imbalance for one investor type (institutional or individual) divided into those recommendation changes with above-median (*High*) versus below-median (*Low*) abnormal announcement-day returns. Figure 5-A shows that institutional net imbalances are more positive prior to, and drop more sharply on the day of, upgrades that have the highest abnormal return on day 0. This behavior is consistent with not only short-term profit-taking, but also institutions correctly anticipating which recommendation changes will have the highest announcement-day price increase. Figure 6-A shows a more muted pattern for institutions relative to analyst downgrades, although institutional investors appear to exhibit more selling before and buying on the day of analyst downgrades that have the lowest (most negative) announcement day returns, consistent with short-term profit taking. Figures 5-B and 6-B show no such short-term profit-taking behavior or anticipation of announcement-day returns by individuals, who tend to net buy less prior to the upgrades that ultimately have the highest price increases on the announcement day.

[Figure 5 here]

[Figure 6 here]

Figures 7 and 8 explore how institutional and individual imbalances differ for analyst recommendation changes that are followed by the highest versus lowest subsequent three-month abnormal returns (rather than the day-0 returns in Figures 5 and 6). Figure 7-A shows that institutional trade imbalances are similar for upgrades that turn out to have the highest versus lowest three-month returns. In contrast, Figure 7-B suggests that individuals have higher net trade imbalances around upgrades that produce the highest subsequent three-month abnormal returns. Similar patterns emerge surrounding downgrades in Figures 8-A and 8-B: Individuals (but not institutions) appear to have higher net trade imbalances around downgrades that produce the highest subsequent three-month abnormal returns. Taken together, Figures 5 through 8 suggest that institutions seem to be more attuned to and savvy about short-term stock price movements. The longer-term stock return is uncorrelated with the position institutions take in a stock.

[Figure 7 here]

[Figure 8 here]

To more rigorously examine the link between investor-type trade imbalances and stock returns, we consider the following class of models:

$$Imbalance_{i,x,t+k} = \alpha + \beta_1 ReturnDay\text{-}4to\text{-}1_{i,t} + \beta_2 ReturnDay0_{i,t} + \beta_3 ReturnDay\text{+}1to\text{+}4_{i,t} + \beta_4 ReturnDay\text{+}5to\text{+}64_{i,t} + \varepsilon_{i,x,t} \quad , \qquad (10)$$

where *Imbalance* is the abnormal trade imbalance for investor-type *x* (institutions or individuals) in stock *i* with a recommendation change on day *t*; *ReturnDay-4to-1* is the cumulative abnormal return for stock *i* from four days to one day before the analyst recommendation change; *ReturnDay0* is the abnormal return for stock *i* on the day of the analyst recommendation change; *ReturnDay+1to+4* is the cumulative abnormal return for stock *i* from one day to four days after the analyst recommendation change; and *ReturnDay+5to+64* is the cumulative abnormal return for stock *i* from five days to 64 days after the analyst recommendation change (roughly three months). As in prior equations, the variable *k* takes values in {-4, 0, 4}.

To see the intuition behind these models, consider the trading activity of institutions before upgrades, and let us set k = -4. The dependent variable in this model measures the abnormal imbalance of institutions in the 4 days prior to the upgrade. We have already seen that institutions tend to buy prior to upgrades (Table 3). Our focus here will be on the coefficients β_1, β_2, and β_3. These coefficients measure whether the buying activity of institutions is stronger for upgrades that are followed by high abnormal returns on the day of the upgrade, in the four days after the upgrade, or during the following month. Thus, this approach allows us to infer whether institutions are savvy in the sense that they buy more of stocks whose prices rise more following upgrades. A similar rationale applies to downgrades and to the trades of individual investors.

[Table 6 here]

Panel A of Table 6 presents the analysis for upgrades. The dependent variable in column (1) is the abnormal institutional imbalance on Days -4 to -1. As in Table 4, the intercept in this regression is positive (0.0058) and significant (*t*-statistic of 2.2), indicating that institutions net buy stocks in the four days before they are upgraded. In addition, the coefficient on *ReturnDay0* is positive and significant. Thus, institutions appear to be buying even more of those about-to-be-upgraded stocks whose prices do in fact rise on the day of the upgrade. Apparently, institutions are savvy enough to identify the subset of stocks whose prices are expected to rise more when they are upgraded. Then institutions "buy the rumor and sell the fact" in these stocks, exploiting the jump in price on Day 0 to take short-term profits. In contrast to this result, the coefficient estimates on *ReturnDay+1to+4* and *ReturnDay+5to+64* are not statistically different from zero. This suggests that the motives of institutions in their trades surrounding analyst upgrades are in aggregate speculative and short-lived. They appear to be profiting from their trading strategy on the day of the upgrade, but not in the long run.

Consider now column (2) in Panel A of Table 6. As in Table 4, the intercept is negative, indicating that institutions are selling upgraded stocks on day 0. Furthermore, the coefficient on *ReturnDay-4to-1* is positive and significant. This suggests that the selling of institutions on day 0 is mitigated if the stock has experienced a run-up in price in the days preceding the upgrade. Finally,

column (3) of panel A shows that when the dependent variable is the imbalance following the upgrade, the coefficient estimates on the returns preceding the upgrade are positive and significant. This suggests that when the stock experiences a run-up in price, institutions chase the returns and keep buying following the upgrade.

We note that the coefficient on *ReturnDay+5to+64* is never significant for any of the models associated with institutional trade imbalances. This reinforces the view that institutions are chasing very short-term returns. Their focus is on the return on the day of the recommendation change, and longer-term returns do not appear to be a main source of profits for them. This is striking especially when contrasted with the results for individual investors in the next three columns. Note that the coefficient on *ReturnDay+1to+4* is positive and significant for both columns (4) and (5), and the coefficient on *ReturnDay+5to+64* is positive and significant for all three models. Thus, in contrast to institutions, it appears that individuals are trading to obtain longer-term profits. In addition, the coefficient estimates on *ReturnDay-4to-1* are negative and significant in columns (5) and (6), suggesting that individuals tend to sell upgraded firms after run-ups in their prices.

This surprising distinction between institutions and individuals is reinforced by the results in Panel B of Table 6, describing the behavior around downgrades. Here again the results for *ReturnDay+1to+4* and *ReturnDay +5to+64* are insignificant for institutions but positive and significant for individuals. This means that individuals (but not institutions) buy more or sell less of downgraded stocks whose prices are about to rise. Once again, it appears that institutions are speculative and short-term in their trades, while individuals trade on longer-term value.

4. Placebo test

A possible alternative explanation for our findings is that they are not attributable to analyst recommendation changes in particular but rather to days with relatively large returns in general. For example, it may be that institutional investors always buy the rumor and sell the fact surrounding days with large returns, and analyst recommendation changes are simply one cause of large returns. In this case

the results may have nothing to do with analyst recommendation changes per se; instead, they may be driven by price changes alone. To investigate this possibility, we conduct a placebo test to examine institutional and individual trader behavior surrounding high return days on which there are no analyst recommendation changes.

We construct our placebo sample as follows. For each analyst recommendation change event in our sample, we identify a placebo event defined as the stock/day on which the same stock has the closest abnormal return to that of the actual analyst recommendation change (day 0).[10] We exclude from consideration the 9-day period (days *t-4* to *t+4*) surrounding the actual analyst recommendation change date, to avoid overlap with analyst recommendation changes. Placebo events are chosen without replacement (i.e., there are no duplicates in the placebo event set). Figure 9 shows the average abnormal return for the period surrounding the actual recommendation change dates and the placebo event dates. The average absolute difference between actual and placebo day-0 abnormal returns is 0.0013%.

[Figure 9 here]

Figure 10 provides a first look at institutional and individual investor trading volume surrounding placebo events compared to analyst recommendation changes.

[Figure 10 here]

The top two graphs in Figure 10 show that institutional investor volume is on average lower surrounding the placebo events than surrounding actual analyst recommendation changes. Individual investor volume also appears lower surrounding placebo events than surrounding analyst recommendation changes, although the average difference is smaller than for institutions (note the different vertical scales for institutions versus individuals). To determine the statistical significance of the volume patterns surrounding the placebo events, we employ regression analyses identical to those in Table 2 except that we now perform the analyses on the placebo event sample. Table 7 presents the results.

[Table 7 here]

[10] We define "closest abnormal return" as the return that has the same sign as and minimum absolute distance from the day-0 abnormal return of the actual analyst recommendation change.

The variable of interest in these regressions is the intercept, which measures the abnormal volume in the days preceding, day of, and days following the placebo event. Institutional abnormal trading volume is positive on Day 0 for the placebo upgrades (see column (1) of Panel A), as it was for actual upgrades in Table 2, consistent with the idea that institutions are often active traders on days of big price moves. But several other results that were significant for the sample of analyst recommendation changes are not significant for the placebo events, and several of the differences between the actual and placebo events are significant. For example, institutions do not trade more on the placebo downgrade days (column (2) of Panel B) or prior to placebo upgrades (column (1) of Panel A), and individuals do not trade more on Day 0 for placebo upgrades or placebo downgrades (column (5) in Panels A and B). These results suggest that the volume patterns for institutions and individuals around analyst recommendation changes are not fully explained by the large returns on Day 0.

Figure 11 provides a first look at institutional and individual investor trade imbalances surrounding placebo events compared to analyst recommendation changes.

[Figure 11 here]

Institutional trade imbalances display dramatically different patterns surrounding the placebo events compared to actual analyst recommendation changes. Most notably, the contrarian behavior (selling on upgrades, buying on downgrades) that appears for actual recommendation changes is reversed for the placebo events: On average institutional investors net buy on Day 0 for placebo upgrades and net sell on Day 0 for placebo downgrades. The differences in individual trade imbalances appear more muted. Table 8 presents the results of regression analyses for abnormal trade imbalances, analogous to those in Table 4 except now using the placebo sample.

[Table 8 here]

The results in Table 8 support the idea that the buy the rumor and sell the fact behavior of institutions is related specifically to analyst recommendation changes, not simply large-return events as captured by the placebo sample. Institutional investors are net buyers rather than sellers on the day of the upgrade (column (2) of Panel A), and they are net sellers on placebo downgrade days (column (2) of

Panel B), in contrast to their insignificant imbalances on actual downgrade days (Table 4). These differences between actual and placebo recommendation changes are significant. Institutions do not demonstrate significant buying prior to the placebo upgrades (column (1) of Panel A). Interestingly, individuals exhibit net abnormal selling on placebo upgrades (column (5) of Panel A), consistent with individuals providing liquidity on high-return days that are not associated with analyst upgrades (although their activity is an order of magnitude smaller than institutions' net buying).[11]

Overall, these placebo tests suggest that the institutional and individual trading patterns documented surrounding analyst recommendation changes are in most cases directly related to the analyst recommendation changes, rather than simply being driven by the large abnormal returns on analyst recommendation change days.

5. Robustness checks

We conduct several additional tests to confirm the robustness of our results (all results from robustness checks are available in the internet appendix[12]). First, including analyst recommendation changes that occur near earnings announcement dates and those that occur on days with multiple analyst recommendation changes in our sample does not change our results. Second, our results are robust to excluding from our sample all recommendation changes announced after 4:00 pm (16% of our original observations). Third, dropping the year fixed effects from our regressions does not change our inference, nor does dividing our sample into subperiods, such as before versus after the NYSE's change to the hybrid market structure in 2007 (Hendershott and Moulton, 2011) . Fourth, the relations between trade imbalances and returns are qualitatively the same when one-month rather than three-month returns are used as the proxy for a longer investment horizon.

Fifth, in our study we focus on analyst recommendation changes and so exclude coverage initiations. Thus our results are not directly comparable to those of Irvine, Lipson, and Puckett (2007),

[11] Similarly, Kaniel, Saar, and Titman (2008) find patterns of individual trading consistent with risk-averse individuals providing liquidity to institutions.
[12] Available at: http://www.hotelschool.cornell.edu/research/facultybios/research-papers/p-moulton-research.html.

who focus on initiations only. To reconcile our results with those of Irvine et al., we repeat our analysis for analyst initial recommendations. Using the methodology of Irvine et al., we identify 6,889 analyst coverage initiations for NYSE stocks during our sample period. Consistent with the findings of Irvine et al., we find that institutions are significant net buyers in the days prior to an analyst's initial positive recommendation. Also consistent with Irvine et al., but in contrast to our findings for analyst recommendation changes, we find no evidence of institutions net selling on the day the initial recommendation is announced. Thus, while institutions appear to be contrarians when it comes to positive recommendation changes, this behavior is not observed for initiations. The differential response of institutions to the announcement of initial positive recommendations versus upgrades may be attributable due to the magnitude of the price effects. The average abnormal return on the day of an analyst upgrade is 1.93% in our sample, compared to only 0.28% on the day of a positive analyst initiation. Thus, it may be that initiations are not powerful enough signals to induce contrarian trading by institutions. In accordance with this conjecture we also note a less pronounced increase in institutional trading volume prior to and on the day of analyst initiations in our sample, compared to volume surrounding analyst recommendation changes.

In summary, our findings for analyst coverage initiations confirm the results of Irvine et al. (2007). The differences in institutional trading around analyst recommendation changes versus analyst coverage initiations appear to be due to the differential price effects of the two types of analyst announcements.

6. Summary and Conclusions

Using a unique dataset that captures all NYSE trading by institutions and individuals between 1999 and 2010, we investigate who trades on and who profits from analyst recommendation changes. This is the first study to analyze trades by both individuals and institutions around these events. In general, institutions dominate trading, with institutional trading volume more than 12 times that of individuals. The difference is even greater around analyst recommendation changes, with abnormal

institutional trading volume more than 20 times that of individuals on recommendation change days. Furthermore, institutional trading volume is significantly higher on the days immediately before and after recommendation changes, while individual trading volume is not.

Not only do institutions trade more prior to recommendation changes, they also trade in the direction of the recommendation change on average. They are significant net buyers before upgrades and, perhaps because of short sales constraints, to a lesser extent they are net sellers before downgrades. Thus institutional traders appear to correctly anticipate analyst recommendation changes. Individuals, on the other hand, do not exhibit abnormal trade imbalances before recommendation changes. On the day of the recommendation change, institutions tend to trade in the opposite direction (selling on upgrades and, to a lesser extent, buying on downgrades).

