

The Influence of Buy-side Analysts on Mutual Fund Trading*

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Abstract

We present evidence of the impact of buy-side analysts on the behavior and performance of fund managers. Using data provided by a large global asset manager, we relate buy-side analysts' recommendations to fund transactions on a daily basis. Our results show that buy-side analysts have a significant influence on trading decisions: Fund managers almost certainly follow recent recommendation revisions in their trades. Fund flows and sell-side recommendations matter as well, but to a lesser extent. Positive abnormal returns to buy-side analysts' revisions are also reflected in the performance of mutual fund trades: trades triggered by buy-side recommendations have higher returns than other trades.

Keywords: Buy-side analysts, analyst recommendations, mutual funds, investment decisions, investment performance

JEL classification: G23, G11, G29, M41

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1 Introduction

The asset management industry is responsible for a large amount of capital invested on behalf of its clients: globally, \$ 53.4 trillion – almost 110% of world GDP – were under management in 2006, \$ 24.3 trillion invested in equities alone.¹ Professional money managers rely on various sources of information in order to guide their investment decisions. In equity markets, sell-side analysts employed by brokerage firms and investment banks as well as analysts employed by independent research providers are a prominent source of information. However, investment management firms also employ their own so-called buy-side analysts as an internal source of investment ideas. Although less visible than sell-side analysts, these internal analysts account for a significant share of the overall spending on equity research: According to the advisory firm Tabb Group (2006), US and UK asset managers spent \$ 7.7 billion on internal and \$ 7.1 billion on external research in 2006. In the period 2000 to 2002, US equity funds' self-reported weight put on in-house analysts averages 73% to 75% (see Cheng, Liu, and Qian, 2006). While sell-side analysts have been analyzed with scrutiny by investors, regulators and academics (see e.g. Boni and Womack, 2003), buy-side analysts have received far less attention. Little is known about the impact of these internal analysts relative to external analysts in money managers' investment process so far.

We empirically analyze how the information provided by buy-side analysts affects the investment decisions of professional money managers. Specifically, we approach the following questions: To what degree do managers follow their in-house analysts' recommendations? To what degree do they follow the recommendations issued by sell side research analysts, which represent public information in the market? What are the performance implications of this behavior? Answers to these questions provide evidence on the value of internal analysts as an important organizational aspect of many asset management firms. To address them, we use a proprietary data set from a large, globally active asset management firm. The data is – to our knowledge – unique in its details. We observe in-house analyst recommendations and changes therein as well as fund positions, transactions and money flows on a daily basis for a set of European equity mutual funds between 2004 and 2007.

Our results show that buy-side analysts (BSAs) have a statistically and economically significant effect on the trading behavior of fund managers. Buy transactions coincide largely with more favorable internal stock recommendations: The direction of trades in a

¹Estimates by the World Bank and the Boston Consulting Group (2007).

stock matches those of a prior recommendation change in almost 90% of the cases during the week following the new recommendation. Even after controlling for other trading influences (most notably fund flows and sell-side recommendations), we find that recent recommendation changes induce a same-directional shift in the probability of a stock purchase of 27 to 41 percentage points. This effect is considerably larger than the effect of the sell-side analysts (SSAs) on transactions.

The analysis of returns to recommendation revisions and fund manager transactions suggests that BSAs positively impact trading performance for our sample funds. Recommendation upgrades by BSAs yield positive abnormal returns while downgrades show negative abnormal returns. The difference in returns is between 1.3 and 2.0 percentage points over a one to two months horizon. Similarly, fund transactions that are very likely to be triggered by recommendation revisions yield positive abnormal return differences of 2.2 percentage points during the first two months. More importantly, these transactions yield higher return differences than transactions that cannot be attributed to BSA recommendations alone. The transaction impact of BSAs thus also leads to a positive performance impact for our sample funds.

Our analysis relates to two strands of the literature. The first provides analyses of research analysts and their value for investments. Most of the empirical contributions here focus on the behavior and incentives of sell side analysts (see e.g. Womack, 1996; Barber, Lehavy, McNichols, and Trueman, 2001; Irvine, 2004; Ivkovic and Jegadeesh, 2004; Jegadeesh, Kim, Krische, and Lee, 2004; Barber, Lehavy, and Trueman, 2007). Given the private nature of the data, there is hardly any empirical work on buy-side analysts. The papers by Groysberg, Healy, and Chapman (2008) and Groysberg, Healy, Serafeim, Shanthikumar, and Gui (2010) are an exception as they use proprietary data from a US asset management firm in order to compare recommendations and earnings estimates by BSAs and SSAs. The analysis in Groysberg et al. (2010) suggests that the investment value of BSA recommendations is lower than the value of the sell side analysts. Earnings estimates by BSAs are also less precise than those by SSAs (Groysberg et al., 2008). These results support the conventional wisdom in the industry that SSAs provide higher value than BSAs as they are both more able and face stronger performance incentives.

The second strand of related literature focusses on the investment behavior of money managers, specifically on the role of public and private information for fund managers. Contributions in this strand are either theoretical (see e.g. Kyle, 1989; Chen and Wilhelm Jr., 2010) or try to infer the use of private information indirectly (see e.g. Cheng

et al., 2006; Kacperczyk and Seru, 2007; Pomorski, 2008). In particular, Kacperczyk and Seru (2007) find that fund managers whose portfolio changes are less correlated with sell side analyst recommendations show better fund performance. The authors attribute this to higher manager skills which yield better private information (or private interpretation of public signals). Cheng et al. (2006) analyze the role of BSAs by using funds' self-reported weight put on BSA research. Analyzing fund performance, they find some evidence that higher use of BSAs yields higher fund performance.

At first glance, the findings by Groysberg et al. (2008, 2010) appear in conflict with those of Cheng et al. (2006) or Kacperczyk and Seru (2007) about the value of BSAs: in the former paper, observed BSA recommendations have lower performance than SSA recommendations while in the latter two papers, fund managers' relying more on private information than sell-side information perform better. However, none of the studies directly links fund managers' trading decisions to private information such as BSA recommendations. Our paper is the first to bridge this gap and relates fund transactions to BSA and SSA recommendations. The analysis shows that BSA recommendations trigger larger same-directional trades more frequently than SSA recommendations. The relative impact of BSAs and SSAs is consistent with the two types of analysts providing fund managers with, respectively, private and public investment signals. Investors receiving both types of signals react more strongly to the private signal.² Public signals will be more reflected in stock prices than private ones as a larger set of investors observe and responds to public signals. As the investor's private signal is revealed less in prices, his response to this signal should be stronger (unless its precision is too low). This differential reaction to public and private signals also reconciles the seemingly conflicting findings of Cheng et al. (2006), Groysberg et al. (2008, 2010) and Kacperczyk and Seru (2007).

Our paper represents a step in quantifying the role of buy-side analysts in the return generating process. The value of relying on internal analyst teams is an important determinant for the organization of asset management activities. It is also relevant for fund investors to gauge the value added of choosing an asset manager with internal research capabilities (at potentially higher management cost).

The paper is structured as follows. Section 2 describes our data set. In section 3, we analyze the impact of BSAs and SSAs on the trading behavior of fund managers. Section

²To have some investment value, the "public" signal needs to be imperfectly observable, e.g. due to liquidity trades (see e.g. Grossman and Stiglitz, 1980; Kyle, 1985). Chen and Wilhelm Jr. (2010) and Kacperczyk and Seru (2007) provide models incorporating private and public signals.

4 then considers analysts' performance impact. Section 5 estimates the value generated by BSAs for the asset management firm. Section 6 concludes.

2 Sample and data

The analysis combines data from both public and private sources. A global asset management firm which belongs to the top ten global asset managers in terms of assets under management is the main data provider. From one of their European offices, we obtained a rich set of information on their mutual funds and buy-side analysts. This data is augmented by stock and sell-side analyst information from public sources.

Mutual fund data: We use a sample of 14 equity funds investing in European equities between June 2004 and December 2007. All these funds are managed by individual fund managers who belong to the firm's European equities team. Managers of a fund can change over time. Most fund managers also manage institutional equity portfolios. Although information on these portfolios is not included, these institutional portfolios share the basic strategy in terms of equity investments. The fund data used thus proxies the full spectrum of investment strategies pursued within the company.

The daily information we use includes all trades undertaken within the funds, all fund investment positions, and net money flows into or out of these funds. We also obtained basic fund information such as the ID of the fund manager, the fund benchmark relevant for fund manager evaluation as well as changes in any of this information during the sample period. We supplement this data with daily fund prices and benchmark returns.

Buy-side analyst information: Internal stock recommendations originate from two groups of analysts, research analysts and small cap fund managers. The main task of the latter group is to manage small cap equity portfolios but they also give stock recommendations for a subset of the stocks they invest in. Research analysts are sector specialists who follow stocks in the sector of their expertise. These analysts very much resemble the sell-side analysts and often worked for the sell-side previously or move to the sell-side later on. The job of a research analyst in our sample firm has a career path of its own. These analysts are hence no junior analysts who will be fund managers in the future. Although a few analysts also manage sector portfolios, their role as analyst is never secondary. Stock recommendations are analysts' key output and a major determinant for analysts' perfor-

mance evaluation and hence bonus payment. Another task of the research analysts is to discuss their views and industry/company news with fund managers. Although research analysts have their own company models, unlike sell-side analysts they are not required to provide earnings estimates on a regular basis.

We use daily information on recommendations for European stocks issued by all internal research analyst.³ The information contains the stock, an analyst ID, and the current recommendation. Analyst stock recommendations are coded 1 for “sell”, 2 for “underperform”, 3 for “hold”, 4 for “buy” and 5 for “strong buy”. Changes in recommendations are recorded in the data set for the same day as the analyst announces the change if this occurs before the market opens. Else, they are recorded as of the subsequent trading day. These timing conventions are also used in the internal evaluation of the analysts. Unless stated otherwise, when considering changes in buy-side analysts’ recommendations, we only use the direction of the change. A value of +1, 0, or -1 for a buy-side recommendation change indicates a more favorable recommendation (upgrade), no change, or a less favorable recommendation (downgrade), respectively.