While institutional trade imbalances in the days before recommendation changes are indicative of profitable trades, a more direct test of profitability is done by linking trade imbalances to returns on and around the change in recommendation. The results show that the amount of institutional buying is positively related to the price change at the time of the recommendation. That is, institutions buy more of stocks whose prices subsequently rise more.

More surprising are the results for individual trading. Although individual trade imbalances do not suggest abnormal buying activity prior to upgrades, it appears that individuals profit from recommendation changes by buying stocks whose prices continue to drift higher long after the upgrade. Institutions notably do not appear skilled at identifying stocks that will continue to rise more long after the upgrade.

Overall, neither institutions nor individuals are losing from trades around recommendation changes; both groups are able to benefit from analyst recommendations, but in different ways and over distinct horizons. Institutions follow a short-term “buy the rumor and sell the fact” strategy by identifying upgrades that experience larger price increases on the announcement and realizing their profit quickly. Individuals buy on the announcement day and make money by holding stocks that appreciate in price in the post-announcement period. That individuals as a group do not lose money and are even able to make

money is important from regulatory perspective. It suggests that the need to level the playing field around these events may be overstated.

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Table 1: Descriptive statistics

The sample consists of all domestic common stocks that were traded on the NYSE and had analyst recommendation changes between March 10, 1999 and April 22, 2010. Panel A presents descriptive statistics for the 2,122 stocks in the sample.*Market capitalization* is calculated annually from CRSP; Number of analysts covering (*# Analysts covering*) is calculated annually from I/B/E/S; and *Institutional holdings* are calculated quarterly as the percentage of shares held by institutional owners from Thompson 13F database;*Raw Trading Volume* and *Raw Trade Imbalance* are calculated daily from CAUD data files. All variables in Panel A are averaged for each stock over the sample period, and across-stock statistics are reported in Panel A. Panel B reports the number of analyst recommendation changes in the sample year-by-year, with *Upgrades* and *Downgrades* determined from the three-tier scale (buy/hold/sell).

Panel A: Firms in sample			
	Mean	Median	Std Dev
Market capitalization ($bn)	6.490	1.532	19.277
# Analysts covering	7.1	6.0	4.7
Institutional holdings (%)	66.6	69.4	22.6
Raw Trading Volume (%)			
Institutional	58.7	58.8	9.1
Individual	4.8	2.7	5.5
Raw Trade Imbalance (%)			
Institutional	0.9	0.7	2.7
Individual	-1.3	-0.8	2.4
Number of firms	2,122		

Panel B: Recommendation changes per year			
	Upgrades	Downgrades	All
1999	1,151	1,106	2,257
2000	386	598	984
2001	795	1,050	1,845
2002	1,194	2,124	3,318
2003	1,667	1,871	3,538
2004	1,414	1,437	2,851
2005	1,328	1,077	2,405
2006	1,157	1,189	2,346
2007	1,774	1,476	3,250
2008	2,016	1,981	3,997
2009	1,735	1,607	3,342
2010	484	391	875
All	15,101	15,907	31,008

Table 2: Univariate regressions of abnormal volume surrounding analyst recommendation changes

This table presents univariate analyses of abnormal trading volumes in the days surrounding analyst upgrades (Panel A) and downgrades (Panel B). The dependent variable is abnormal trading volume for institutional (three left columns) or individual (three center columns) traders. Abnormal volume is defined as volume as a percent of NYSE volume on day *t* minus volume as a percent of NYSE volume during the benchmark period (days *t-45* to *t-11* and days *t+11* to *t+45* relative to the day of the analyst recommendation change). *Day 0* is the day the analyst recommendation change is released if before 4:00 pm on a trading day, else the next trading day. *Day -4 to -1* (*Day +1 to +4*) cumulates over day -4 to -1 (+1 to +4). Regressions include year fixed effects (coefficients not reported). *t* -statistics (in parentheses below parameter estimates) are based on double-clustered standard errors, clustered on stock and date.

Panel A: Analyst upgrades

Dependent Variable	Institutional Volume			Individual Volume			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0121	0.0246	0.0141	-0.0005	0.0012	-0.0006	0.0126	0.0234	0.0147
	(3.7)	*(7.1)*	*(4.9)*	*(-1.2)*	*(2.6)*	*(-1.4)*	*(3.7)*	*(6.7)*	*(5.0)*
# Observations	15,101	15,101	15,101	15,101	15,101	15,101			

Panel B: Analyst downgrades

Dependent Variable	Institutional Volume			Individual Volume			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0082	0.0186	0.0132	0.0000	0.0024	-0.0002	0.0082	0.0162	0.0134
	(1.6)	*(5.2)*	*(4.8)*	*(0.0)*	*(4.1)*	*(-0.4)*	*(1.7)*	*(4.5)*	*(4.8)*
# Observations	15,907	15,907	15,907	15,907	15,907	15,907			

Table 3: Multivariate regressions of abnormal volumes surrounding analyst recommendation changes

This table presents multivariate analyses of abnormal trading volumes in the days surrounding analyst upgrades (Panel A) and downgrades (Panel B). The dependent variable is abnormal trading volume for institutional (three left columns) or individual (three center columns) traders. Abnormal volume is defined as volume as a percent of NYSE volume on day *t* minus volume as a percent of NYSE volume during the benchmark period (days *t-45* to *t-11* and days *t+11* to *t+45* relative to the day of the analyst recommendation change). *Day 0* is the day the analyst recommendation change is released if before 4:00 pm on a trading day, else the next trading day. *Day -4 to -1* (*Day +1 to +4*) cumulates over day -4 to -1 (+1 to +4). *Firm size* is the log of the firm's market capitalization in the year of the recommendation change; *Book-to-market* is the log of the firm's book-to-market ratio in the year of the recommendation change; *Institutional ownership* is the percentage of shares held by institutions as of the previous quarter-end; *Number of analysts* is the number of analysts covering the stock in the year of the recommendation change; *All-star analyst* is an indicator variable that is equal to one if the analyst making the recommendation change is ranked as an All-star analyst by Institutional Investor in the prior year, else zero; *Concurrent earnings forecast* is an indicator variable that is equal to one if the analyst announces an earnings forecast with the recommendation change, else zero; *Post-Global settlement* is an indicator variable that is equal to one for recommendation changes made on or after September 1, 2002, else zero; *Big broker* is an indicator variable that is equal to one for recommendation changes issued by the 10 largest broker/dealers, else zero. Regressions also include year fixed effects (not reported), and *t*-statistics (in parentheses below parameter estimates) are based on double-clustered standard errors, clustered on stock and date.

Panel A: Analyst upgrades

Dependent Variable	Institutional Volume			Individual Volume			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0630	0.0457	0.0550	-0.0170	-0.0037	-0.0119	0.0800	0.0494	0.0670
	(5.3)	*(3.0)*	*(4.8)*	*(-4.2)*	*(-0.7)*	*(-3.5)*	*(6.0)*	*(3.0)*	*(5.2)*
Firm size	-0.0027	-0.0018	-0.0018	0.0006	-0.0001	0.0004	-0.0032	-0.0016	-0.0021
	(-5.0)	*(-2.7)*	*(-3.4)*	*(3.5)*	*(-0.5)*	*(2.4)*	*(-5.5)*	*(-2.3)*	*(-3.6)*
Book-to-market	0.0010	-0.0012	0.0011	-0.0005	-0.0002	-0.0002	0.0015	-0.0010	0.0013
	(1.2)	*(-1.2)*	*(1.5)*	*(-2.6)*	*(-0.6)*	*(-0.8)*	*(1.7)*	*(-0.9)*	*(1.6)*
Institutional ownership	-0.0050	-0.0036	-0.0074	0.0028	0.0025	0.0017	-0.0078	-0.0061	-0.0090
	(-1.6)	*(-0.9)*	*(-2.0)*	*(2.5)*	*(1.3)*	*(1.6)*	*(-2.2)*	*(-1.4)*	*(-2.1)*
Number of analysts	-0.0001	-0.0006	-0.0004	0.0000	0.0000	0.0000	-0.0001	-0.0006	-0.0004
	(-0.8)	*(-3.6)*	*(-3.3)*	*(0.0)*	*(0.0)*	*(0.0)*	*(-0.8)*	*(-3.5)*	*(-3.2)*
All-star analyst	0.0022	0.0057	0.0030	0.0002	0.0007	-0.0002	0.0020	0.0050	0.0032
	(1.2)	*(2.8)*	*(1.8)*	*(0.4)*	*(1.3)*	*(-0.6)*	*(1.0)*	*(2.3)*	*(1.8)*
Concurrent earnings forecast	0.0050	0.0029	0.0022	0.0007	0.0011	0.0005	0.0043	0.0018	0.0017
	(3.9)	*(2.0)*	*(1.9)*	*(2.0)*	*(2.4)*	*(1.7)*	*(3.1)*	*(1.2)*	*(1.3)*
Post-Global settlement	-0.0004	0.0018	0.0036	0.0012	0.0025	0.0030	-0.0015	-0.0007	0.0006
	(-0.1)	*(0.2)*	*(0.6)*	*(0.5)*	*(1.3)*	*(1.6)*	*(-0.2)*	*(-0.1)*	*(0.1)*
Big broker	-0.0005	0.0095	0.0007	0.0004	0.0014	0.0010	-0.0009	0.0081	-0.0003
	(-0.3)	*(5.5)*	*(0.6)*	*(1.3)*	*(3.4)*	*(3.4)*	*(-0.6)*	*(4.5)*	*(-0.2)*
# Observations	15,101	15,101	15,101	15,101	15,101	15,101			
R^2	0.0304	0.0274	0.0193	0.0110	0.0040	0.0071			
Adj R^2	0.0291	0.0261	0.0181	0.0098	0.0027	0.0058			

Panel B: Analyst downgrades

Dependent Variable	Institutional Volume			Individual Volume			Institutional - Individual Difference		
	(1) Day -4 to -1	(2) Day 0	(3) Day +1 to +4	(4) Day -4 to -1	(5) Day 0	(6) Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0698	0.0333	0.0561	-0.0173	-0.0040	-0.0205	0.0870	0.0374	0.0767
	(5.3)	*(2.2)*	*(5.0)*	*(-4.2)*	*(-0.8)*	*(-3.9)*	*(6.0)*	*(2.2)*	*(5.7)*
Firm Size	-0.0029	-0.0023	-0.0021	0.0007	0.0001	0.0009	-0.0036	-0.0024	-0.0031
	(-5.0)	*(-3.2)*	*(-4.0)*	*(3.1)*	*(0.4)*	*(3.5)*	*(-5.6)*	*(-2.9)*	*(-4.8)*
Book-to-market	0.0006	-0.0022	0.0007	-0.0006	0.0000	-0.0001	0.0012	-0.0022	0.0007
	(0.7)	*(-1.9)*	*(0.8)*	*(-2.4)*	*(0.0)*	*(-0.2)*	*(1.3)*	*(-1.7)*	*(0.7)*
Institutional ownership	-0.0018	0.0075	-0.0064	0.0031	0.0029	0.0057	-0.0049	0.0046	-0.0121
	(-0.5)	*(1.7)*	*(-1.9)*	*(2.1)*	*(1.5)*	*(3.4)*	*(-1.2)*	*(0.9)*	*(-2.9)*
Number of analysts	-0.0003	-0.0010	-0.0006	0.0000	0.0001	0.0001	-0.0004	-0.0011	-0.0007
	(-2.0)	*(-5.7)*	*(-4.4)*	*(0.0)*	*(0.0)*	*(0.0)*	*(-2.2)*	*(-5.9)*	*(-4.8)*
All-star analyst	0.0006	0.0089	0.0026	-0.0002	-0.0004	-0.0003	0.0009	0.0093	0.0029
	(0.3)	*(3.5)*	*(1.5)*	*(-0.6)*	*(-0.6)*	*(-0.7)*	*(0.4)*	*(3.4)*	*(1.5)*
Concurrent earnings forecast	0.0058	0.0092	0.0028	-0.0013	-0.0008	0.0000	0.0071	0.0100	0.0028
	(4.1)	*(5.1)*	*(2.2)*	*(-3.8)*	*(-1.8)*	*(0.1)*	*(4.6)*	*(5.2)*	*(2.0)*
Post-Global settlement	-0.0116	0.0011	0.0042	0.0001	0.0015	0.0001	-0.0116	-0.0005	0.0041
	(-1.7)	*(0.1)*	*(0.8)*	*(0.1)*	*(0.8)*	*(0.0)*	*(-1.7)*	*(0.0)*	*(0.8)*
Big broker	-0.0014	0.0056	-0.0006	-0.0001	0.0003	0.0006	-0.0013	0.0054	-0.0011
	(-0.9)	*(2.7)*	*(-0.4)*	*(-0.4)*	*(0.6)*	*(1.5)*	*(-0.7)*	*(2.4)*	*(-0.7)*
# Observations	15,907	15,907	15,907	15,907	15,907	15,907			
R^2	0.0287	0.0321	0.0243	0.0183	0.0045	0.0191			
Adj R^2	0.0276	0.0309	0.0231	0.0171	0.0033	0.0179			

Table 4: Univariate regressions of abnormal trade imbalance surrounding analyst recommendation changes

This table presents univariate analyses of abnormal trade imbalances in the days surrounding analyst upgrades (Panel A) and downgrades (Panel B). The dependent variable is abnormal trade imbalance for institutional (three left columns) or individual (three center columns) traders. Abnormal imbalance is defined as shares bought minus shares sold as a percent of NYSE volume on day *t* minus shares bought minus shares sold as a percent of NYSE volume during the benchmark period (days *t-45* to *t-11* and days *t+11* to *t+45* relative to the day of the analyst recommendation change). *Day 0* is the day the analyst recommendation change is released if before 4:00 pm on a trading day, else the next trading day. *Day -4 to -1* (*Day +1 to +4*) cumulates over day -4 to -1 (+1 to +4). Regressions include year fixed effects, and *t* -statistics (in parentheses below parameter estimates) are based on double-clustered standard errors, clustered on stock and date.