Sell-side analyst information: For each stock traded by one of the sample funds, we collect sell-side analyst recommendations from the Thomson Reuters I/B/E/S database. These recommendations are originally coded in the opposite direction of the buy-side recommendations (from 1 for “strong buy” to 5 for “sell”) and are recoded to match the buy-side structure. A higher recommendation thus implies a more favorable view of the stock in both data sets. We use the daily mean consensus recommendation for each stock as well as detail information for individual analysts’ recommendations. The change in the consensus over a period is the difference between the consensus value at the end of the period and the value on the trading day preceding the period.

Although the consensus recommendation is an easily observable and hence prominent indicator, professional investors might consider alternative investment signals more important, not least because SSAs may provide biased investment recommendations (see Malmendier and Shanthikumar, 2007a,b). We therefore also include I/B/E/S information about SSAs’ earnings estimates. Specifically, we calculate earnings revisions as the relative change in the consensus earnings estimate over a specified period. In order to have a rolling measure of the consensus earnings, we use a time-weighted average of the earnings estimates for FY1 and FY2. The weighting factor for the FY1 estimate is the number of

³We disregard recommendations issued by small cap fund managers as these are not their main task.

trading days until the reporting date of the FY1 earnings relative to the number of trading days between the reporting days for FY1 and FY2. The weighting factor for FY2 is then 1 minus the factor for FY1. By this weighting structure, FY1 estimates receive a lower weighting the closer the corresponding reporting date.

As the market consensus in many stocks is determined by a large number of SSAs, professional investors may decide not to pay attention to all recommendation or earnings revision issued. Rather, some SSAs or brokers might be followed more closely than others. We consequently also consider a sub-set of sell-side firms by identifying the key brokerage firms for our sample firm. We measure the relevance of a sell-side firm for our sample firm by the overlap between the stocks traded by the mutual funds and stocks covered by the sell-side firm. Hence, sell-side brokers which cover a higher number of stocks that were also traded by the mutual funds are deemed more important. We rank all brokers covered in the I/B/E/S detail database and consider only the top 10 brokers in this ranking. The overlap between these firms' coverage and the stocks traded ranges from 226 to 242 stocks. Analysts employed by these 10 brokers will be termed *key SSAs*. Recommendation revisions by key SSAs are then reported as the number of upgrades minus the number of downgrades over a specified period of time.

Sample description: We restrict our sample to those stocks that were covered by the buy-side analysts at some time (i.e. where there is at least one buy-side analyst recommendation) during January 2004 and December 2007. We then collect all transactions by the mutual funds in these stocks and add buy-side recommendations, fund flows, the sell-side consensus and stock returns. Table 1 provides descriptive statistics for the sample.

For recommendation or earnings revisions, cash flows and returns, we consider several, non-overlapping time periods. For example, we differentiate the sum of cash flows by whether they were reported on the same or previous day as the trade (Cash Flow $_{t,t-1}$) or during the remainder of the preceding trading week (Cash Flow $_{t-2,t-5}$), where t denotes the day of the transaction. Since cash flows have very immediate effect on the portfolio structure, we don't consider cash flows which occurred over a week ago. For BSA recommendation revisions we use the period of one day prior to one day after the transaction (BSA recommendation revision $_{t+1,t-1}$) in order to account for fund managers receiving information about planned revisions by the BSAs. We also consider revisions during the remainder of the preceding week (BSA recommendation revision $_{t-1,t-5}$) and changes that happened up to a month earlier (BSA rec. change $_{t-6,t-20}$). The same three time periods

are used for revisions by key SSAs, however the most recent day being the revision day. The consensus recommendation or earnings variables and past stock returns are included for three non-overlapping subperiods within the past six months.

3 Transaction impact

In this section, we consider the impact of buy-side and sell-side analyst recommendations on the trading behavior of fund managers. In the first step, we look at the structure of transactions around buy-side recommendation changes. We then turn to a more thorough analysis of the determinants of trading decisions and BSA revisions.

3.1 Recommendations and the structure of transactions

If buy-side analyst recommendations matter for fund managers' investment decisions, we should expect to see changes in their behavior when recommendations are changed. Over the sample period, we observe 536 recommendation changes. Table 2 (Panel A) presents the distribution of these revisions in a transition matrix. The table shows the distribution of new recommendations by the prior recommendation level. The last column in Panel A gives the percentage of recommendation revisions by the prior recommendation level. Recommendation reiterations are not recorded for the buy-side analysts in the sample. Hence, the main diagonal of the transition matrix is empty.

The numbers in Panel A show that most of the recommendations by buy-side analysts are either a hold (recommendation of 3) or a buy (recommendation of 4). Over 76.5% of recommendation revisions start at these levels, and the transitions are also mostly towards these levels. Only very few recommendations originate from or target the lowest recommendation level. Additionally, the transition matrix shows that most recommendation revisions are single level changes. In later analyses, we will therefore neglect the size of recommendation changes and simply differentiate between upgrades and downgrades.

Panel B of Table 2 illustrates the distribution of buy versus sell transactions in stocks whose recommendations are changed. Specifically, the table reports the proportion of buy transactions among all transactions in a stock within the period starting one trading day prior to the recommendation change and ending one trading day afterwards. These buy proportions are averaged and presented for the same recommendation transitions as in Panel A. The results show that upgrades (numbers above the main diagonal) and down-

grades (numbers below the main diagonal) go along with very different trading behavior: Upgrades are accompanied with mostly buy transactions, whereas sell transactions dominate for recommendation downgrades. As an example, consider an initial hold recommendation (level of 3). For the 65.3% of stock upgrades to a buy recommendations (recommendation level 4, see Panel A), buy transactions make up 86.8% of all transactions in these stocks in the three day period around the recommendation change. Conversely, for the 33.6% of stocks downgraded to underperform (recommendation level 2), 87.0% (100%-13.0%) of transactions are sells. The results in Panel B show a strong congruence between fund managers' trading decisions and buy-side recommendation revisions.

Figures 1 and 2 provide further evidence of the impact of buy-side analysts' revisions on fund manager trading. Both figures analyze trades in stocks around recommendation revisions. The event day (of the revision) is $t=0$. Similarly to Panel B of Table 2, Figure 1 reports the proportion of buys (in percentages) up to five weeks prior to and after the revision. The dark-shaded bars show proportions of buys around upgrades, the light-shaded bars show buy proportions around downgrades. Figure 2 looks at the trading intensity of fund managers around recommendation revisions. It shows the average number of trades observed in a stock around its revision day, again for upgrades (dark-shaded bars) and downgrades (light-shaded bars) separately. In both figures, numbers are averaged on a daily basis for the first week around revisions. For weeks -5 to -2 and 2 to 5, the figure reports weekly averages.⁴ Additionally, the dashed line in each figure represents the average during weeks -5 to -2 for both upgrades and downgrades.

Figure 1 shows that the congruence between recommendation revisions and fund managers' trades extends over a fairly long period. Recommendation upgrades (downgrades) shift post-revision trades towards buys (sells) for at least three weeks, with weakening effect over time: The difference between the proportion of buys after upgrades versus downgrades on revision days is over 80 percentage points and declines to roughly 20 percentage points three weeks afterwards. Trading activity also increases around recommendation revisions, as Figure 2 illustrates. On the revision days, average activity is almost six times higher than the average activity in weeks -5 to -2 prior to revisions. However, the effect appears not to be long-lasting as it vanishes within the first week following a revision. Both figures strongly highlight the impact of buy-side analysts' recommendations on fund manager behavior.

⁴The change from weekly to daily (to weekly) averaging is also highlighted in the figure by changes in the background shading.

A notable feature in Figures 1 and 2 is that the structure of transactions already changes in the days prior to recommendation revisions. This is not surprising for trades happening one to two days ahead of a revision: By the timing convention, a revision during trading hours results in a lag of one day between the day a revision is published internally and the recorded announcement day. Additionally, analysts regularly communicate their planned revisions to fund managers. Updating their valuation models and writing an accompanying research report might then delay the officially recorded announcement by another day. These effects can best be seen in Figure 2 as the pick-up in trading activity is evident two days ahead of the revision day. Figure 1, however, shows that the distribution of buys and sells changes strongly up to four days ahead of the revision. This pre-revision effect is unlikely to be due to time lags between an analyst's decision to revise a recommendation and the official announcement. Rather, it is due to other interactions between fund managers and buy-side analysts. In particular, fund managers and buy-side analysts share and discuss their views about stocks. These discussions can be around specific events, such as company meetings, company announcements, or institutionalized meetings between analysts and fund managers.⁵ This may enable analysts to give an early indication of their plans to revise a recommendation or may allow fund managers to correctly assess the direction of the next revision. Alternatively, fund managers might be able to convince analysts and simply trade according to their view. Although it is not discernible from the data which mechanism drives the pre-revision effects, conversations with fund managers and analysts suggest that revisions determine fund managers' transactions rather than vice versa.

3.2 Explaining the direction of trades

The previous analysis illustrates that buy-side recommendations have a strong effect on whether fund managers buy or sell a specific stock. Therefore, we look at this decision in more detail. We first show that buy-side analyst recommendation revisions and fund flows have a high impact on the trade direction even after controlling for other investment signals. We then analyze whether buy-side analyst recommendations are more than a compound signal of these public investment signals.

⁵For example, fund managers used to specialize within the team on certain industries. Hence, analysts know whom to approach when there is any new information or upcoming events. Also, sector analysts and the fund management team meet on a regular basis.

Table 3 presents the results of a logit regression of buys versus sells on various internal and publicly observable variables. The dependent variable takes on a value of one if a stock transaction by a single mutual fund during a day is a buy transaction and zero if the transaction is a sell. The explanatory variables include the internal information about buy-side analyst recommendations (both current levels and past changes) and cash flow information. As the publicly observable investment signals, we use consensus recommendations and earnings estimates. We use the current levels of the consensus recommendation as well as the value of past changes therein, distinguishing between three sub-periods within the preceding six months to account for how recent the changes in the variable are. For the consensus earnings estimates, we consider percentage changes over the same sub-periods as for recommendations. The consensus variables provide a signal of the average analyst's recommended transaction and should take into account all relevant stock information up to the day of transaction. In addition, we use recommendation revisions by key SSAs for three sub-periods within the preceding month. We also include past stock returns as a control variable. This variable captures potential momentum or contrarian trading by the fund managers.

The results of the logit analysis show that all internal variables are highly statistically significant whereas only some of the public investment signals determine trading decisions. Recommendation upgrades by either the buy-side or the sell-side (consensus or key brokers) positively affect the propensity to buy a stock for all time periods between the revision and the transaction considered here. The effects are statistically significant for the most recent recommendation revisions by key SSAs as well as for consensus revisions that occur more than a week prior to a transaction. Hence, the key SSAs have a very immediate effect, whereas changes in the consensus matter only with some lag but for a longer period of time. Cash inflows also increase the probability of a buy transaction. This is as expected as fund managers usually prefer to hold only small cash positions. The inflow of new money thus triggers at least some buy transactions. Although statistically significant, recommendation levels show less clear results. While they increase the propensity to buy when issued by a buy-side analyst, higher recommendation levels have a negative effect when issued by the sell side. This is consistent with fund managers considering recommendation changes to contain investment value whereas the level of a recommendation is less relevant. Similar to recommendation levels, past stock returns show no consistent behavior. While the most recent returns positively affect the propensity to buy, less recent returns have the reverse effect. Lastly, consensus earnings revisions are statistically insignificant.

The last columns of Table 3 report the average marginal effects of changes in the explanatory variables. The results show that the internal signals have the highest economic impact on trade directions. Most notably, a buy-side analyst’s recommendation upgrade (downgrade) at the same or previous day increases (decreases) the probability that fund managers buy that stock by 41 (27) percentage points. Although the effect decreases over time it is still economically high (between 13 and 16 percentage points) if the recommendation change happened between two to four weeks before the transaction. As a comparison, the maximum effect that a similar change in the consensus recommendation has is 18 percentage points. Although it generally depends on the coverage of a stock, a one-unit change within a single week is highly unlikely. The effect of a one standard-deviation change in the consensus is below two percentage points ($0.18 \times 0.096 \approx 0.017$). Nevertheless, the sell-side information signal has an impact that persists even for periods of up to six months. Key SSAs have a very immediate impact: a single upgrade on the trading or the preceding day shifts the likelihood of a buy transaction by 7 percentage points. A cash flow of one percent of a fund’s asset value over the same or previous trading day changes the buy probability by 16 percentage points in the same direction. The effect is reduced to five percentage points if the cash flow occurs 5 to 3 days before the trading date. Finally, past returns and recommendation levels, although statistically significant, show low economic impact on trade directions.

3.3 The direction of buy-side analysts’ revisions

In order to gauge whether BSA recommendation revisions are more than a combination of the public investment signals considered by fund managers, we now turn to the recommendation upgrade or downgrade decision. Similar to the trade direction analysis, we perform a logit regression of the direction of the stock recommendation revisions. The dependent variable thus takes on a value of one (zero) if the analyst upgrades (downgrades) the stock. For the independent variables, we use the set of publicly observable variables (consensus and key SSA recommendations, consensus earnings and returns) as in the analysis of trade directions.

The results and average marginal effects of the logit analysis are presented in Table 4. Only few variables turn out to be statistically significant (at the 5% level). The most important variables in the analysis are the revisions by key SSAs. In contrast to the transaction analysis, revisions by these key analysts affect BSAs’ revisions positively for

all sub-periods within the prior month. A recommendation upgrade by a single key SSA increases the likelihood that a BSA revision is an upgrade by 30 percentage points if it happens on the same or previous day. If the sell-side upgrade happens up to a month ago, the effect is still significant with a marginal effect of 7 percentage points. In contrast to the key SSAs, consensus recommendations are not statistically significant. However, consensus earnings revisions have some, albeit limited, positive impact on the direction of BSA revisions. Finally, stock returns over the prior month have a statistically significant effect. However, the effects are rather inconclusive as their direction changes within that period.

In sum, our results suggest that buy-side analysts' changes in recommendations play an important role as internal investment signals. Their impact is also larger than that of the sell-side consensus. And even though buy-side analysts and fund managers might partly follow similar investment signals, the recommendation revisions by the buy-side analysts can be interpreted to have additional information content for the fund managers.

4 Performance impact

The previous results show that buy-side and, to a lesser extent, key sell-side analyst recommendations affect trading decisions. We now consider the impact of analyst recommendations on fund performance. Before analyzing the performance of fund transactions, we first consider the performance of buy-side and key sell-side analysts' recommendation changes.

4.1 The performance of analysts' recommendation revisions

Buy-side analysts' performance: We measure buy-side analyst performance by calculating the percentage return of each stock upgrade and downgrade for holding periods of one, five, 10, 15, 20, 40, 60 and 120 trading days as of the day of the recommendation change. We report both raw returns as well as abnormal returns. A stock's abnormal return is computed as the difference between the raw return and the market return adjusted for the stock-specific beta. Stock-specific betas are the result of a regression of daily stock returns on an intercept and the market return during the sample period. We use the MSCI Europe index for the market return. Returns are averaged for all upgrades and downgrades with equal weighting. Table 5 presents the performance results of recommendation changes as well as the difference in performance between upgrades and downgrades.

Looking at raw returns, Panel A shows that stocks that have been upgraded have almost steadily increasing performance over time. Even the returns to downgraded stocks turn positive and increase over time. The general increase in stock prices is not overly surprising, given the time period of our analysis. However, the results also show that the return difference between recommendation upgrades and downgrades is positive and significant for the first two to three months. This return difference builds up from 0.44 to 1.94 percentage points over the first weeks and reaches a maximum of 2.50 percentage points after one month. The latter structure of returns is also visible in abnormal returns (Panel B). The difference in returns between upgrades and downgrades increases from 0.56 to 1.99 percentage points within one month and decreases thereafter. Overall, it is possible to generate positive returns by following buy-side analysts recommendation changes.

Key sell-side analysts' performance: We next consider the performance of the top 10 brokers' analyst recommendation revisions. Very recent revisions by the key SSAs positively affect fund manager transactions, even though the effect is much weaker than for BSAs. For example, combining the revisions by key SSAs with our transaction data shows that the same-day percentage of buys following key SSA upgrades versus downgrades is 50.7% versus 22.4%, respectively.

Similarly to the analysis in table 5, we calculate percentage returns of each stock upgraded and downgraded by key SSAs for the various holding periods. We measure the analyst return based on the closing price on the revision day. This implies that we disregard the potential announcement day effect that has been found for SSA revisions (see Francis and Soffer, 1997; Ivkovic and Jegadeesh, 2004). Although we thus miss out a part of the stock return generally attributed to a revision, this lag in the performance calculation is more relevant for fund managers as they are usually not able to react fast enough to realize the announcement day return.

Table 6 presents the performance results of key SSA recommendation changes as well as the difference in performance between upgrades and downgrades. The results show that SSAs provide valuable investment recommendations: Both raw and abnormal returns of upgrades are statistically significant and positive for all return periods considered. Recommendation downgrades yield negative raw returns initially, and significantly negative abnormal returns. The return differences are highly statistically significant, positive and increase from 0.36 percentage points to 1.02 percentage points for abnormal returns.

Although the patterns of returns for SSA and BSA revisions are similar, the returns to

SSA revisions appear slightly weaker than BSA revisions over the first months. However, in contrast to BSA revisions, key SSAs' revisions remain significantly positive even for the 6 months period.

4.2 Performance of fund managers' transactions

Given that BSAs and key SSAs generate valuable investment signals and that fund managers appear to trade consistently with these signals, we should expect to see positive performance of trades induced by these revisions. We now analyze fund managers' transactions and consider the returns to buy and sell transactions as well as their return differences.

Buy-side analysts' performance impact: Table 7 presents the performance of two transaction samples: The first sample (in columns two and three, six and seven, ten and eleven) contains all transactions where a same-directional revision by a BSA is observed in the period of one trading day prior to one trading day after the transaction. From the analysis in 3, we know that these transactions are very likely to be driven by the internal investment signal. The second set of trades contains those without a same-directional revision by the BSA during the three days around the transaction. The second sample thus contains transactions that are not (solely) driven by the BSA recommendation but might be based on other information.

We look at raw (Panel A) and abnormal returns (Panel B) over the same time-horizons as in Tables 5 and 6. Although the funds in our sample have different, fund-specific benchmarks (given their differences in investment focus and style), we continue using the MSCI Europe index as the market return. Unreported calculations using market-adjusted returns with fund-specific benchmarks yield very similar results. We present returns for buy and sell transactions as well as the (within-sample) difference in these returns.

The results for the raw returns show again positive returns for both buys and sells over the longer return periods. Raw returns are highest mostly for buys around upgrades and lowest for sells triggered by downgrades. For both samples, the difference in returns between buys and sells is positive and significant during the first two months.

Looking at abnormal returns provides further information about the return structure of transactions. Most notably, the results suggest that the negative abnormal returns of fund managers' sells contribute most to trading returns. These returns are almost all significantly negative, particularly those triggered by BSA downgrades. Stocks sold

around downgrades have abnormal returns of -1.20% within the first week and -3.26% after 6 months. Sells without a BSA revision on the other hand underperform by less than 0.5% – still, the returns are significantly different from zero. Buy transactions show much weaker evidence of positive abnormal returns. Only buys without upgrades have positive and statistically significant returns (over the two-month period). Except for the one-day performance, BSA driven buys show return differences which are statistically insignificant from zero.

The differences in returns between buys and sells are positive and significant for both samples during the first two months after the trade. The transactions driven by BSA revisions reach a maximum difference of 2.50 percentage points after two weeks and the difference remains significantly positive for two months. The time horizon for those trades to be profitable is thus the same as for the BSA revisions themselves. The results suggest that the return potential of BSAs' revisions is captured by fund managers. In particular, fund managers seem to profit from negative revisions, whereas trades implementing upgrades surprisingly show returns not significantly different from zero.

Table 8 presents a comparison of the return differences between buys and sells for the two samples. While the return difference is always higher for transactions driven by BSA revisions, the difference (in return differences) is only statistically significant during the first month. Although fund manager trades seem to be more profitable if triggered by BSA revisions, this can only be confirmed for a relatively short return horizon. Still, overall the return analysis of transactions shows that BSAs positively affect fund managers' transaction returns and thus improve fund performance.