Panel A: Analyst upgrades

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0065	-0.0123	-0.0009	0.0002	0.0010	0.0004	0.0063	-0.0133	-0.0013
	(2.5)	*(-3.1)*	*(-0.3)*	*(0.3)*	*(1.6)*	*(1.0)*	*(2.4)*	*(-3.2)*	*(-0.4)*
# Observations	15,101	15,101	15,101	15,101	15,101	15,101			

Panel B: Analyst downgrades

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	-0.0011	0.0056	0.0013	-0.0002	0.0009	0.0011	-0.0009	0.0047	0.0001
	(-0.3)	*(1.3)*	*(0.3)*	*(-0.3)*	*(0.8)*	*(1.6)*	*(-0.2)*	*(1.0)*	*(0.0)*
# Observations	15,907	15,907	15,907	15,907	15,907	15,907			

Table 5: Multivariate regressions of abnormal trade imbalances surrounding analyst recommendation changes

This table presents multivariate analyses of abnormal trade imbalances in the days surrounding analyst upgrades (Panel A) and downgrades (Panel B). The dependent variable is abnormal trade imbalance for institutional (three left columns) or individual (three center columns) traders. Abnormal imbalance is defined as shares bought minus shares sold as a percent of NYSE volume on day *t* minus shares bought minus shares sold as a percent of NYSE volume during the benchmark period (days *t-45* to *t-11* and days *t+11* to *t+45* relative to the day of the analyst recommendation change). *Day 0* is the day the analyst recommendation change is released if before 4:00 pm on a trading day, else the next trading day. *Day -4 to -1* (*Day +1 to +4*) cumulates over day -4 to -1 (+1 to +4). *Firm size* is the log of the firm's market capitalization in the year of the recommendation change; *Book-to-market* is the log of the firm's book-to-market ratio in the year of the recommendation change; *Institutional ownership* is the percentage of shares held by institutions as of the previous quarter-end; *Number of analysts* is the number of analysts covering the stock in the year of the recommendation change; *All-star analyst* is an indicator variable that is equal to one if the analyst making the recommendation change is ranked as an All-star analyst by Institutional Investor in the prior year, else zero; *Concurrent earnings forecast* is an indicator variable that is equal to one if the analyst announces an earnings forecast with the recommendation change, else zero; *Post-Global settlement* is an indicator variable that is equal to one for recommendation changes made on or after September 1, 2002, else zero; *Big broker* is an indicator variable that is equal to one for recommendation changes issued by the 10 largest broker/dealers, else zero. Regressions also include year fixed effects, and *t*-statistics (in parentheses below parameter estimates) are based on double-clustered standard errors, clustered on stock and date.

Panel A: Analyst upgrades

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0181	-0.0605	-0.0345	0.0352	0.0153	0.0139	-0.0170	-0.0757	-0.0484
	(1.2)	*(-2.8)*	*(-2.1)*	*(4.9)*	*(1.5)*	*(1.9)*	*(-1.0)*	*(-3.1)*	*(-2.6)*
Firm size	-0.0004	0.0024	0.0004	-0.0014	-0.0003	-0.0005	0.0011	0.0028	0.0009
	(-0.5)	*(2.5)*	*(0.6)*	*(-4.5)*	*(-0.8)*	*(-1.4)*	*(1.3)*	*(2.5)*	*(0.9)*
Book-to-market	0.0001	-0.0025	-0.0031	0.0005	0.0007	0.0003	-0.0004	-0.0032	-0.0033
	(0.1)	*(-1.6)*	*(-2.6)*	*(1.3)*	*(1.1)*	*(0.6)*	*(-0.3)*	*(-1.8)*	*(-2.5)*
Institutional ownership	-0.0003	-0.0065	0.0060	-0.0067	-0.0011	-0.0031	0.0065	-0.0054	0.0091
	(-0.1)	*(-0.9)*	*(1.2)*	*(-2.7)*	*(-0.4)*	*(-1.3)*	*(1.1)*	*(-0.6)*	*(1.5)*
Number of analysts	-0.0001	-0.0005	0.0000	-0.0002	-0.0001	-0.0001	0.0001	-0.0004	0.0001
	(-0.3)	*(-1.9)*	*(-0.1)*	*(0.0)*	*(0.0)*	*(0.0)*	*(0.6)*	*(-1.3)*	*(0.5)*
All-star analyst	0.0035	-0.0007	0.0021	-0.0001	-0.0007	0.0008	0.0035	-0.0001	0.0013
	(1.5)	*(-0.2)*	*(0.9)*	*(-0.1)*	*(-0.7)*	*(1.3)*	*(1.4)*	*(0.0)*	*(0.5)*
Concurrent earnings forecast	-0.0018	-0.0048	-0.0027	-0.0002	-0.0020	-0.0009	-0.0016	-0.0028	-0.0018
	(-1.0)	*(-2.1)*	*(-1.6)*	*(-0.3)*	*(-2.5)*	*(-1.6)*	*(-0.8)*	*(-1.1)*	*(-1.0)*
Post-Global settlement	-0.0038	0.0038	-0.0004	-0.0017	-0.0008	-0.0007	-0.0022	0.0046	0.0002
	(-0.5)	*(0.3)*	*(0.0)*	*(-0.6)*	*(-0.1)*	*(-0.2)*	*(-0.3)*	*(0.3)*	*(0.0)*
Big broker	0.0007	-0.0010	0.0017	-0.0002	0.0010	0.0008	0.0009	-0.0021	0.0008
	(0.4)	*(-0.4)*	*(0.9)*	*(-0.4)*	*(1.4)*	*(1.4)*	*(0.4)*	*(-0.7)*	*(0.4)*
# Observations	15,101	15,101	15,101	15,101	15,101	15,101			
R^2	0.0025	0.0059	0.0064	0.0199	0.0210	0.0044			
Adj R^2	0.0012	0.0047	0.0051	0.0186	0.0197	0.0032			

Panel B: Analyst downgrades

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1) Day -4 to -1	(2) Day 0	(3) Day +1 to +4	(4) Day -4 to -1	(5) Day 0	(6) Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0220	0.0055	0.0020	0.0021	-0.0004	0.0124	0.0199	0.0058	-0.0104
	(1.4)	*(0.2)*	*(0.1)*	*(0.3)*	*(0.0)*	*(1.8)*	*(1.0)*	*(0.2)*	*(-0.6)*
Firm Size	-0.0003	-0.0011	0.0006	0.0000	-0.0005	-0.0006	-0.0003	-0.0007	0.0012
	(-0.4)	*(-1.1)*	*(0.7)*	*(0.0)*	*(-0.8)*	*(-1.9)*	*(-0.4)*	*(-0.5)*	*(1.3)*
Book-to-market	0.0023	-0.0027	0.0003	0.0001	0.0001	0.0002	0.0022	-0.0027	0.0001
	(2.1)	*(-1.4)*	*(0.3)*	*(0.2)*	*(0.1)*	*(0.4)*	*(1.7)*	*(-1.3)*	*(0.1)*
Institutional ownership	-0.0027	-0.0061	-0.0005	0.0009	0.0033	-0.0019	-0.0036	-0.0094	0.0014
	(-0.6)	*(-0.9)*	*(-0.1)*	*(0.4)*	*(1.0)*	*(-0.9)*	*(-0.7)*	*(-1.2)*	*(0.2)*
Number of analysts	0.0002	0.0000	-0.0004	-0.0001	0.0001	-0.0001	0.0003	-0.0002	-0.0003
	(1.3)	*(-0.2)*	*(-2.1)*	*(0.0)*	*(0.0)*	*(0.0)*	*(1.6)*	*(-0.6)*	*(-1.6)*
All-star analyst	0.0005	-0.0048	-0.0005	0.0006	-0.0001	-0.0012	-0.0001	-0.0047	0.0007
	(0.2)	*(-1.4)*	*(-0.2)*	*(0.7)*	*(-0.1)*	*(-1.4)*	*(0.0)*	*(-1.3)*	*(0.3)*
Concurrent earnings forecast	-0.0005	0.0009	0.0010	0.0006	0.0000	0.0020	-0.0012	0.0009	-0.0010
	(-0.3)	*(0.4)*	*(0.5)*	*(0.9)*	*(0.0)*	*(2.9)*	*(-0.5)*	*(0.3)*	*(-0.5)*
Post-Global settlement	0.0001	-0.0009	-0.0033	-0.0022	0.0047	0.0005	0.0024	-0.0055	-0.0038
	(0.0)	*(-0.1)*	*(-0.6)*	*(-1.3)*	*(1.8)*	*(0.2)*	*(0.4)*	*(-0.6)*	*(-0.6)*
Big broker	-0.0011	0.0094	-0.0030	0.0010	0.0002	-0.0001	-0.0021	0.0092	-0.0029
	(-0.6)	*(3.3)*	*(-1.5)*	*(1.4)*	*(0.2)*	*(-0.2)*	*(-1.0)*	*(3.0)*	*(-1.3)*
# Observations	15,907	15,907	15,907	15,907	15,907	15,907			
R^2	0.0033	0.0042	0.0073	0.0019	0.0018	0.0045			
Adj R^2	0.0021	0.0030	0.0061	0.0007	0.0006	0.0033			

Table 6: Regressions of abnormal trade imbalance surrounding analyst recommendation changes on returns

This table presents regression analyses of abnormal trade imbalances in the days surrounding analyst upgrades (Panel A) and downgrades (Panel B). The dependent variable is abnormal trade imbalance for institutional (three left columns) or individual (three center columns) traders. Abnormal imbalance is defined as shares bought minus shares sold as a percent of NYSE volume on day *t* minus shares bought minus shares sold as a percent of NYSE volume during the benchmark period (days *t-45* to *t-11* and days *t+11* to *t+45* relative to the day of the analyst recommendation change). *Day 0* is the day the analyst recommendation change is released if before 4:00 pm on a trading day, else the next trading day. *Day -4 to -1* (*Day +1 to +4*) cumulates over day -4 to -1 (+1 to +4). *Return day -4 to -1* is the cumulative abnormal return for the stock from four days to one day before the analyst recommendation change; *Return day 0* is the abnormal return for the stock on the day of the analyst recommendation change; *Return day +1 to +4* is the cumulative abnormal return for the stock from one day to four days after the analyst recommendation change; *Return day +5 to +64* is the cumulative abnormal return for the stock from five to 64 trading days (3 months) after the analyst recommendation change. Regressions also include year fixed effects, and *t* -statistics (in parentheses below parameter estimates) are based on double-clustered standard errors, clustered on stock and date.

Panel A: Analyst upgrades

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0058	-0.0125	-0.0017	-0.0004	0.0009	0.0009	0.0062	0.0062	-0.0026
	(2.2)	*(-3.2)*	*(-0.5)*	*(-0.6)*	*(1.5)*	*(1.7)*	*(2.3)*	*(2.3)*	*(-0.8)*
Return day -4 to -1		0.0454	0.0290		-0.0427	-0.0322		0.0179	0.0613
		(3.0)	*(2.3)*		*(-5.9)*	*(-6.1)*		*(0.9)*	*(3.9)*
Return day 0	0.0317		0.0348	0.0132		-0.0259	0.0179		0.0608
	(2.1)		*(1.8)*	*(2.0)*		*(-2.8)*	*(0.9)*		*(2.5)*
Return day +1 to +4	0.0196	0.0144		0.0140	0.0170		0.0056	0.0056	
	(1.4)	*(0.8)*		*(2.2)*	*(2.1)*		*(0.3)*	*(0.3)*	
Return day +5 to +64	0.0002	-0.0015	0.0006	0.0080	0.0049	0.0041	-0.0078	-0.0078	-0.0034
	(0.0)	*(-0.3)*	*(0.2)*	*(4.9)*	*(2.4)*	*(2.8)*	*(-1.9)*	*(-1.9)*	*(-0.8)*
# Observations	15,101	15,101	15,101	15,101	15,101	15,101			
R^2	0.0022	0.0045	0.0070	0.0096	0.0068	0.0098			
Adj R^2	0.0012	0.0036	0.0061	0.0086	0.0059	0.0088			

Panel B: Analyst downgrades

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1) Day -4 to -1	(2) Day 0	(3) Day +1 to +4	(4) Day -4 to -1	(5) Day 0	(6) Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	-0.0011	0.0052	0.0016	0.0000	0.0014	0.0009	-0.0011	0.0038	0.0007
	(-0.3)	*(1.2)*	*(0.4)*	*(0.0)*	*(1.2)*	*(1.1)*	*(-0.3)*	*(0.8)*	*(0.2)*
Return day -4 to -1		0.0386	0.0311		-0.0428	-0.0425		0.0814	0.0736
		(2.7)	*(3.2)*		*(-4.6)*	*(-6.7)*		*(3.9)*	*(5.6)*
Return day 0	0.0089		0.0648	0.0172		-0.0535	-0.0083		0.1183
	(0.5)		*(3.7)*	*(2.4)*		*(-7.0)*	*(-0.4)*		*(5.4)*
Return day +1 to +4	-0.0032	0.0312		0.0217	0.0235		-0.0250	0.0078	
	(-0.3)	*(1.5)*		*(3.2)*	*(1.8)*		*(-1.6)*	*(0.3)*	
Return day +5 to +64	0.0069	0.0019	0.0000	0.0057	0.0073	0.0086	0.0012	-0.0054	-0.0085
	(1.6)	*(0.3)*	*(0.0)*	*(3.8)*	*(1.9)*	*(4.8)*	*(0.3)*	*(-0.6)*	*(-1.6)*
# Observations	15,907	15,907	15,907	15,907	15,907	15,907			
R^2	0.0034	0.0056	0.0091	0.0044	0.0082	0.0239			
Adj R^2	0.0025	0.0047	0.0083	0.0035	0.0074	0.0230			

Table 7: Univariate regressions of abnormal volume surrounding placebo dates

This table presents univariate analyses of abnormal trading volumes in the days surrounding placebo positive-return days (Panel A) and negative-return days (Panel B). The dependent variable is abnormal trading volume for institutional (three left columns) or individual (three center columns) traders. Abnormal volume is defined as volume as a percent of NYSE volume on day *t* minus volume as a percent of NYSE volume during the benchmark period (days *t-45* to *t-11* and days *t+11* to *t+45* relative to the placebo day). *Day 0* is the placebo day. *Day -4 to -1* (*Day +1 to +4*) cumulates over day -4 to -1 (+1 to +4). Regressions include year fixed effects (coefficients not reported). *t* -statistics (in parentheses below parameter estimates) are based on double-clustered standard errors, clustered on stock and date.

Panel A: Placebo positive-return days

Dependent Variable	Institutional Volume			Individual Volume			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0058	0.0135	0.0096	-0.0007	0.0003	-0.0002	0.0065	0.0133	0.0099
	(1.5)	*(2.9)*	*(2.5)*	*(-1.6)*	*(0.5)*	*(-0.5)*	*(1.7)*	*(2.7)*	*(2.5)*
# Observations	15,101	15,101	15,101	15,101	15,101	15,101			
	Actual - Placebo Difference								
Actual - Placebo	0.0063	0.0111	0.0045	0.0003	0.0009	-0.0003			
	(1.9)	*(2.2)*	*(1.1)*	*(0.5)*	*(1.6)*	*(-0.7)*			

Panel B: Placebo negative-return days

Dependent Variable	Institutional Volume			Individual Volume			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0070	0.0025	0.0097	-0.0007	0.0012	0.0003	0.0078	0.0013	0.0094
	(1.9)	*(0.5)*	*(2.8)*	*(-1.4)*	*(1.9)*	*(0.5)*	*(2.0)*	*(0.2)*	*(2.6)*
# Observations	15,907	15,907	15,907	15,907	15,907	15,907			
	Actual - Placebo Difference								
Actual - Placebo	0.0012	0.0161	0.0036	0.0007	0.0012	-0.0004			
	(0.3)	*(3.5)*	*(1.0)*	*(1.4)*	*(1.3)*	*(-0.7)*			

Table 8: Univariate regressions of abnormal trade imbalance surrounding placebo dates

This table presents univariate analyses of abnormal trade imbalances in the days surrounding placebo positive-return days (Panel A) and negative-return days (Panel B). The dependent variable is abnormal trading volume for institutional (three left columns) or individual (three center columns) traders. Abnormal volume is defined as volume as a percent of NYSE volume on day *t* minus volume as a percent of NYSE volume during the benchmark period (days *t-45* to *t-11* and days *t+11* to *t+45* relative to the placebo day). *Day 0* is the placebo day. *Day -4 to -1* (*Day +1 to +4*) cumulates over day -4 to -1 (+1 to +4). Regressions include year fixed effects (coefficients not reported). *t* -statistics (in parentheses below parameter estimates) are based on double-clustered standard errors, clustered on stock and date.

Panel A: Placebo positive-return days

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0045	0.0168	0.0058	-0.0001	-0.0022	0.0000	0.0045	0.0190	0.0058
	(1.1)	*(2.8)*	*(1.6)*	*(-0.1)*	*(-2.3)*	*(0.0)*	*(1.1)*	*(3.0)*	*(1.6)*
# Observations	15,101	15,101	15,101	15,101	15,101	15,101			
	Actual - Placebo Difference								
Actual - Placebo	0.0021	-0.0291	-0.0067	0.0003	0.0032	0.0004			
	(0.5)	*(-4.9)*	*(-1.5)*	*(0.4)*	*(2.8)*	*(0.6)*			

Panel B: Placebo negative-return days

Dependent Variable	Institutional Trade Imbalance			Individual Trade Imbalance			Institutional - Individual Difference		
	(1)	(2)	(3)	(4)	(5)	(6)			
	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4	Day -4 to -1	Day 0	Day +1 to +4
Intercept	0.0084	-0.0128	-0.0022	-0.0004	0.0014	0.0014	0.0089	-0.0143	-0.0036
	(1.9)	*(-2.4)*	*(-0.6)*	*(-0.6)*	*(1.1)*	*(2.5)*	*(2.0)*	*(-2.5)*	*(-0.9)*
# Observations	15,907	15,907	15,907	15,907	15,907	15,907			
	Actual - Placebo Difference								
Actual - Placebo	-0.0095	0.0185	0.0035	0.0003	-0.0005	-0.0003			
	(-1.5)	*(2.8)*	*(0.8)*	*(0.3)*	*(-0.3)*	*(-0.3)*			

Figure 1: Volume surrounding analyst upgrades

Daily *Raw Trading Volume* for each stock is defined as trader-type volume divided by total NYSE volume for each stock each day. Daily *Abnormal Trading Volume* for each stock is equal to Raw Trading Volume minus trader-type Benchmark Trading Volume, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict averages across 15,101 analyst upgrades from March 10, 1999 to April 22, 2010.

Figure 1-A: Upgrades -45 days to +45 days

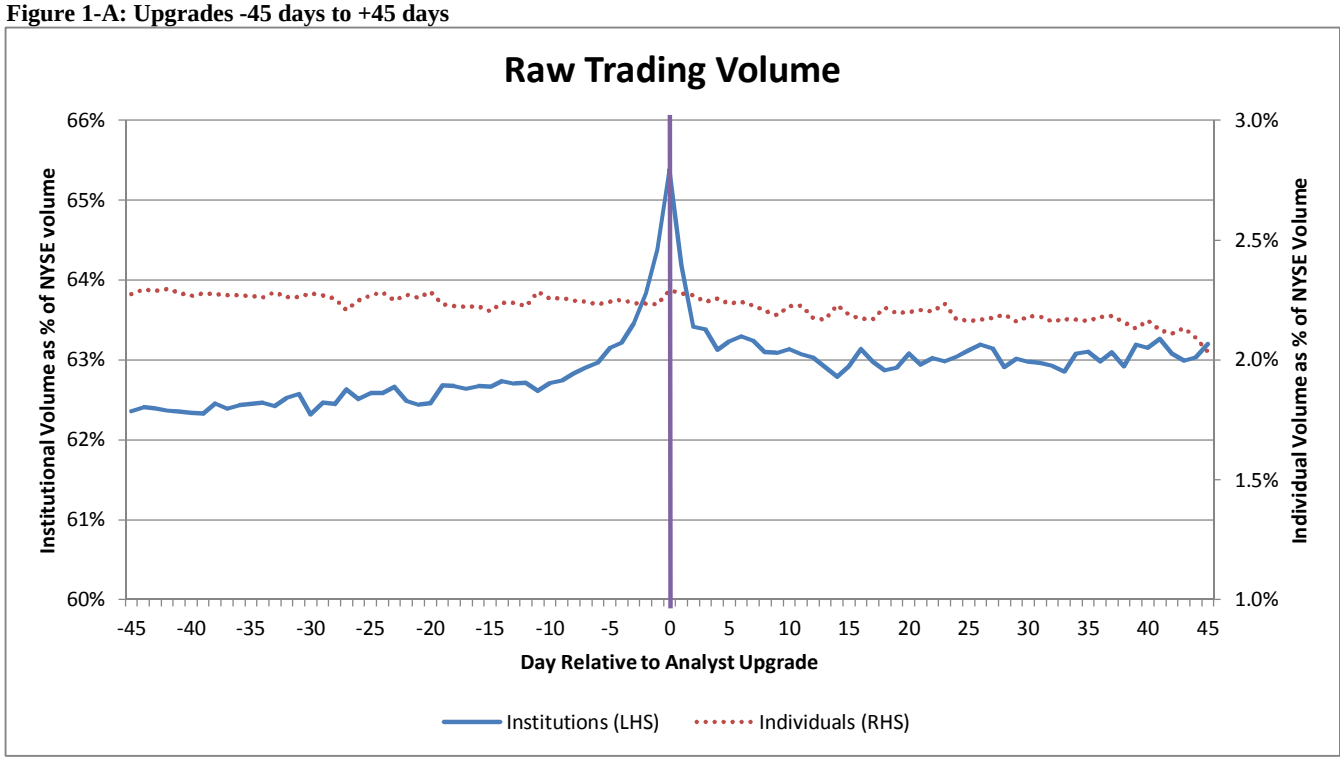


Figure 1-B: Upgrades -5 days to +5 days

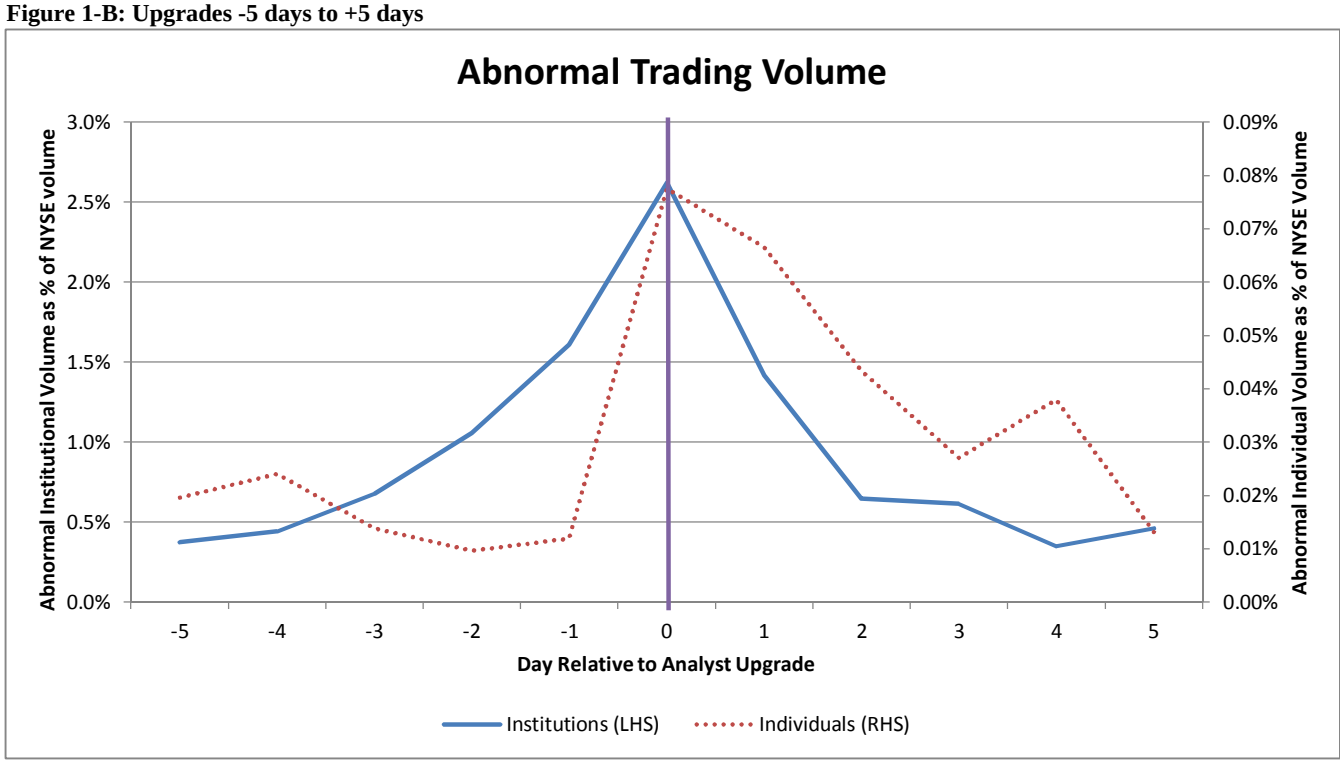


Figure 2: Volume surrounding analyst downgrades

Daily *Raw Trading Volume* for each stock is defined as trader-type volume divided by total NYSE volume for each stock each day. Daily *Abnormal Trading Volume* for each stock is equal to Raw Trading Volume minus trader-type Benchmark Trading Volume, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict averages across 15,907 analyst downgrades from March 10, 1999 to April 22, 2010.