Key sell-side analysts' performance impact: We now consider the performance of transactions which occur during the same day or one day after a recommendation revision by one of the key SSAs. Because SSA revisions are not always followed, we compare the performance of both buy and sell transactions for recommendation upgrades and downgrades separately (see Busse, Green, and Jegadeesh, 2010, for a similar analysis). Trades that are in the same direction as SSA revisions should not only contribute positively to the overall fund performance. Rather, if fund managers are also able to discern profitable and unprofitable stock recommendations, the return difference between buy and sell transactions should be positive both for transactions following upgrades as well as following downgrades.

Table 9 presents raw and abnormal returns to buy and sell transactions for stocks that

were traded on the announcement day of a key SSA revision or one day afterwards. If more than one key SSA revision occurs from different brokers during those two days, the difference in the number of upgrades versus downgrades determines the direction of the overall revision. We interpret an equal number of upgrades and downgrades as no revision. The table distinguishes trades by the direction of the revision (upgrades versus downgrades) and also presents averages over all buys or sells.

Looking at the abnormal returns to buy transactions in Table 9 reveals returns which are either not significantly different from zero (for most buys around SSA upgrades) or even significantly negative (for buys around downgrades). For return periods of 3 to 6 months, abnormal returns are significantly negative for each of the reported sets of buy transactions. The results suggest that buy transactions around revisions by key SSAs add no value at best or even negative abnormal longer-run returns at worst – irrespective of the revisions’ direction.

The returns to sell transactions in Table 9 show that fund managers generate value with their sell transactions – similar to the results in Table 7. The effect is particularly strong for sells around key SSA downgrades, but is also visible in sells which happen around upgrades by key brokers. As in the case of buy transactions, abnormal returns are lowest for return periods of 3 and 6 months. Overall, the evidence for key SSA revisions adding value to fund managers’ trades is mixed when looking at the returns to buys and sells separately.

In Table 10, we present return differences between buy and sell transactions around key SSA revisions. Comparing return differences over different sub-sets of trades yields some more information on the value of SSA revisions. The first pairs of columns reports differences between returns to buys and sells by the direction of the revisions. Abnormal return differences are significantly positive over the first three weeks for upgrades and over the first two months for downgrades. These positive return differences suggest that to some degree, fund managers are able identify profitable and unprofitable stock recommendations and react accordingly. However, the next two column pairs show that only those transactions which implement SSA revisions (congruent trades) yield significantly positive abnormal returns. Contrarian trades which are opposite to the revisions yield no significant abnormal returns. Hence, fund managers appear to be able to identify and follow revisions which are valuable but are less able to identify potentially loss-making revisions by the key brokers. Still, the overall return difference for all transactions around key SSA revisions is significantly positive for the first two months. We can thus conclude that SSAs employed

by the key brokers also provide investment signals which – to some degree – improve fund performance.

5 Trading profits and the value of buy-side analysts

Our results show that BSAs positively affect fund manager trading and the performance of their trades. However, the performance impact so far depends on the holding period considered. We now provide a more concrete, albeit rough, estimate of the value of BSAs for the asset management firm. To do so, we calculate realized trading profits for round-trip transactions that were likely to be initialized by BSAs. We select all transactions in stocks that had a same-directional revision in the period of one day prior to one day after the transaction. We then eliminate all transactions which afterwards had no offsetting trades by the same fund until the end of our sample period. For the remaining transactions, we calculate round-trip raw profits using reported execution prices. As an illustration, consider a BSA-induced buy of 100 shares in stock X at a price of 1 at date 0. The transaction is offset by sells at two distinct dates: 60 shares of X are sold at a price of 2 at date 1, and 40 shares are sold at a price of 1.5 at date 2. The round-trip profit is hence 80. The same profit results if 100 shares are sold at date 2 (the fund might have already had a position in X at date 0) – only the sale of 40 shares is needed to close the position. Thus, offsetting transactions need not be contained in a single trade and might be part of an even larger trade. Also, subsequent transactions other than offsetting trades are disregarded until the position is closed: the trading profits in the example remain unaffected by additional purchases of X between date 0 and date 2. We thus assume that the BSA-induced transaction is always closed first.

We provide several adjustments to the raw profits generated by the round-trip transactions. Market-adjusted profits are derived by deducting the profits from equal-sized investments into the MSCI Europe index on the transaction day. Investment returns from this hypothetical portfolio are realized at the same point(s) in time as the stock investment. In order to account for the stock-specific risk, we also calculate beta-adjusted profits by adjusting the investment into the market index by the stock's beta. Finally, we derive profits when transactions are executed without transaction costs and net of transaction costs. Transaction costs for stocks are included in our data set, and we use transaction costs of 5 basis points for investments into the market index.

Table 11 presents the results for the profits from 346 round-trip transactions follow-

ing BSA revisions. The average raw return before transaction costs amounts to almost € 110,000 or a total profit of € 37.9 million during the 3.5 years of the sample. Transaction costs reduce this profit by almost € 4 million. Adjusted profits are considerably lower, with beta-adjusted profits being at the lowest level. Net of transaction costs, beta-adjusted profits amount to € 4.9 million a year.

As transaction profits at first accrue to mutual fund investors, we need an estimate for the profits these transactions generate for the asset management firm. For this, we assume that the trading profit generated in a year is invested in the market portfolio and yearly pays out management fees. Discounting the infinite stream of fee income yields a net present value for the asset management firm. Writing this net present value as a fraction of the one-period trading profit gives

$$\frac{NPV_{BSA}}{\pi_t} = \sum_{t=0}^{\infty} f \left(\frac{(1-f)(1+r_M)}{1+r_d} \right)^t = \frac{f(1+r_d)}{r_d + f - r_M(1-f)},$$

where π_t denotes the trading profit, f the management fee, r_M the return on the market portfolio and r_d the discount rate. Using the CAPM for the discount rate, we can write $r_d = r_f + \beta(r_M - r_f)$ with r_f as the risk-free rate. The mutual funds in our sample charge management fees between 1.5% and 2.0% of assets. We use a risk-free rate of 3%, an equity premium of 5.5% (see e.g. Dimson, Marsh, and Staunton, 2006) and a “financials” β of 1.3. Running the numbers results in a net present value which is between 50.4% and 57.7% of the trading profit.⁶ Hence, the value of the buy-side analysts would be between € 2.49 and € 2.85 million per year.

During the sample period, the asset management firm employed between 18 and 23 research analyst at various experience levels. Assuming an average yearly cost per analyst of € 400,000 (approximately US\$ 500,000 to 550,000) and employment of 20 analysts implies that the value of these analysts as derived above only amounts to 31% to 36% of their costs. By these estimates, the profits generated by BSAs would fall significantly short of their costs. However, these estimates should be rather interpreted as a lower bound to the value of BSAs. First, not all transactions that are likely to be induced by BSAs are included in the profit calculation of Table 11. For some BSA-induced transactions there were no offsetting trades. Second, we considered only the direct revenue effect of BSAs. Indirect effects arise if fund returns enhanced by BSAs also yield higher inflows as

⁶Varying the risk-free rate between 2% and 4%, the equity premium between 4% and 7% and β between 1.1 and 1.5 results in a NPV range between 33% and 82% of trading profits.

investors prefer to invest into better-performing funds (see e.g. Ippolito, 1992; Chevalier and Ellison, 1997). Moreover, the additional returns generated from BSA recommendations might enable the asset manager to charge higher fund fees.

6 Conclusion

Equity research analysts provide financial market information that can be sold in two ways, directly and indirectly (see Admati and Pfleiderer, 1988, 1990; Biais and Germain, 2002). Sell-side analysts are direct sellers of information whereas buy-side analysts and asset managers sell their information indirectly. In many asset management firms, the task of gathering and producing investment information and the task of making investment decisions are separated. Fund managers may hence rely on both information sources and decide for themselves on the use of the information. This paper analyzes how fund managers use private (buy-side) and public (sell-side) information by directly linking recommendations from both sources to transactions.

Our results show that fund managers react most strongly to recommendation changes by buy-side analysts. Jegadeesh et al. (2004) have already documented that the information content of sell-side stock recommendations is highest in recommendation changes. The response by fund managers suggests that the same is true for buy-side recommendations. Additionally, the private nature of buy-side recommendations probably ensures that prices will not (instantly) reflect the information. It is thus more profitable to respond to a signal if it is private. The higher impact of buy-side recommendations, particularly in comparison with the sell-side consensus, found in our analysis is consistent with this interpretation.

The analysis of the returns to buy-side analyst recommendations shows that following buy-side analysts' revisions can be profitable for fund managers. Transactions triggered by buy-side analyst revisions yield positive abnormal returns that exceed those of other transactions. In sum, the behavior of fund managers and impact of buy-side analysts found in the analysis accords well with models of investment decisions and market microstructure under public and private information.

Since our data come from a single firm, our results are clearly not generally applicable to the overall asset management industry. However, our results show a consistency of the sample firm's business model of using sell-side information while at the same time employing buy-side analysts. As this is a widely adopted business model, our analysis can be of interest to other firms in the industry as well as fund investors.

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Figure 1: Percentage of buy transactions around BSA recommendation revisions

This figure reports the average proportion of buys (in percentages) in a stock around the day ($t=0$) a buy-side analyst revises the stock's recommendation. The dark-shaded bars show buy proportions around upgrades, the light-shaded bars show buy proportions around downgrades. Averages are taken on a daily basis for the first week around revisions (white background). For weeks -5 to -2 and 2 to 5, the figure reports weekly averages (shaded background). The dashed line denotes the average for upgrades and downgrades over weeks -5 to -2.

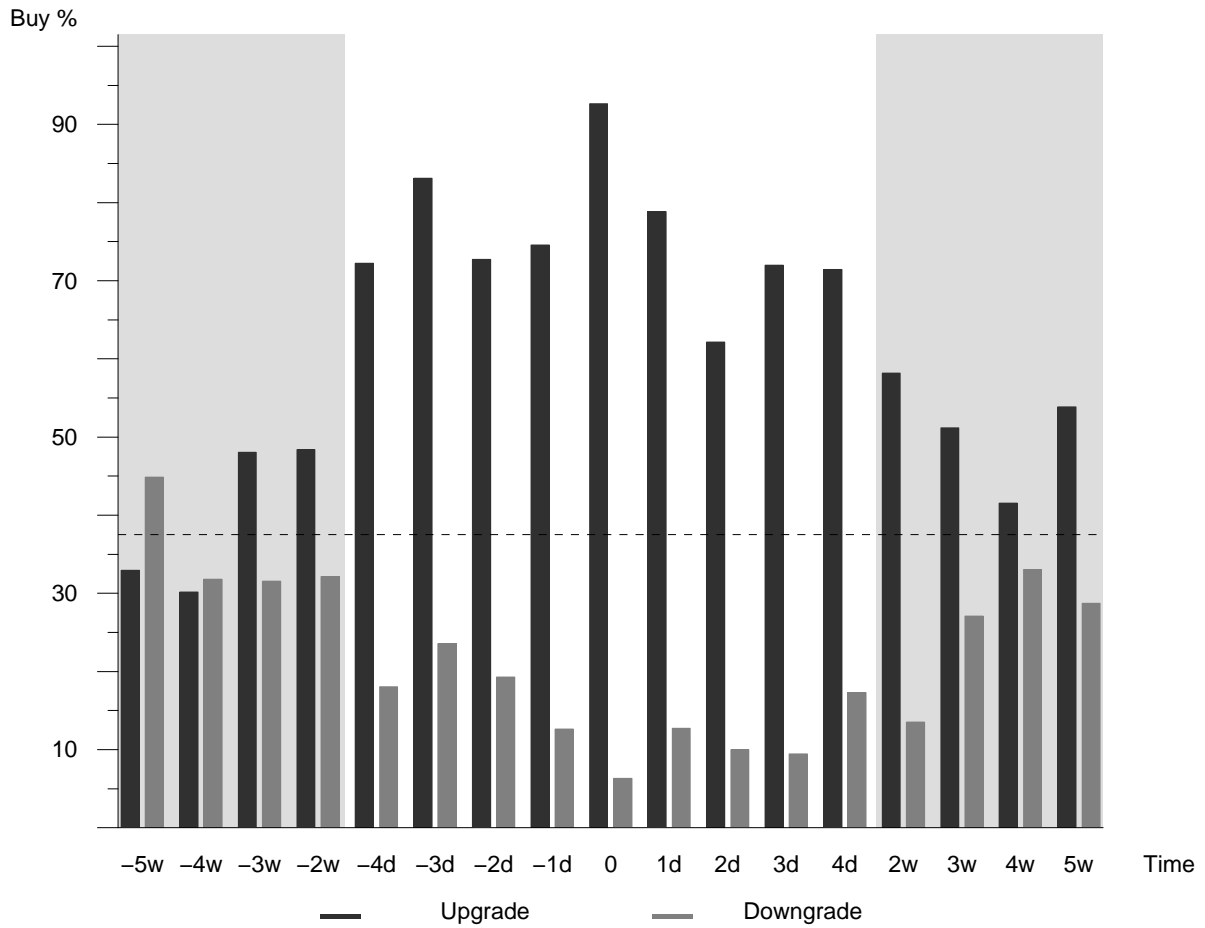


Figure 2: Trading activity around BSA recommendation revisions

This figure reports the average number of trades in a stock around the day ($t=0$) a buy-side analyst revises the stock's recommendation. The dark-shaded bars show the number of trades around upgrades, the light-shaded bars show number of trades around downgrades. Averages are taken on a daily basis for the first week around revisions (white background). For weeks -5 to -2 and 2 to 5, the figure reports weekly averages (shaded background). The dashed line denotes the average for upgrades and downgrades over weeks -5 to -2.

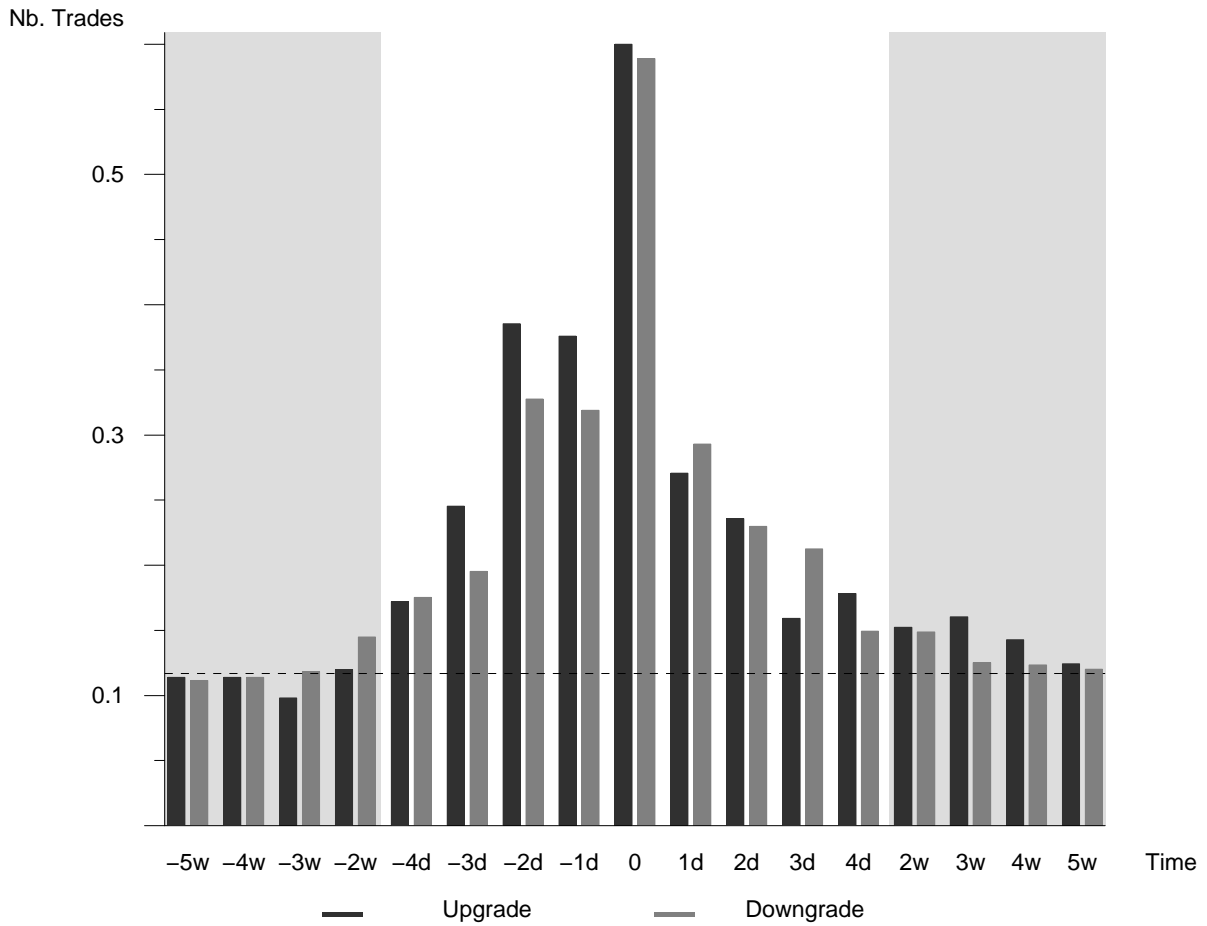


Table 1: Descriptive Statistics

This table reports summary statistics for all transactions in stocks that have at least one buy-side recommendation between January 2004 and December 2007. *Sign of transaction_t* indicates whether the transaction is a buy (+1) or sell (-1). *t* denotes the day of the transaction. *BSA recommendation revision_{τ,τ-i}* is an indicator whether the BSA stock recommendation has been reduced (-1), increased (+1) or is unchanged (0) within the period $\tau - i$ to τ . *Cash Flow_{τ,τ-i}* is the total net cash flow of the fund trading the stock over the period. *Key SSA recommendation revision_{τ,τ-i}* is the difference in the number of upgrades and downgrades by key SSAs within the period $\tau - i$ to τ . Key SSAs are those employed by the top 10 brokers with highest overlap of their coverage with the stocks covered and traded by the buy-side firm. *Cons. recommendation revision_{τ,τ-i}* is the difference between the consensus recommendation value in τ and its value in $\tau - i - 1$. *Cons. earnings revision_{τ,τ-i}* is the relative change in the weighted consensus earnings forecast between τ and $\tau - i - 1$. The weighted consensus is obtained by weighing the FY1 earnings forecast by the number of trading days until the FY1 reporting date relative to the number of trading days between reporting FY1 and FY2; FY2 earnings are weighted by 1 minus the weight of FY1 earnings. *Return_{τ,τ-i}* is the percentage change between the closing stock price in τ and $\tau - i$. *BSA recommendation_t* and *Cons. recommendation_t* denote the buy-side and consensus recommendation level, respectively, of the stock on day *t*. BSA and consensus recommendations are coded from 1 for “sell” to 5 for “strong buy”.

| | Mean | Median | StdDev | Min | Max |
|---|--------|--------|--------|-------|-------|
| Sign of transaction _t | -0.280 | -1.000 | 0.960 | -1.0 | 1.0 |
| BSA recommendation revision _{t+1,t-1} | -0.001 | 0.000 | 0.155 | -1.0 | 1.0 |
| BSA recommendation revision _{t-2,t-5} | -0.001 | 0.000 | 0.113 | -1.0 | 1.0 |
| BSA recommendation revision _{t-6,t-20} | -0.002 | 0.000 | 0.210 | -1.0 | 1.0 |
| Cash Flow _{t,t-1} | -0.174 | -0.086 | 2.345 | -40.8 | 24.9 |
| Cash Flow _{t-2,t-5} | -0.445 | -0.183 | 2.167 | -40.7 | 25.2 |
| Key SSA recommendation revision _{t,t-1} | -0.004 | 0.000 | 0.250 | -4.0 | 3.0 |
| Key SSA recommendation revision _{t-2,t-5} | 0.001 | 0.000 | 0.319 | -4.0 | 3.0 |
| Key SSA recommendation revision _{t-6,t-20} | 0.016 | 0.000 | 0.617 | -6.0 | 5.0 |
| Cons. recommendation revision _{t,t-5} | 0.001 | 0.000 | 0.053 | -1.0 | 0.6 |
| Cons. recommendation revision _{t-6,t-20} | 0.003 | 0.000 | 0.096 | -1.0 | 1.0 |
| Cons. recommendation revision _{t-21,t-120} | 0.036 | 0.040 | 0.227 | -1.1 | 1.1 |
| Cons. earnings revision _{t,t-5} | 0.003 | 0.000 | 0.041 | -1.0 | 1.0 |
| Cons. earnings revision _{t-6,t-20} | 0.010 | 0.000 | 0.068 | -1.0 | 1.0 |
| Cons. earnings revision _{t-21,t-120} | 0.064 | 0.058 | 0.175 | -1.0 | 1.0 |
| Return _{t-1,t-5} | 0.249 | 0.238 | 4.786 | -62.4 | 41.0 |
| Return _{t-6,t-20} | 1.179 | 1.198 | 6.040 | -53.7 | 48.5 |
| Return _{t-21,t-120} | 7.566 | 6.985 | 15.073 | -65.6 | 157.2 |
| BSA recommendation _t | 3.633 | 4.000 | 0.708 | 1.0 | 5.0 |
| Cons. recommendation _t | 3.671 | 3.710 | 0.381 | 2.2 | 4.8 |