Figure 2-A: Downgrades -45 days to +45 days

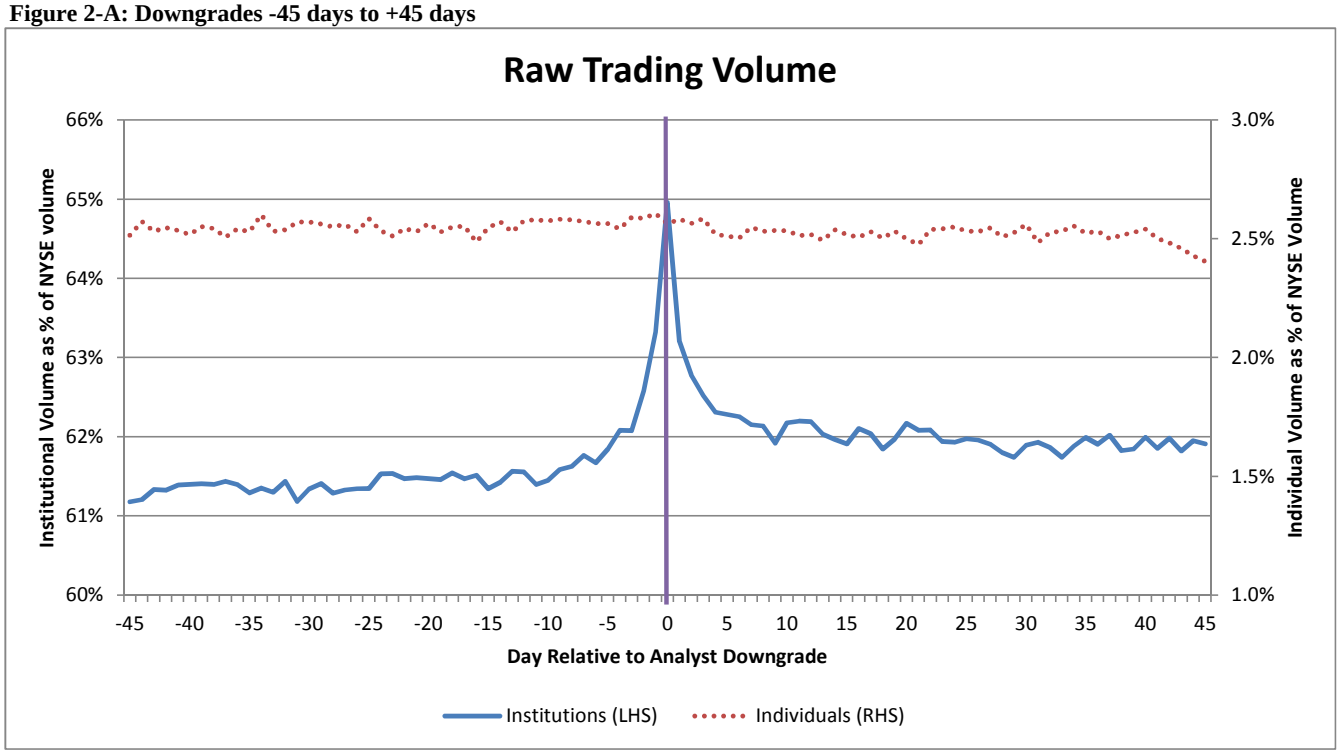


Figure 2-B: Downgrades -5 days to +5 days

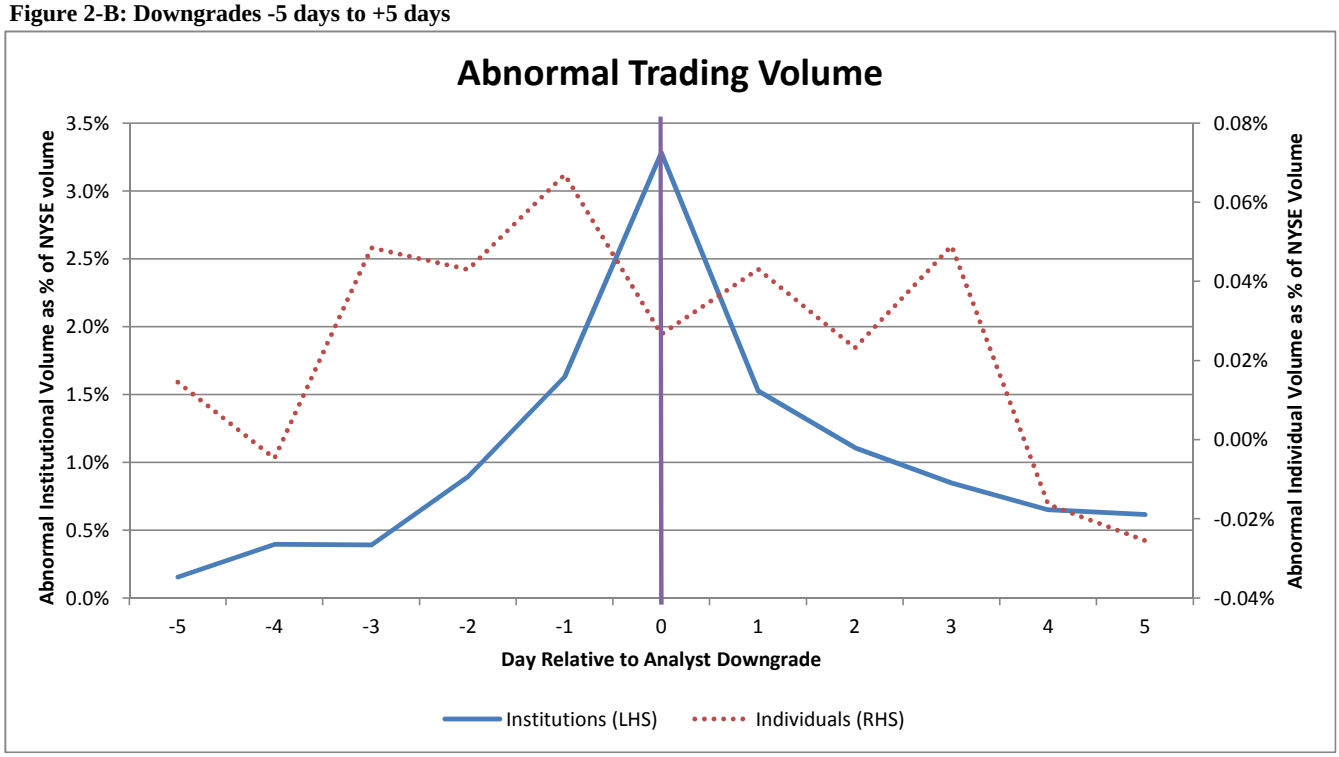


Figure 3: Imbalance surrounding analyst upgrades

Daily *Raw Trade Imbalance* for each stock is defined as trader-type buy minus sell imbalance divided by total NYSE volume for each stock each day. Daily *Abnormal Trade Imbalance* for each stock is equal to Raw Trade Imbalance minus trader-type Benchmark Trade Imbalance, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict averages across 15,101 analyst upgrades from March 10, 1999 to April 22, 2010.

Figure 3-A: Upgrades -45 days to +45 days

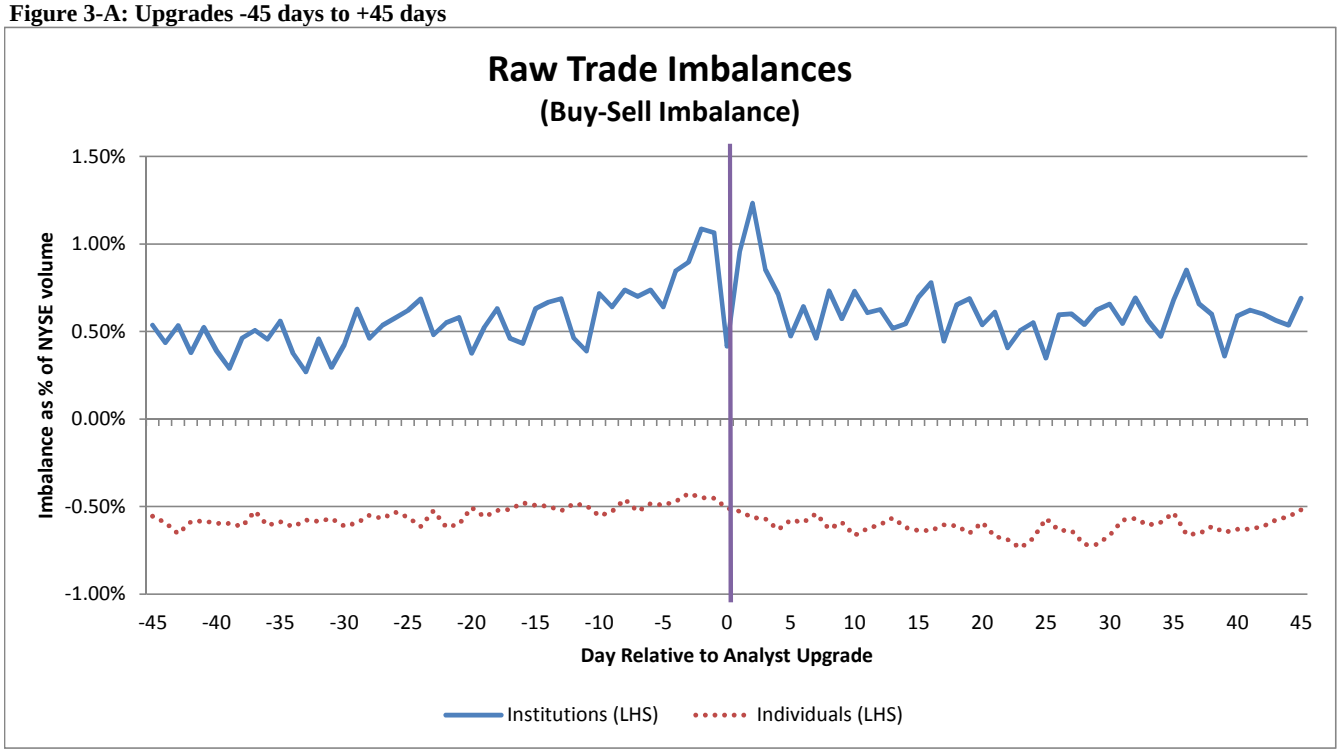


Figure 3-B: Upgrades -5 days to +5 days

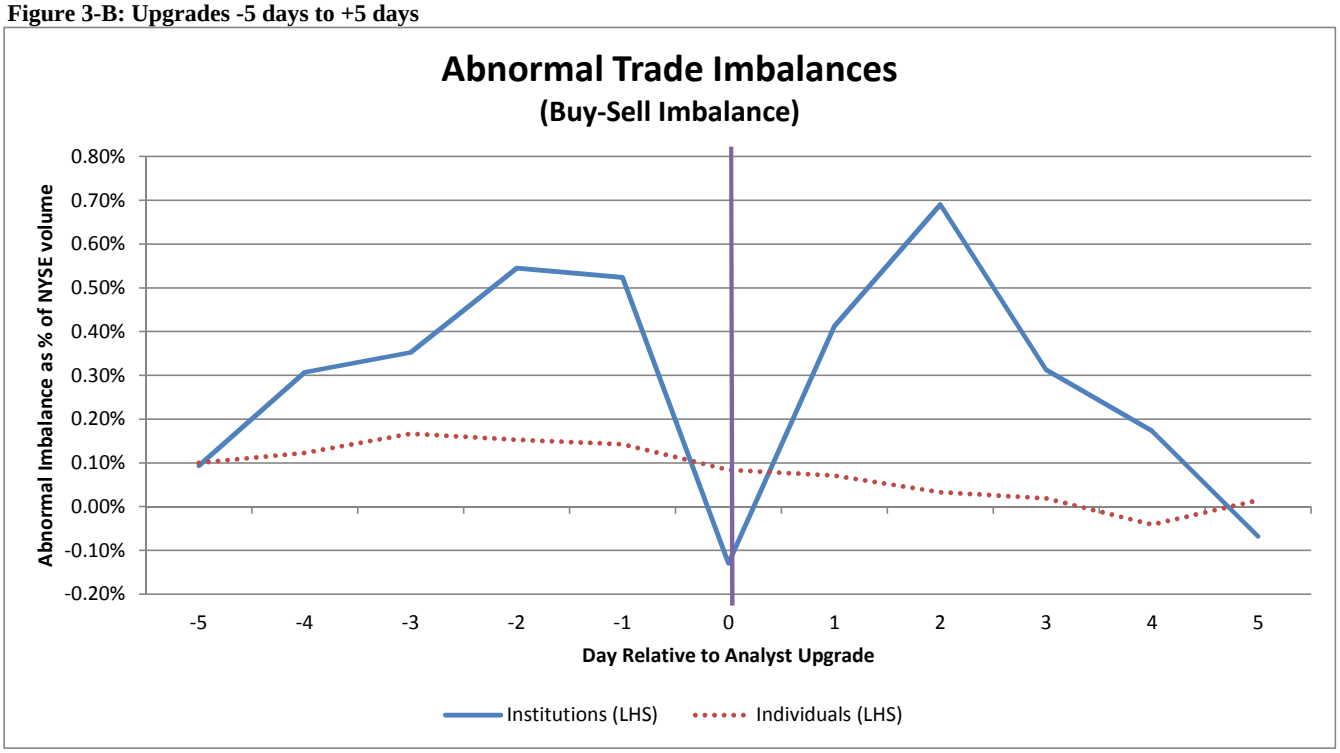


Figure 4: Imbalance surrounding analyst downgrades

Daily *Raw Trade Imbalance* for each stock is defined as trader-type buy minus sell imbalance divided by total NYSE volume for each stock each day. Daily *Abnormal Trade Imbalance* for each stock is equal to Raw Trade Imbalance minus trader-type Benchmark Trade Imbalance, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict averages across 15,907 analyst downgrades from March 10, 1999 to April 22, 2010.