Table 2: The distribution of recommendation revisions and associated transactions

This table reports in Panel A the distribution of recommendation revisions for each prior recommendation level. The last column of Panel A shows the distribution of all prior recommendations. Panel B reports the percentage of buy transactions in stocks with a recommendation revision by prior and new recommendation. Percentages are calculated for all transactions in the stock in the period one trading day prior to one trading day after the recommendation revision. BSA recommendations are coded from 1 for “sell” to 5 for “strong buy”.

| Panel A: BSA recommendation revisions: Transition matrix (%) | | | | | | |
|--|-------------------|------|-------|------|-------|------------|
| from rec. | to recommendation | | | | | Sample (%) |
| | 1 | 2 | 3 | 4 | 5 | |
| 1 | . | 50.0 | 50.0 | . | . | 0.3 |
| 2 | 0.9 | . | 83.0 | 15.1 | 0.9 | 16.2 |
| 3 | 0.4 | 33.6 | . | 65.3 | 0.8 | 39.9 |
| 4 | 0.4 | 7.5 | 79.2 | . | 12.9 | 36.6 |
| 5 | . | . | 21.7 | 78.3 | . | 7.0 |
| No. of observations: 536 | | | | | | |
| Panel B: Buy percentage around recommendation revisions | | | | | | |
| from rec. | to recommendation | | | | | |
| | 1 | 2 | 3 | 4 | 5 | |
| 1 | . | . | 100.0 | . | . | |
| 2 | . | . | 70.9 | 90.9 | 100.0 | |
| 3 | 0.0 | 13.0 | . | 86.8 | 100.0 | |
| 4 | 0.0 | 16.0 | 8.0 | . | 64.5 | |
| 5 | . | . | 6.9 | 10.5 | . | |

Table 3: Logit analysis of transaction sign

This table reports parameter estimates and average marginal effects for the logit analysis of fund managers' trading direction. The dependent variable is each transaction's sign and takes on a value of 1 (0) for a buy (sell) transaction. t denotes the day of the transaction. The explanatory variables are described in Table 1. The *Return* and *Cons. earnings revision* variables are normalized to units of 10 percentage points. Standard errors (SE) are given in parentheses. The Change column presents the unit of the change underlying the marginal effect calculation. The R^2 reported is the maximum re-scaled R^2 . BSA and consensus recommendations are coded from 1 for "sell" to 5 for "strong buy".

| Variable | Estimate | SE | Marginal Effects | | |
|---|----------|--------|-------------------|--------|--------|
| | | | Change | Effect | SE |
| Intercept | -0.31 | (0.17) | na | na | na |
| BSA recommendation revision $_{t+1,t-1}$ | 2.06 | (0.15) | +1 | 0.41 | (0.02) |
| | | | -1 | -0.27 | (0.01) |
| BSA recommendation revision $_{t-2,t-5}$ | 1.43 | (0.17) | +1 | 0.30 | (0.03) |
| | | | -1 | -0.22 | (0.02) |
| BSA recommendation revision $_{t-6,t-20}$ | 0.74 | (0.08) | +1 | 0.16 | (0.02) |
| | | | -1 | -0.13 | (0.01) |
| Cash Flow $_{t,t-1}$ | 0.79 | (0.04) | $\pm 1\%$ | 0.16 | (0.01) |
| Cash Flow $_{t-2,t-5}$ | 0.24 | (0.02) | $\pm 1\%$ | 0.05 | (0.00) |
| Key SSA recommendation revision $_{t,t-1}$ | 0.36 | (0.07) | ± 1 | 0.07 | (0.01) |
| Key SSA recommendation revision $_{t-2,t-5}$ | 0.09 | (0.05) | ± 1 | 0.02 | (0.01) |
| Key SSA recommendation revision $_{t-6,t-20}$ | 0.03 | (0.03) | ± 1 | 0.01 | (0.01) |
| Cons. recommendation revision $_{t,t-5}$ | 0.42 | (0.31) | ± 1 | 0.08 | (0.07) |
| Cons. recommendation revision $_{t-6,t-20}$ | 0.91 | (0.17) | ± 1 | 0.18 | (0.04) |
| Cons. recommendation revision $_{t-21,t-120}$ | 0.24 | (0.07) | ± 1 | 0.05 | (0.02) |
| Cons. earnings revision $_{t,t-5}$ | 0.05 | (0.04) | $\pm 10\text{pp}$ | 0.01 | (0.01) |
| Cons. earnings revision $_{t-6,t-20}$ | -0.04 | (0.02) | $\pm 10\text{pp}$ | -0.01 | (0.00) |
| Cons. earnings revision $_{t-21,t-120}$ | 0.01 | (0.01) | $\pm 10\text{pp}$ | 0.00 | (0.00) |
| Return $_{t-1,t-5}$ | 0.29 | (0.04) | $\pm 10\text{pp}$ | 0.06 | (0.01) |
| Return $_{t-6,t-20}$ | -0.11 | (0.03) | $\pm 10\text{pp}$ | -0.02 | (0.01) |
| Return $_{t-21,t-120}$ | -0.05 | (0.01) | $\pm 10\text{pp}$ | -0.01 | (0.00) |
| BSA recommendation $_t$ | 0.05 | (0.02) | ± 1 | 0.01 | (0.01) |
| Cons. recommendation $_t$ | -0.09 | (0.05) | ± 1 | -0.02 | (0.01) |
| R^2 | 0.1892 | | | | |
| No. of observations | 19,566 | | | | |

Table 4: Logit analysis of BSA recommendation revisions

This table reports parameter estimates and average marginal effects for the logit analysis of buy-side analysts' recommendation revisions. The dependent variable is the direction of the recommendation change and equals 1 (0) for an upgrade (downgrade). t denotes the day of the recommendation change. The explanatory variables are described in Table 1. The *Return* and *Cons. earnings revision* variables are normalized to units of 10 percentage points. Standard errors (SE) are given in parentheses. The Change column presents the unit of the change underlying the marginal effect calculation. The R^2 reported is the maximum re-scaled R^2 . BSA and consensus recommendations are coded from 1 for "sell" to 5 for "strong buy".

| Variable | Estimate | SE | Marginal Effects | | |
|---|----------|--------|-------------------|--------|--------|
| | | | Change | Effect | SE |
| Intercept | 0.06 | (0.87) | na | na | na |
| Key SSA recommendation revision $_{t,t-1}$ | 1.36 | (0.40) | ± 1 | 0.30 | (0.09) |
| Key SSA recommendation revision $_{t-2,t-5}$ | 0.56 | (0.27) | ± 1 | 0.12 | (0.06) |
| Key SSA recommendation revision $_{t-6,t-20}$ | 0.32 | (0.15) | ± 1 | 0.07 | (0.03) |
| Cons. recommendation revision $_{t,t-5}$ | 1.55 | (1.33) | ± 1 | 0.34 | (0.30) |
| Cons. recommendation revision $_{t-6,t-20}$ | -0.70 | (1.03) | ± 1 | -0.15 | (0.23) |
| Cons. recommendation revision $_{t-21,t-120}$ | 0.19 | (0.41) | ± 1 | 0.04 | (0.09) |
| Cons. earnings revision $_{t,t-5}$ | 0.15 | (0.35) | $\pm 10\text{pp}$ | 0.03 | (0.08) |
| Cons. earnings revision $_{t-6,t-20}$ | 0.44 | (0.20) | $\pm 10\text{pp}$ | 0.10 | (0.05) |
| Cons. earnings revision $_{t-21,t-120}$ | 0.01 | (0.05) | $\pm 10\text{pp}$ | 0.00 | (0.01) |
| Return $_{t-1,t-5}$ | 0.73 | (0.18) | $\pm 10\text{pp}$ | 0.16 | (0.04) |
| Return $_{t-6,t-20}$ | -0.33 | (0.17) | $\pm 10\text{pp}$ | -0.07 | (0.04) |
| Return $_{t-21,t-120}$ | -0.08 | (0.06) | $\pm 10\text{pp}$ | -0.02 | (0.01) |
| Cons. recommendation $_t$ | -0.06 | (0.25) | ± 1 | -0.01 | (0.06) |
| R^2 | 0.1526 | | | | |
| No. of observations | 534 | | | | |

Table 5: Performance of BSA revisions

This table reports % returns of stocks upgraded and downgraded by the buy-side analysts as well as the difference in returns (in percentage points). Stock returns are calculated using closing prices, starting with the closing price on the event day, and are averaged over each return period. t-statistics are given in brackets. Panel A reports raw returns, Panel B reports abnormal returns using the beta-adjusted MSCI Europe index.

| | Upgrades | | Downgrades | | Difference | |
|---------------------------|----------|---------|------------|---------|------------|--------|
| | Returns | t-stat | Returns | t-stat | Returns | t-stat |
| Panel A: Raw returns | | | | | | |
| 1 day | 0.168 | [1.45] | -0.274 | [-2.16] | 0.442 | [2.58] |
| 1 week | 0.598 | [2.59] | -0.400 | [-1.73] | 0.998 | [3.05] |
| 2 weeks | 1.530 | [4.98] | -0.415 | [-1.25] | 1.944 | [4.30] |
| 3 weeks | 2.051 | [5.18] | -0.146 | [-0.45] | 2.197 | [4.31] |
| 1 month | 1.999 | [4.70] | -0.501 | [-1.39] | 2.500 | [4.48] |
| 2 months | 2.773 | [4.53] | 1.019 | [1.97] | 1.754 | [2.19] |
| 3 months | 3.418 | [4.49] | 1.665 | [2.51] | 1.753 | [1.73] |
| 6 months | 5.772 | [5.56] | 4.166 | [4.76] | 1.606 | [1.18] |
| Panel B: Abnormal returns | | | | | | |
| 1 day | 0.194 | [1.91] | -0.362 | [-3.04] | 0.556 | [3.55] |
| 1 week | 0.448 | [2.23] | -0.408 | [-2.07] | 0.856 | [3.04] |
| 2 weeks | 0.849 | [3.11] | -0.677 | [-2.33] | 1.526 | [3.83] |
| 3 weeks | 0.985 | [2.83] | -0.783 | [-2.91] | 1.768 | [4.02] |
| 1 month | 0.803 | [2.13] | -1.184 | [-3.92] | 1.987 | [4.11] |
| 2 months | 0.392 | [0.67] | -0.896 | [-1.99] | 1.288 | [1.75] |
| 3 months | -0.141 | [-0.20] | -1.281 | [-2.25] | 1.140 | [1.24] |
| 6 months | -0.252 | [-0.26] | -1.193 | [-1.56] | 0.941 | [0.76] |

Table 6: Performance of key SSA recommendation revisions

This table considers the recommendation revisions by key SSAs. The table reports % returns of stocks upgraded and downgraded by these analysts as well as the difference in returns (in percentage points). If there are multiple revisions, the majority of upgrades or downgrades determines the revision direction; for equal numbers of upgrades and downgrades, the revisions are discarded. Stock returns are calculated using closing prices, starting with the closing price on the event day, and are averaged over each return period. t-statistics are given in brackets. Panel A reports raw returns, Panel B reports abnormal returns using the beta-adjusted MSCI Europe index.

| | Upgrades | | Downgrades | | Difference | |
|---------------------------|----------|---------|------------|---------|------------|--------|
| | Returns | t-stat | Returns | t-stat | Returns | t-stat |
| Panel A: Raw returns | | | | | | |
| 1 day | 0.249 | [7.67] | -0.144 | [-4.00] | 0.394 | [8.11] |
| 1 week | 0.591 | [9.22] | 0.002 | [0.03] | 0.589 | [5.99] |
| 2 weeks | 0.781 | [8.76] | 0.059 | [0.63] | 0.722 | [5.55] |
| 3 weeks | 1.068 | [9.99] | 0.346 | [3.07] | 0.722 | [4.64] |
| 1 month | 1.396 | [11.64] | 0.610 | [4.88] | 0.786 | [4.54] |
| 2 months | 2.468 | [14.93] | 1.489 | [8.61] | 0.979 | [4.09] |
| 3 months | 3.537 | [17.13] | 2.325 | [10.97] | 1.212 | [4.10] |
| 6 months | 6.585 | [21.67] | 5.001 | [16.05] | 1.584 | [3.64] |
| Panel B: Abnormal returns | | | | | | |
| 1 day | 0.179 | [6.48] | -0.184 | [-5.60] | 0.363 | [8.46] |
| 1 week | 0.259 | [4.85] | -0.239 | [-3.41] | 0.498 | [5.66] |
| 2 weeks | 0.208 | [2.75] | -0.392 | [-4.61] | 0.600 | [5.27] |
| 3 weeks | 0.209 | [2.31] | -0.403 | [-4.07] | 0.613 | [4.57] |
| 1 month | 0.226 | [2.19] | -0.387 | [-3.53] | 0.613 | [4.07] |
| 2 months | 0.368 | [2.58] | -0.403 | [-2.62] | 0.771 | [3.67] |
| 3 months | 0.340 | [1.89] | -0.664 | [-3.54] | 1.004 | [3.87] |
| 6 months | 0.507 | [1.89] | -0.505 | [-1.85] | 1.012 | [2.64] |

Table 7: BSA revisions and the performance of transactions

This table reports % returns of fund managers' buy and sell transactions as well as the difference in returns (in percentage points). Transactions used are either those with same-directional recommendation revision -1 to +1 trading days around the trade date (columns headed *Upgrade*, *Downgrade* and *Same-dir. Revision*) or those without such a revision -1 to +1 trading days around the trade date (*No Upgrade/Downgrade/Same-dir. Revision*). Stock returns are calculated using closing prices, starting with the closing price on the event day, and are averaged over each return period. t-statistics are given in brackets. Panel A reports raw returns, Panel B reports abnormal returns using the beta-adjusted MSCI Europe index.

| | Buy transactions | | | | Sell transactions | | | | Difference Buy/Sell | | | |
|---------------------------|------------------|---------|------------|---------|-------------------|---------|--------------|---------|---------------------|-----------------------|---------|--------|
| | Upgrade | | No Upgrade | | Downgrade | | No Downgrade | | Same-dir. Revision | No Same-dir. Revision | | |
| | Returns | t-stat | Returns | t-stat | Returns | t-stat | Returns | t-stat | Returns | t-stat | Returns | t-stat |
| Panel A: Raw returns | | | | | | | | | | | | |
| 1 day | 0.297 | [2.13] | 0.095 | [4.59] | -0.759 | [-3.66] | 0.017 | [1.15] | 1.057 | [4.22] | 0.078 | [3.09] |
| 1 week | 0.185 | [0.71] | 0.302 | [7.53] | -1.261 | [-3.60] | 0.161 | [5.22] | 1.446 | [3.31] | 0.141 | [2.79] |
| 2 weeks | 0.938 | [2.63] | 0.591 | [10.78] | -1.777 | [-3.97] | 0.304 | [7.09] | 2.715 | [4.74] | 0.287 | [4.13] |
| 3 weeks | 1.313 | [3.10] | 0.926 | [13.93] | -0.978 | [-2.51] | 0.398 | [7.65] | 2.291 | [3.98] | 0.527 | [6.24] |
| 1 month | 1.310 | [2.47] | 1.083 | [13.97] | -1.280 | [-2.98] | 0.602 | [10.22] | 2.590 | [3.80] | 0.480 | [4.94] |
| 2 months | 2.468 | [3.31] | 1.917 | [18.32] | 0.021 | [0.03] | 1.312 | [15.86] | 2.446 | [2.36] | 0.605 | [4.53] |
| 3 months | 2.621 | [3.08] | 2.526 | [20.62] | 0.884 | [0.92] | 2.338 | [23.38] | 1.737 | [1.35] | 0.187 | [1.18] |
| 6 months | 3.849 | [3.46] | 5.444 | [31.81] | 2.260 | [1.78] | 4.907 | [34.75] | 1.589 | [0.94] | 0.538 | [2.42] |
| Panel B: Abnormal returns | | | | | | | | | | | | |
| 1 day | 0.326 | [2.48] | 0.071 | [3.85] | -0.887 | [-4.38] | -0.008 | [-0.62] | 1.213 | [5.03] | 0.079 | [3.51] |
| 1 week | 0.321 | [1.40] | 0.116 | [3.37] | -1.202 | [-3.60] | -0.070 | [-2.61] | 1.523 | [3.76] | 0.186 | [4.27] |
| 2 weeks | 0.416 | [1.35] | 0.136 | [2.88] | -2.083 | [-4.67] | -0.142 | [-3.89] | 2.499 | [4.61] | 0.278 | [4.66] |
| 3 weeks | 0.580 | [1.60] | 0.229 | [3.95] | -1.599 | [-4.27] | -0.258 | [-5.70] | 2.180 | [4.17] | 0.486 | [6.62] |
| 1 month | 0.497 | [1.06] | 0.204 | [2.99] | -1.824 | [-4.50] | -0.239 | [-4.73] | 2.321 | [3.75] | 0.443 | [5.21] |
| 2 months | 0.456 | [0.65] | 0.267 | [2.82] | -1.771 | [-2.72] | -0.422 | [-5.89] | 2.227 | [2.33] | 0.689 | [5.81] |
| 3 months | -0.242 | [-0.31] | -0.110 | [-1.01] | -2.202 | [-2.51] | -0.325 | [-3.69] | 1.960 | [1.67] | 0.214 | [1.53] |
| 6 months | -1.214 | [-1.14] | 0.093 | [0.62] | -3.264 | [-2.97] | -0.071 | [-0.57] | 2.050 | [1.34] | 0.164 | [0.84] |

Table 8: Return differences for transactions with or without BSA revisions

This table reports the difference in returns (in percentage points) between fund managers' buy and sell transactions for stocks with same-directional BSA revisions during the period -1 to +1 trading days around the trade date and for stocks with no such revisions in that period. The last two columns present the difference in these differences between the two samples. Stock returns are calculated using closing prices, starting with the closing price on the event day, and are averaged over each return period. t-statistics are given in brackets. Panel A reports raw returns, Panel B reports abnormal returns using the beta-adjusted MSCI Europe index.

| | Same-dir. Revision | | No Same-dir. Revision | | Difference | |
|---------------------------|--------------------|--------|-----------------------|--------|------------|--------|
| | Returns | t-stat | Returns | t-stat | Returns | t-stat |
| Panel A: Raw returns | | | | | | |
| 1 day | 1.057 | [4.22] | 0.078 | [3.09] | 0.979 | [3.89] |
| 1 week | 1.446 | [3.31] | 0.141 | [2.79] | 1.304 | [2.96] |
| 2 weeks | 2.715 | [4.74] | 0.287 | [4.13] | 2.428 | [4.21] |
| 3 weeks | 2.291 | [3.98] | 0.527 | [6.24] | 1.764 | [3.03] |
| 1 month | 2.590 | [3.80] | 0.480 | [4.94] | 2.110 | [3.06] |
| 2 months | 2.446 | [2.36] | 0.605 | [4.53] | 1.841 | [1.76] |
| 3 months | 1.737 | [1.35] | 0.187 | [1.18] | 1.550 | [1.20] |
| 6 months | 1.589 | [0.94] | 0.538 | [2.42] | 1.052 | [0.62] |
| Panel B: Abnormal returns | | | | | | |
| 1 day | 1.213 | [5.03] | 0.079 | [3.51] | 1.134 | [4.68] |
| 1 week | 1.523 | [3.76] | 0.186 | [4.27] | 1.337 | [3.28] |
| 2 weeks | 2.499 | [4.61] | 0.278 | [4.66] | 2.221 | [4.07] |
| 3 weeks | 2.180 | [4.17] | 0.486 | [6.62] | 1.693 | [3.21] |
| 1 month | 2.321 | [3.75] | 0.443 | [5.21] | 1.879 | [3.01] |
| 2 months | 2.227 | [2.33] | 0.689 | [5.81] | 1.538 | [1.60] |
| 3 months | 1.960 | [1.67] | 0.214 | [1.53] | 1.746 | [1.47] |
| 6 months | 2.050 | [1.34] | 0.164 | [0.84] | 1.886 | [1.23] |