Figure 4-A: Downgrades -45 days to +45 days

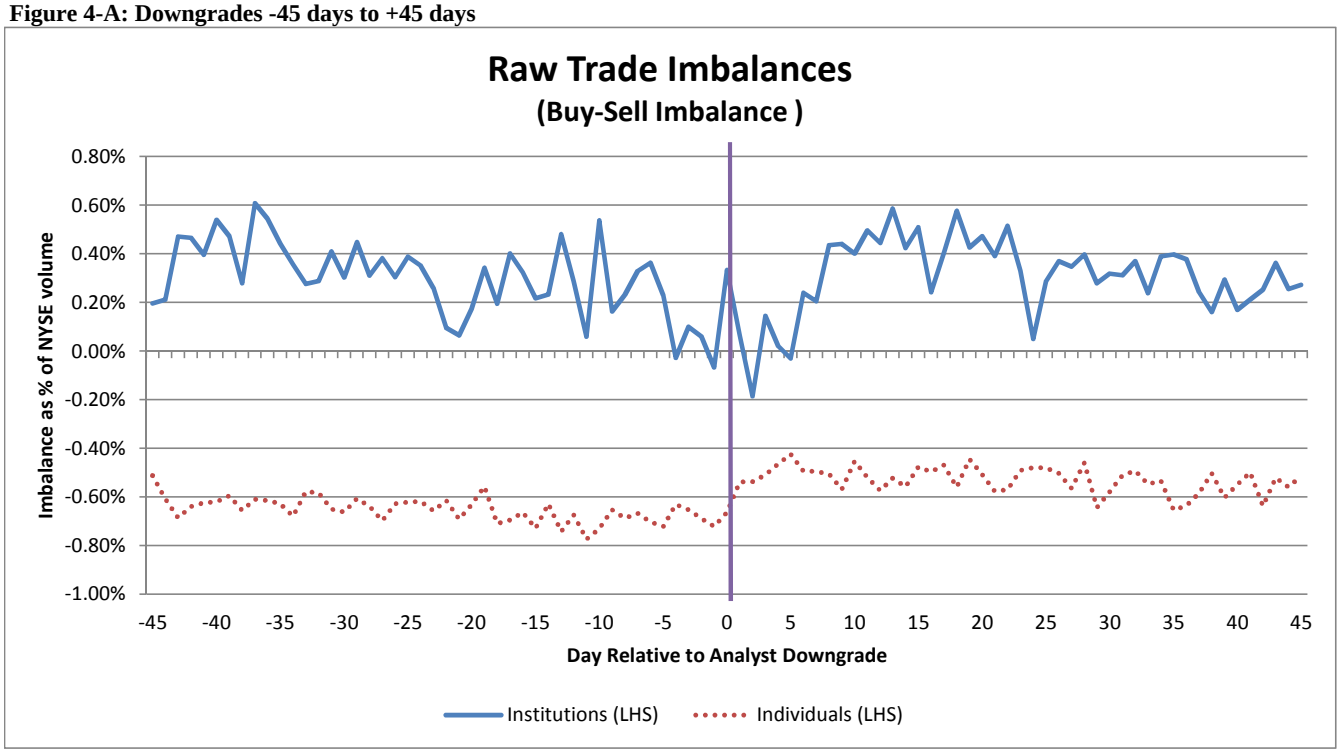


Figure 4-B: Downgrades -5 days to +5 days

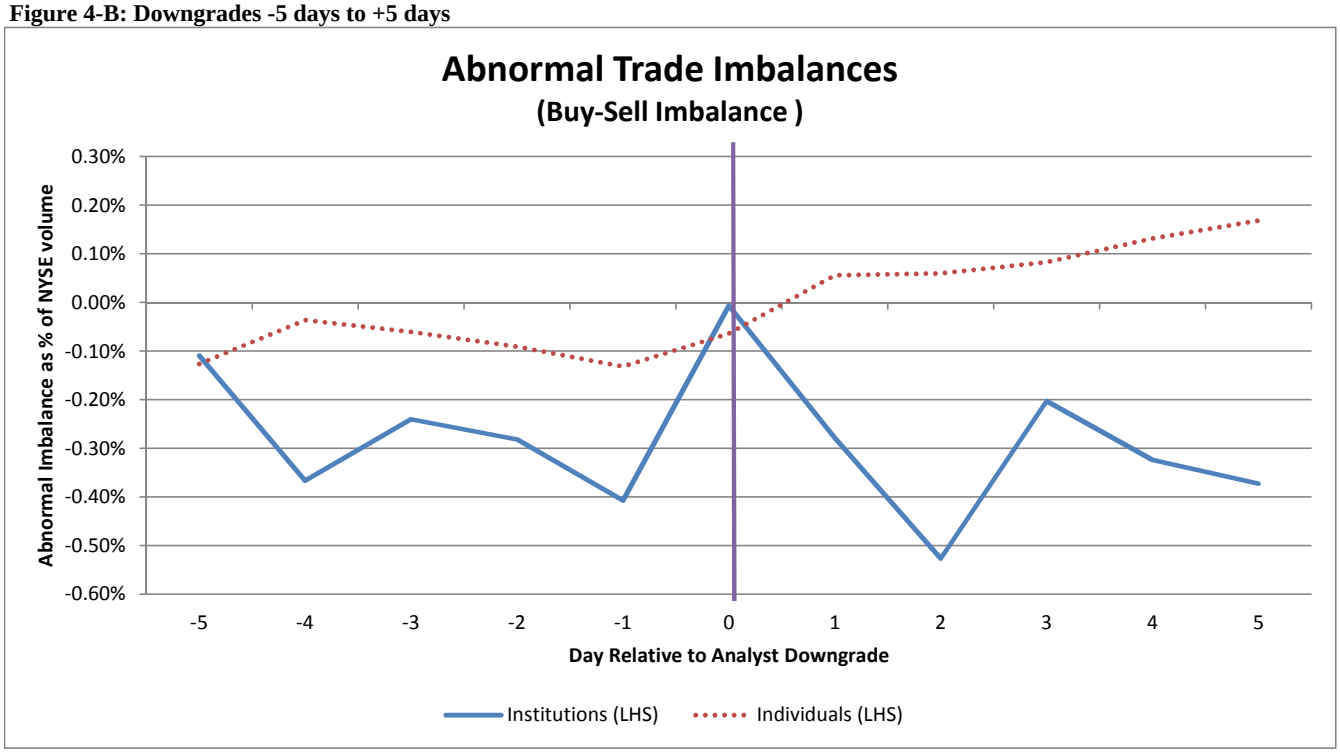


Figure 5: Imbalances versus returns surrounding analyst upgrades

Daily Raw Trade Imbalance for each stock is defined as trader-type buy minus sell imbalance divided by total NYSE volume for each stock each day. Daily *Abnormal Trade Imbalance* for each stock is equal to Raw Trade Imbalance minus trader-type Benchmark Trade Imbalance, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict average abnormal returns across 15,101 analyst upgrades from March 10, 1999 to April 22, 2010 and abnormal imbalances across upgrades with above-median announcement-day abnormal returns (*High*) and across upgrades with below-median announcement-day abnormal returns (*Low*).

Figure 5-A: Institutional imbalances surrounding Upgrades

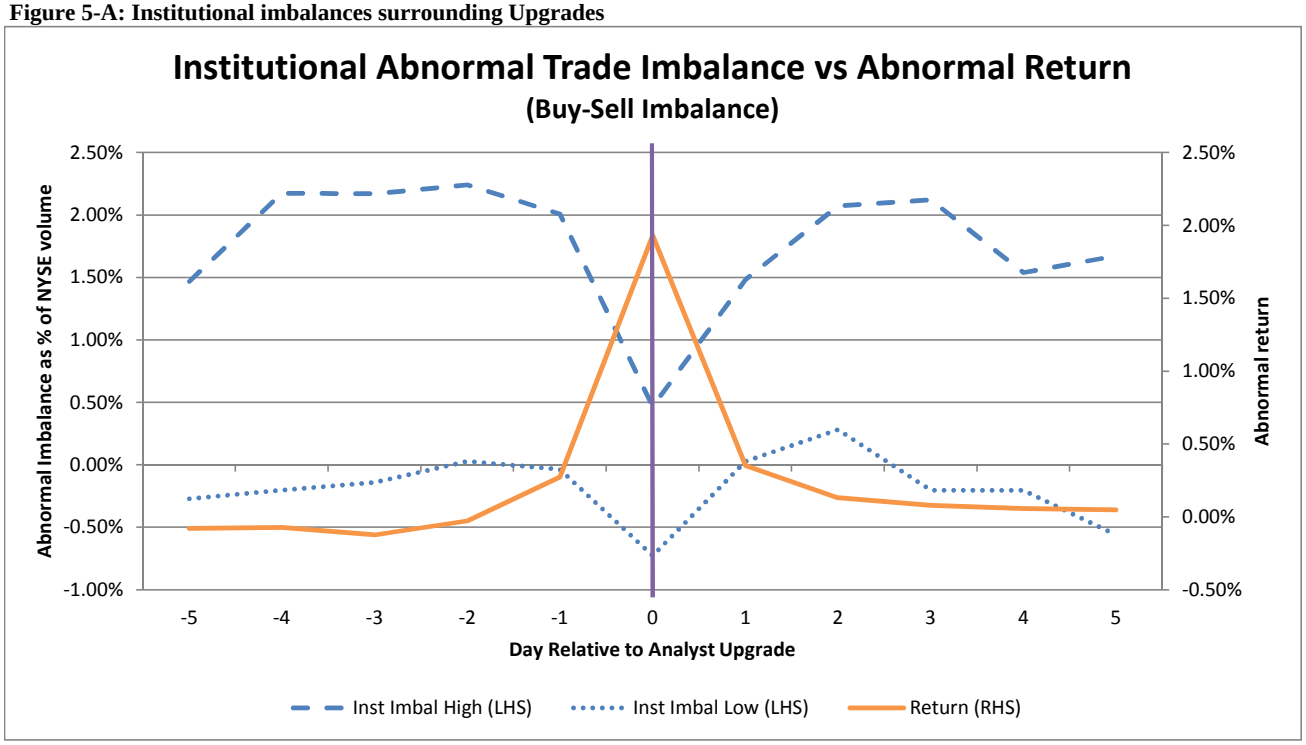


Figure 5-B: Individual imbalances surrounding Upgrades

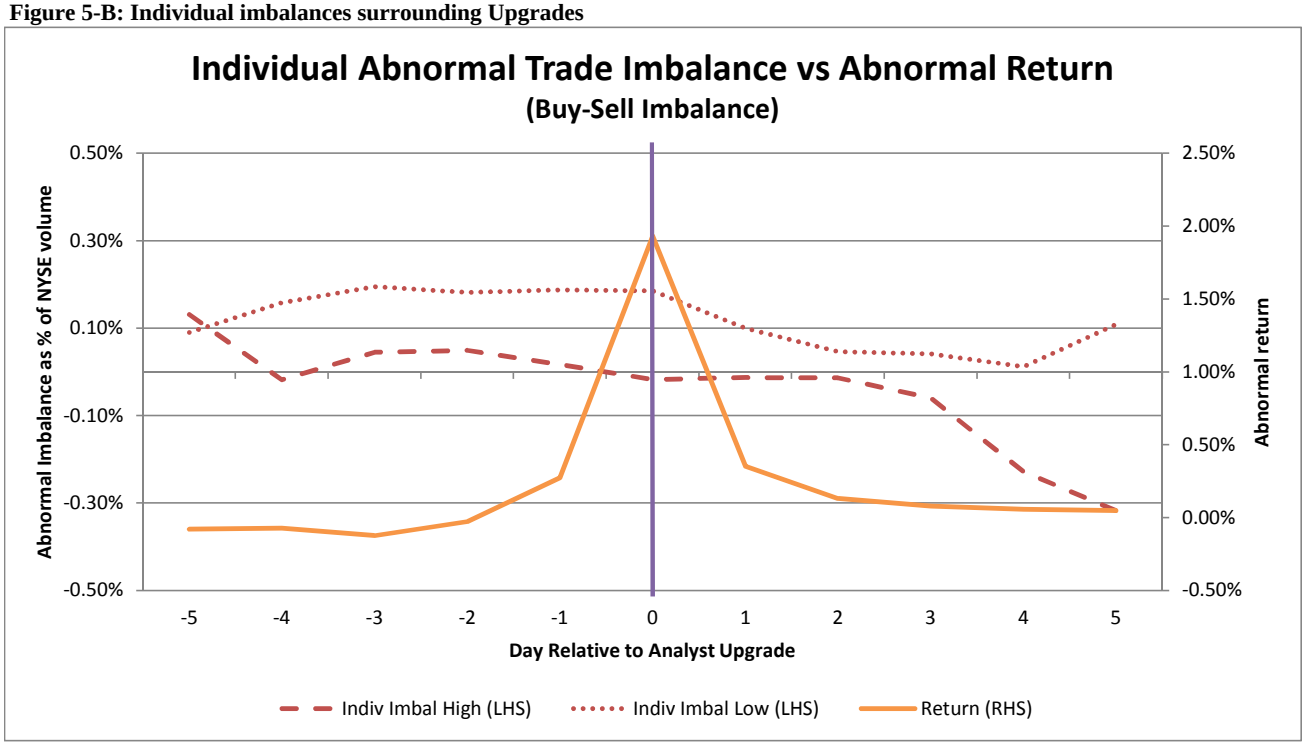


Figure 6: Imbalances versus returns surrounding analyst downgrades

Daily Raw Trade Imbalance for each stock is defined as trader-type buy minus sell imbalance divided by total NYSE volume for each stock each day. Daily *Abnormal Trade Imbalance* for each stock is equal to Raw Trade Imbalance minus trader-type Benchmark Trade Imbalance, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict average abnormal returns across 15,907 analyst downgrades from March 10, 1999 to April 22, 2010 and abnormal imbalances across downgrades with above-median announcement-day abnormal returns (*High*) and across downgrades with below-median announcement-day abnormal returns (*Low*).