Table 9: Performance of transactions around key SSA recommendation revisions

This table reports % returns of fund managers' buy and sell transactions with revisions by key SSAs -1 to 0 trading days around the trade date. If there are multiple revisions, the majority of upgrades or downgrades determines the revision direction; for equal numbers of upgrades and downgrades, the transactions are discarded. Returns are reported for buys and sells, differentiated by whether the key SSA revisions are upgrades or downgrades as well as aggregated over all buys or sells. Stock returns are calculated using closing prices, starting with the closing price on the event day, and are averaged over each return period. t-statistics are given in brackets. Panel A reports raw returns, Panel B reports abnormal returns using the beta-adjusted MSCI Europe index.

| | Buy transactions | | | | Sell transactions | | | | All Buys | | All Sells | |
|---------------------------|------------------|---------|------------------|---------|-------------------|---------|------------------|---------|----------|---------|-----------|---------|
| | Upgrade | | Downgrade | | Upgrade | | Downgrade | | Returns | t-stat | Returns | t-stat |
| | (Congruent Buy) | | (Contrarian Buy) | | (Contrarian Sell) | | (Congruent Sell) | | | | | |
| | Returns | t-stat | Returns | t-stat | Returns | t-stat | Returns | t-stat | Returns | t-stat | | |
| Panel A: Raw returns | | | | | | | | | | | | |
| 1 day | 0.026 | [0.23] | 0.001 | [0.00] | -0.082 | [-0.92] | -0.473 | [-3.36] | 0.016 | [0.18] | -0.314 | [-3.44] |
| 1 week | 0.710 | [3.10] | -0.035 | [-0.15] | -0.089 | [-0.50] | -0.223 | [-0.69] | 0.427 | [2.52] | -0.169 | [-0.83] |
| 2 weeks | 1.033 | [3.58] | 0.447 | [1.43] | 0.228 | [0.87] | -1.243 | [-3.82] | 0.810 | [3.77] | -0.645 | [-2.91] |
| 3 weeks | 1.174 | [3.53] | -0.147 | [-0.38] | 0.202 | [0.74] | -1.752 | [-4.59] | 0.671 | [2.64] | -0.958 | [-3.77] |
| 1 month | 1.414 | [3.83] | 0.266 | [0.59] | 0.562 | [1.76] | -1.346 | [-3.48] | 0.977 | [3.40] | -0.571 | [-2.15] |
| 2 months | 1.706 | [3.40] | 0.407 | [0.59] | 1.474 | [3.22] | -0.958 | [-1.75] | 1.212 | [2.97] | 0.031 | [0.08] |
| 3 months | 2.580 | [4.28] | 0.706 | [0.62] | 1.144 | [1.76] | -0.044 | [-0.07] | 1.867 | [3.25] | 0.439 | [0.97] |
| 6 months | 4.819 | [4.66] | 2.271 | [1.68] | 2.577 | [2.83] | 1.248 | [1.45] | 3.850 | [4.68] | 1.788 | [2.83] |
| Panel B: Abnormal returns | | | | | | | | | | | | |
| 1 day | 0.051 | [0.60] | -0.042 | [-0.34] | -0.089 | [-1.19] | -0.536 | [-3.99] | 0.016 | [0.22] | -0.354 | [-4.14] |
| 1 week | 0.439 | [2.27] | -0.457 | [-2.18] | -0.457 | [-2.94] | -0.330 | [-0.99] | 0.098 | [0.68] | -0.381 | [-1.84] |
| 2 weeks | 0.211 | [0.89] | -0.466 | [-1.72] | -0.357 | [-1.58] | -1.584 | [-4.84] | -0.047 | [-0.26] | -1.085 | [-5.02] |
| 3 weeks | 0.213 | [0.77] | -1.059 | [-3.40] | -0.615 | [-2.61] | -2.206 | [-6.47] | -0.271 | [-1.29] | -1.559 | [-6.91] |
| 1 month | 0.132 | [0.42] | -0.788 | [-2.10] | -0.430 | [-1.64] | -2.123 | [-6.24] | -0.218 | [-0.90] | -1.434 | [-6.24] |
| 2 months | -0.404 | [-0.94] | -1.086 | [-1.92] | -0.252 | [-0.65] | -2.402 | [-4.95] | -0.663 | [-1.94] | -1.528 | [-4.62] |
| 3 months | -1.111 | [-2.12] | -1.635 | [-1.64] | -1.526 | [-2.53] | -2.938 | [-5.28] | -1.310 | [-2.63] | -2.364 | [-5.73] |
| 6 months | -1.529 | [-1.69] | -1.679 | [-1.51] | -2.133 | [-2.45] | -3.603 | [-4.77] | -1.586 | [-2.26] | -3.005 | [-5.26] |

Table 10: Return differences for transactions with key SSA recommendation revisions

This table reports the difference in returns (in percentage points) between fund managers' buy and sell transactions for stocks with revisions by key SSAs -1 to 0 trading days around the trade date. Return differences are reported for transactions around upgrades (*SSA Upgrade Trades*) and downgrades (*SSA Downgrade Trades*); for trades with same-directional SSA revisions (*SSA Congruent Trades*) and with opposite SSA revisions (*SSA Contrarian Trades*); and for all trades with SSA revisions (*All SSA Trades*). Stock returns are calculated using closing prices, starting with the closing price on the event day, and are averaged over each return period. t-statistics are given in brackets. Panel A reports raw returns, Panel B reports abnormal returns using the beta-adjusted MSCI Europe index.

| | SSA Upgrade Trades | | SSA Downgrade Trades | | SSA Congruent Trades | | SSA Contrarian Trades | | All SSA Trades | |
|---------------------------|--------------------|---------|----------------------|---------|----------------------|--------|-----------------------|---------|----------------|--------|
| | Returns | t-stat | Returns | t-stat | Returns | t-stat | Returns | t-stat | Returns | t-stat |
| Panel A: Raw returns | | | | | | | | | | |
| 1 day | 0.108 | [0.74] | 0.474 | [2.37] | 0.499 | [2.76] | 0.083 | [0.49] | 0.330 | [2.60] |
| 1 week | 0.799 | [2.76] | 0.189 | [0.47] | 0.934 | [2.37] | 0.054 | [0.18] | 0.595 | [2.25] |
| 2 weeks | 0.805 | [2.07] | 1.690 | [3.74] | 2.276 | [5.23] | 0.219 | [0.54] | 1.455 | [4.71] |
| 3 weeks | 0.972 | [2.26] | 1.606 | [2.97] | 2.926 | [5.78] | -0.348 | [-0.74] | 1.629 | [4.53] |
| 1 month | 0.853 | [1.75] | 1.613 | [2.70] | 2.761 | [5.16] | -0.295 | [-0.53] | 1.548 | [3.95] |
| 2 months | 0.232 | [0.34] | 1.364 | [1.55] | 2.664 | [3.59] | -1.068 | [-1.29] | 1.180 | [2.13] |
| 3 months | 1.436 | [1.62] | 0.750 | [0.57] | 2.625 | [3.03] | -0.438 | [-0.33] | 1.428 | [1.95] |
| 6 months | 2.243 | [1.63] | 1.023 | [0.64] | 3.571 | [2.65] | -0.305 | [-0.19] | 2.061 | [1.99] |
| Panel B: Abnormal returns | | | | | | | | | | |
| 1 day | 0.140 | [1.23] | 0.494 | [2.71] | 0.587 | [3.69] | 0.046 | [0.32] | 0.370 | [3.33] |
| 1 week | 0.895 | [3.61] | -0.127 | [-0.32] | 0.768 | [2.00] | 0.000 | [0.00] | 0.479 | [1.90] |
| 2 weeks | 0.568 | [1.74] | 1.118 | [2.63] | 1.795 | [4.44] | -0.109 | [-0.31] | 1.039 | [3.70] |
| 3 weeks | 0.828 | [2.28] | 1.146 | [2.48] | 2.419 | [5.51] | -0.444 | [-1.14] | 1.288 | [4.18] |
| 1 month | 0.561 | [1.37] | 1.335 | [2.64] | 2.255 | [4.85] | -0.358 | [-0.78] | 1.216 | [3.63] |
| 2 months | -0.152 | [-0.26] | 1.317 | [1.77] | 1.998 | [3.08] | -0.834 | [-1.21] | 0.865 | [1.82] |
| 3 months | 0.415 | [0.52] | 1.303 | [1.14] | 1.827 | [2.39] | -0.108 | [-0.09] | 1.053 | [1.63] |
| 6 months | 0.604 | [0.48] | 1.924 | [1.43] | 2.074 | [1.76] | 0.454 | [0.32] | 1.419 | [1.57] |

Table 11: Profits generated by BSA-induced round-trip transactions

This table reports the average realized trading profit for round-trip transactions. The transactions used are those with same-directional BSA recommendation revision -1 to +1 trading days around the initial trade date that also have transactions reverting the initial trade. Profits are calculated without market adjustment (*Raw profits*), adjusted for an equal investment in the MSCI Europe index (*Market-adjusted profits*) and for a beta-adjusted investment into the MSCI Europe index (*β -adjusted profits*). Stock prices used are reported transaction prices. Profits are calculated both gross and net of transaction costs. Transaction costs applied to the benchmark or risk-adjusted benchmark are 5 basis points. t-statistics are given in brackets.

| | Gross of transaction costs | | Net of transaction costs | |
|---------------------------|----------------------------|--------|--------------------------|--------|
| | Mean (€) | t-stat | Mean (€) | t-stat |
| Raw profits | 109,676 | [2.52] | 98,610 | [2.27] |
| Market-adjusted profits | 81,695 | [1.98] | 73,951 | [1.78] |
| β -adjusted profits | 57,955 | [1.56] | 49,949 | [1.34] |
| No. of round-trips | 346 | | | |