Figure 6-A: Institutional imbalances surrounding Downgrades

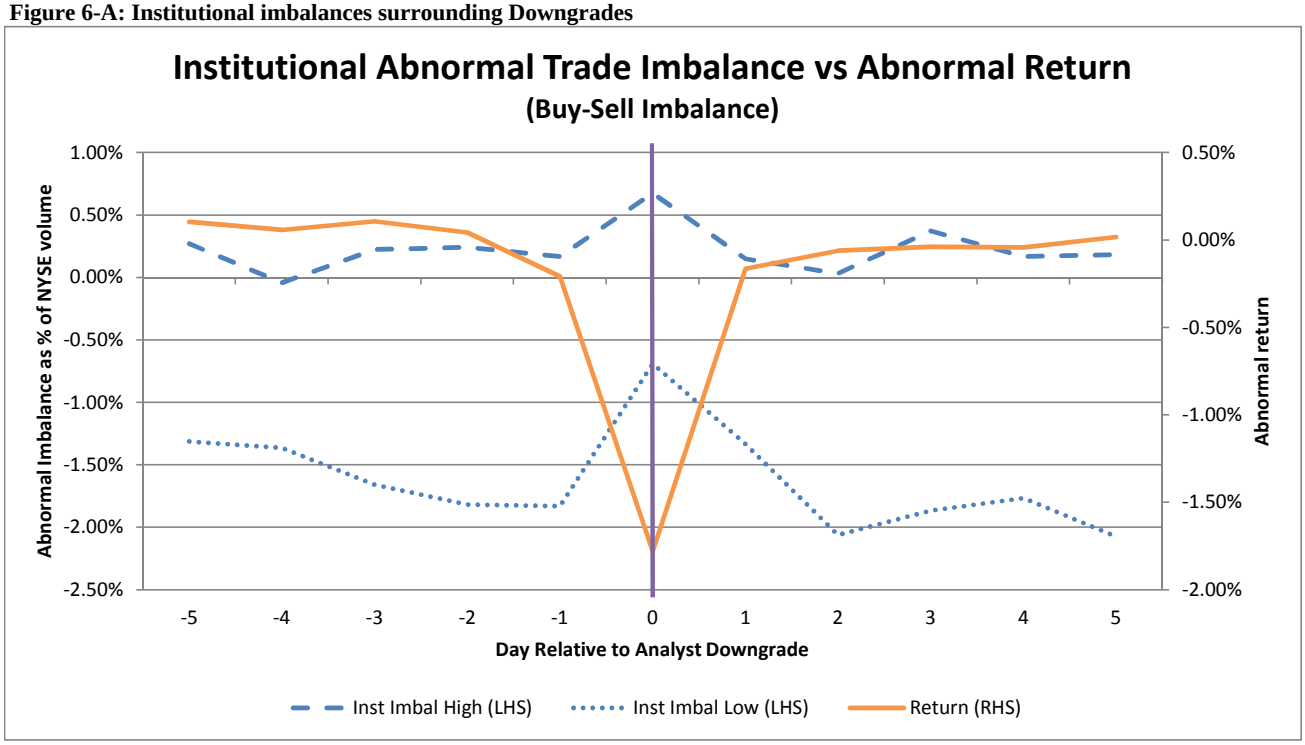


Figure 6-B: Individual imbalances surrounding Downgrades

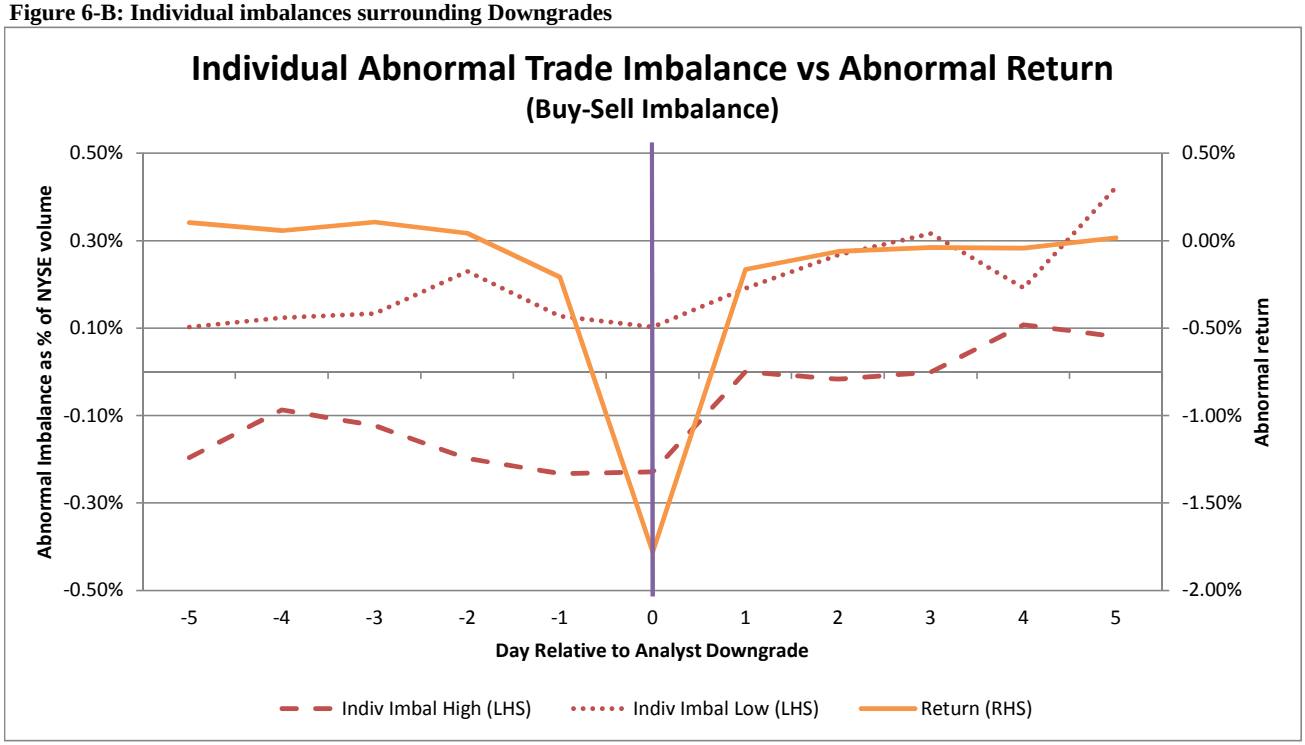


Figure 7: Imbalances versus long-term returns surrounding analyst upgrades

Daily Raw Trade Imbalance for each stock is defined as trader-type buy minus sell imbalance divided by total NYSE volume for each stock each day. Daily *Abnormal Trade Imbalance* for each stock is equal to Raw Trade Imbalance minus trader-type Benchmark Trade Imbalance, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict average abnormal returns across 15,101 analyst upgrades from March 10, 1999 to April 22, 2010 and abnormal imbalances across upgrades with above-median day t+5 to day t+64 abnormal returns (*High*) and across upgrades with below-median day t+5 to day t+64 abnormal returns (*Low*).

Figure A: Institutional imbalances surrounding Upgrades

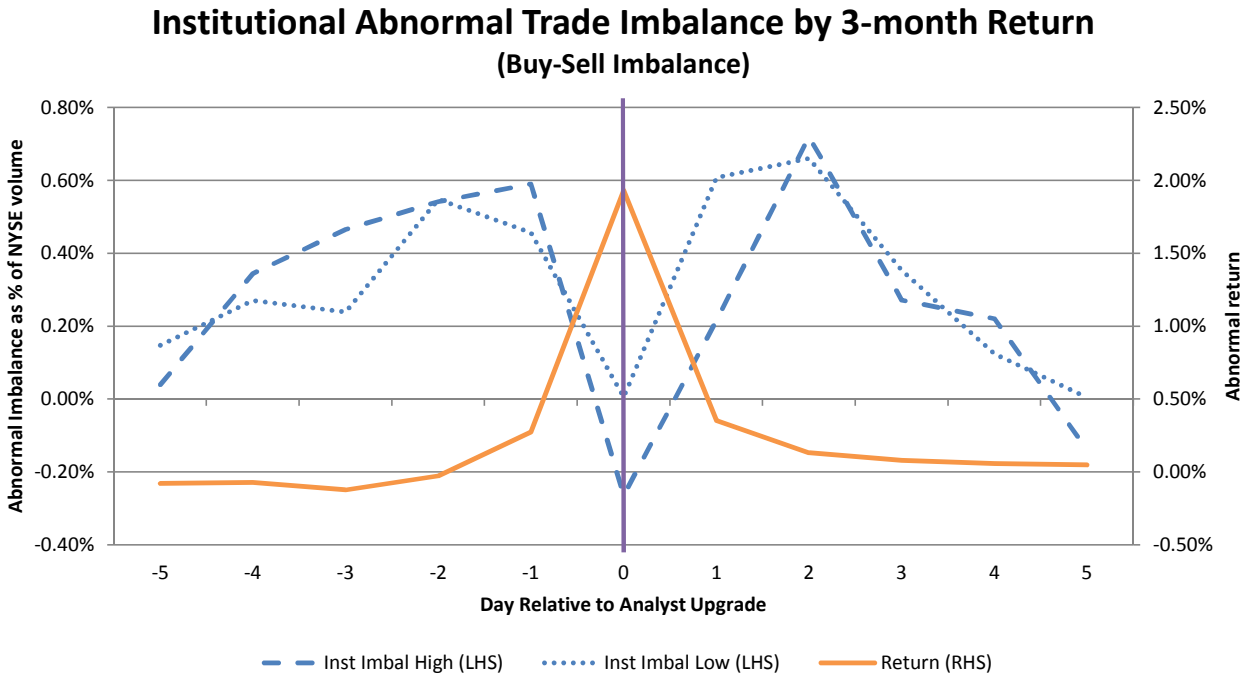


Figure B: Individual imbalances surrounding Upgrades

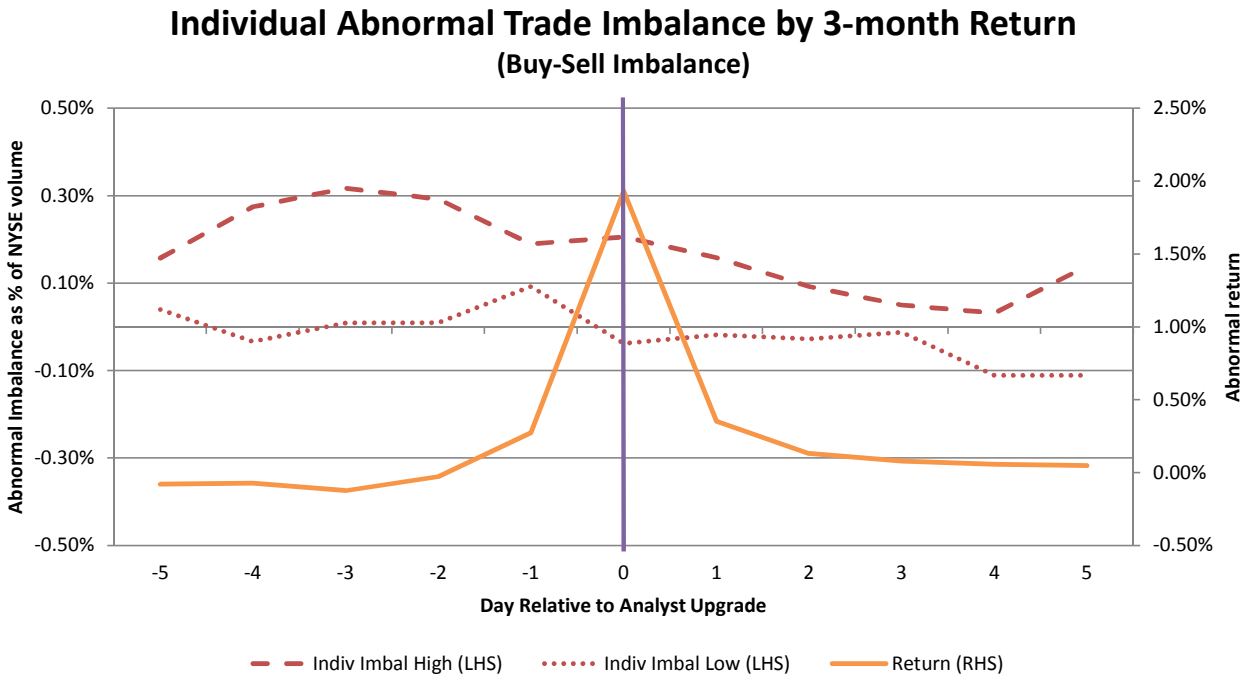


Figure 8: Imbalances versus long-term returns surrounding analyst downgrades

Daily Raw Trade Imbalance for each stock is defined as trader-type buy minus sell imbalance divided by total NYSE volume for each stock each day. Daily *Abnormal Trade Imbalance* for each stock is equal to Raw Trade Imbalance minus trader-type Benchmark Trade Imbalance, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change. Graphs depict average abnormal returns across 15,907 analyst downgrades from March 10, 1999 to April 22, 2010 and abnormal imbalances across upgrades with above-median day t+5 to day t+64 abnormal returns (*High*) and across upgrades with below-median day t+5 to day t+64 abnormal returns (*Low*).

Figure A: Institutional imbalances surrounding Downgrades

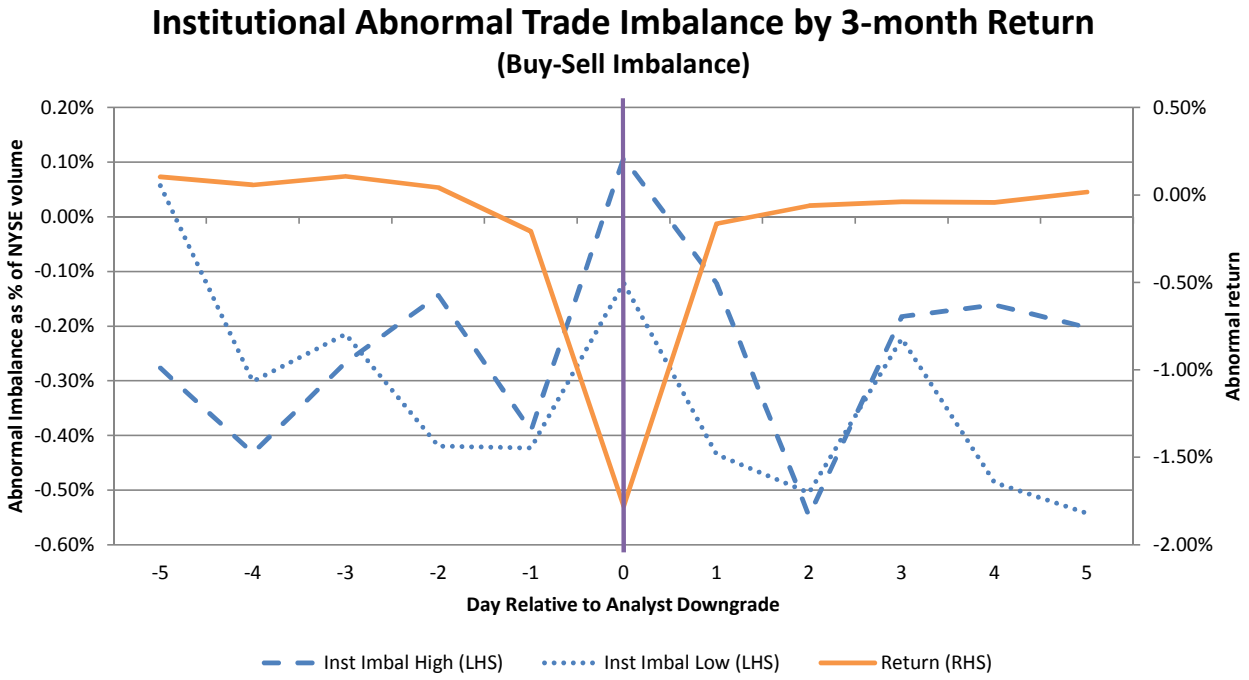


Figure B: Individual imbalances surrounding Downgrades

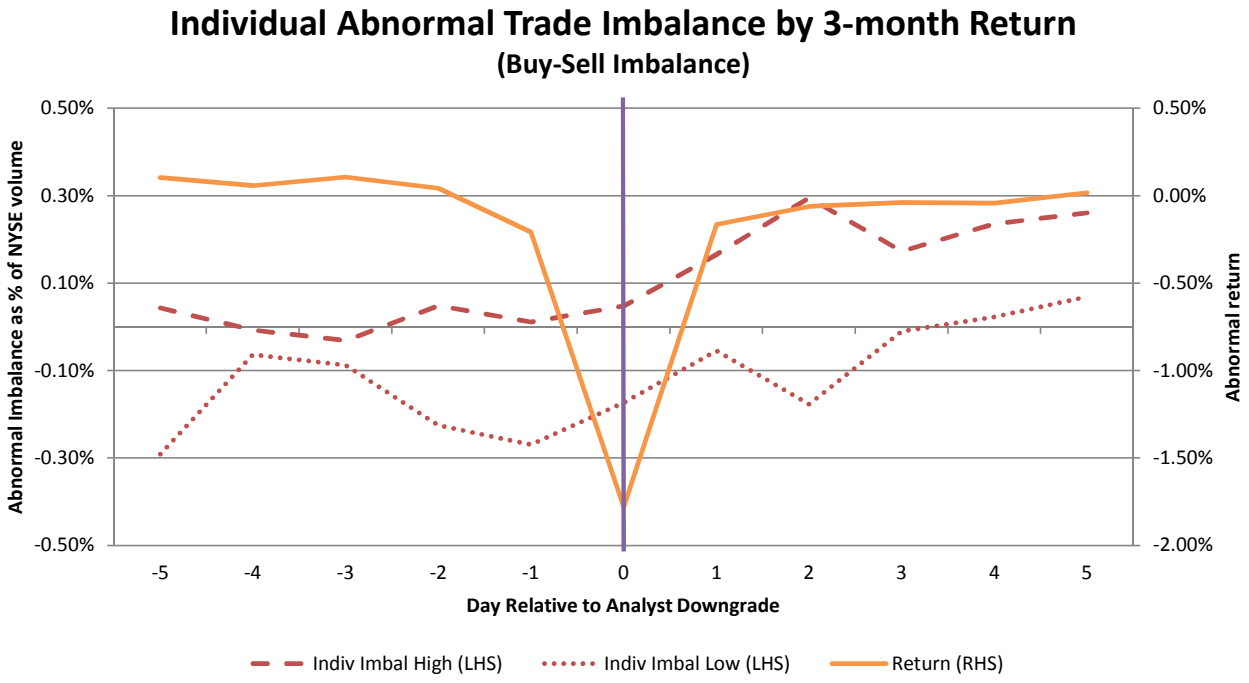
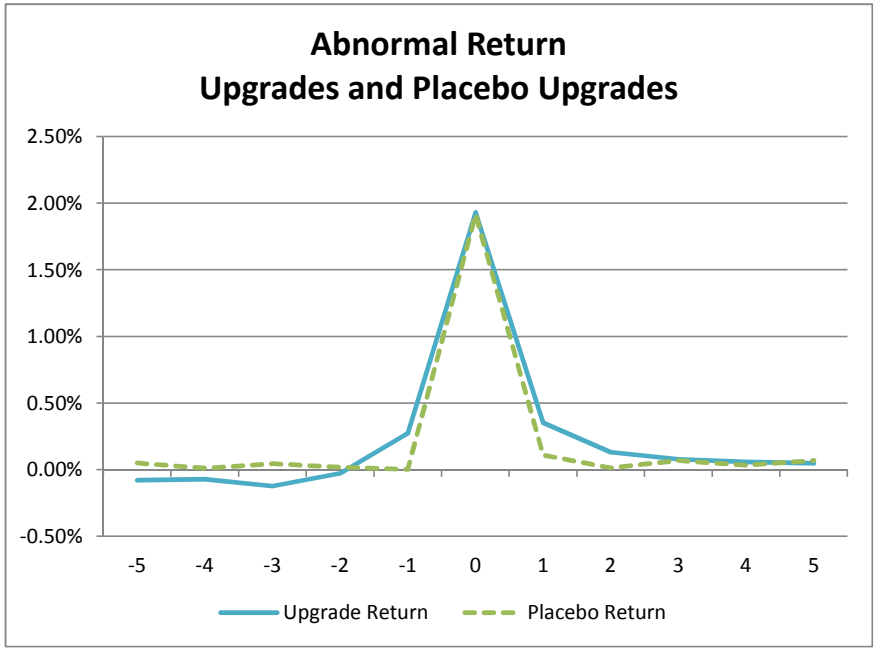


Figure 9: Abnormal returns surrounding analyst recommendation changes and placebo events

Graphs depict average abnormal returns across 15,101 analyst upgrades and placebo upgrades (left graph) and 5,907 analyst downgrades and placebo downgrades (right graph) from March 10, 1999 to April 22, 2010. For each analyst recommendation change, the placebo event is defined as the stock/day combination on which the same stock has the closest abnormal return to the stock's abnormal return on the day of the analyst recommendation change. Days within *t-4* to *t+4* of analyst recommendation changes are excluded, and placebo events are chosen without replacement.



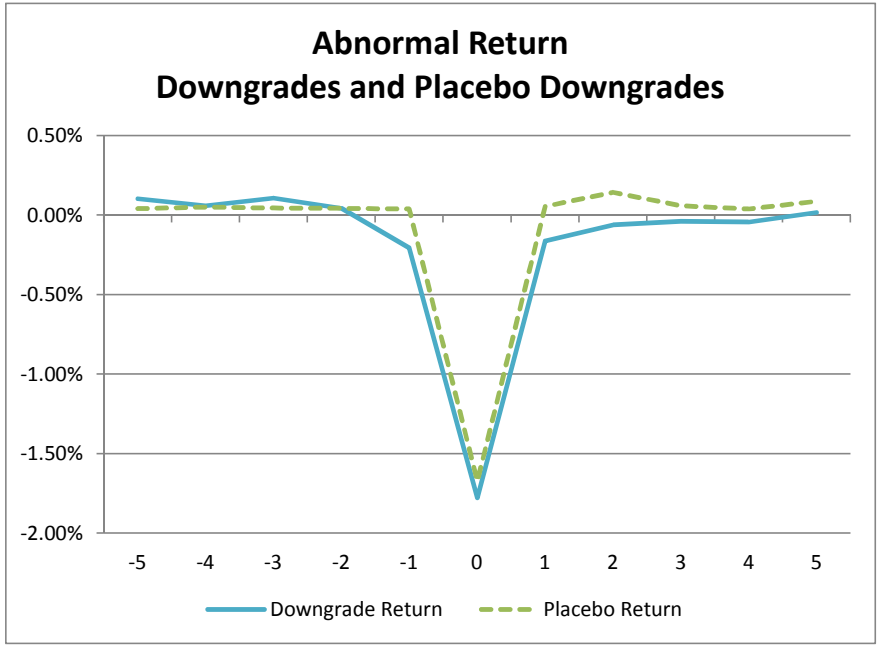
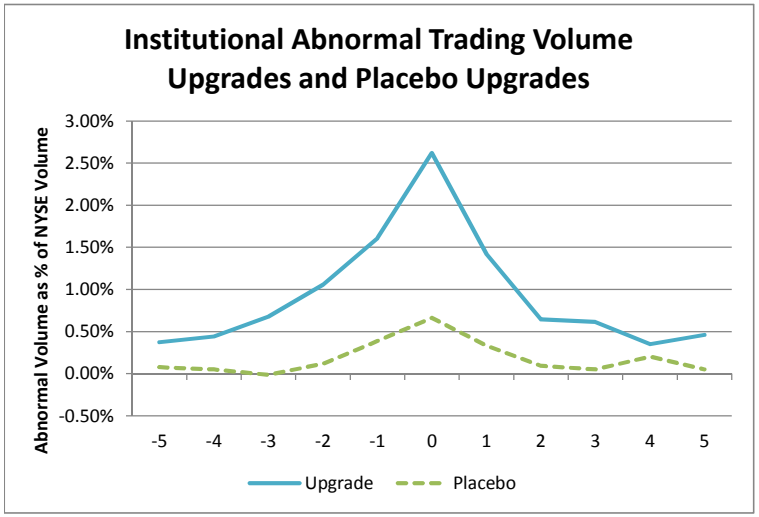
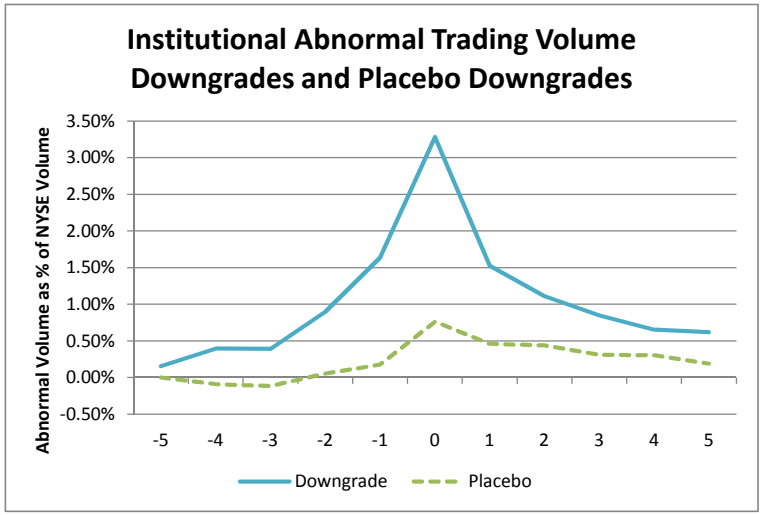
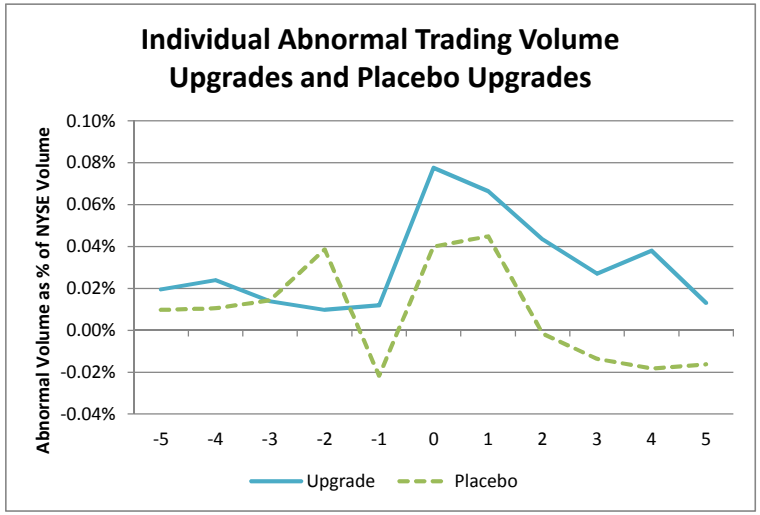


Figure 10: Abnormal trading volume surrounding analyst recommendation changes and placebo events

Graphs depict average *Abnormal Trading Volume* for institutional investors (top graphs) and individual investors (bottom graphs) across 15,101 analyst upgrades and placebo upgrades (left graphs) and 5,907 analyst downgrades and placebo downgrades (right graphs) from March 10, 1999 to April 22, 2010. For each analyst recommendation change, the placebo event is defined as the stock/day combination on which the same stock has the closest abnormal return to the stock's abnormal return on the day of the analyst recommendation change. Dates within *t-4* to *t+4* of analyst recommendation changes are excluded, and placebo events are chosen without replacement. Daily *Abnormal Trading Volume* for each stock is equal to Raw Trading Volume minus trader-type Benchmark Trading Volume, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change or placebo event.







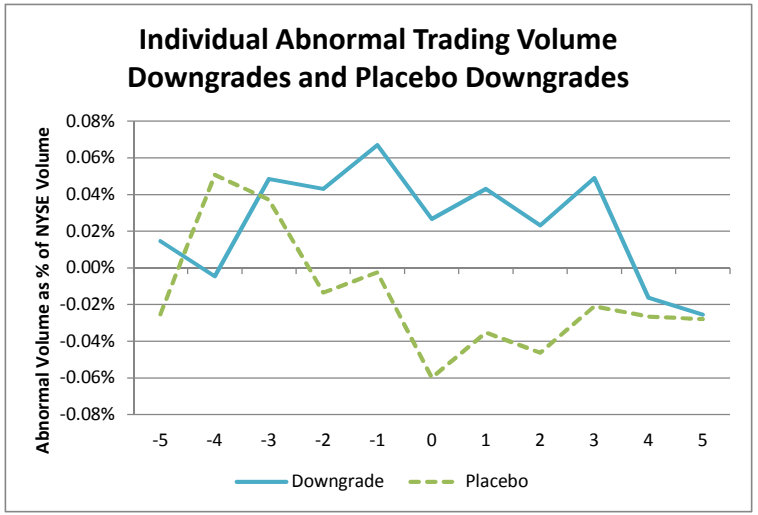


Figure 11: Abnormal trade imbalances surrounding analyst recommendation changes and placebo events

Graphs depict average *Abnormal Trade Imbalances* for institutional investors (top graphs) and individual investors (bottom graphs) across 15,101 analyst upgrades and placebo upgrades (left graphs) and 5,907 analyst downgrades and placebo downgrades (right graphs) from March 10, 1999 to April 22, 2010. For each analyst recommendation change, the placebo event is defined as the stock/day combination on which the same stock has the closest abnormal return to the stock's abnormal return on the day of the analyst recommendation change. Dates within *t-4* to *t+4* of analyst recommendation changes are excluded, and placebo events are chosen without replacement. Daily *Abnormal Trade Imbalance* for each stock is equal to Raw Trade Imbalance minus trader-type Benchmark Trade Imbalance, measured over the period from -45 to -11 and +11 to +45 days relative to each analyst recommendation change or placebo event.