A glimpse behind a closed door: The investment value of buy-side research and its effect on fund trades and performance

by

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School of Management, University of Texas at Dallas, Richardson TX 75080. We alone are responsible for all errors.

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1. Introduction

To attract capital, managers of active mutual funds have to convince investors that they can outperform various benchmarks. To consistently outperform benchmarks, fund managers must have access to superior information. The primary sources of their information are sell-side analysts, informal networks, and in-house buy-side analysts.[1] A large volume of studies has provided us with considerable insights into the value of sell-side analyst research, and its influence on fund performance (Womack, 1996; Barber, Lehavy, McNichols, and Trueman, 2001, 2006; Irvine, Lipson, and Puckett, 2007; and Kacperczyk and Seru, 2007). Several recent studies have also given us insights into the impact of informal networks on fund holdings and fund performance (see, for example, Coval and Moskowitz, 1999; Frazzini, Cohen and Malloy, 2008). In contrast, though the vast sums spent by fund management companies to maintain teams of buy-side analysts suggests that their research may be the main impetus behind fund performance, few studies have examined buy-side research (Cheng, Liu and Qian, 2006; Groysberg, Healy, Chapman and Shanthikumar, 2010; and Frey and Herbst, 2011).[2]

The primary reason for the paucity of studies on buy-side research is that it is proprietary and thus, typically not publicly observable. Researchers have adopted indirect measures of buy-side research to overcome this roadblock. For example, Cheng, Liu and Qian (2006) infer the use of buy-side research by individual funds from the Nelson's Directory of Investment Managers survey data on reliance on buy-side research at the fund family level. Kacperczyk and Seru (2007) estimate a fund's reliance on sell-side research to infer its use of other information sources including buy-side research. These indirect approaches to studying buy-side research have

[1] Fund managers can also obtain information from insiders. The recently completed trial of the founder of the Galleon fund, Raj Rajarathnam, provides many examples of the use of inside information by fund managers.

[2] For example, the Tabb Group (2006) estimates that fund management companies in the US and UK spend more on buy-side research annually than on sell-side research (USD 7.7 billion versus USD 7). Moreover, Cheng, Liu and Qian (2006) document that fund companies self report that they place much greater reliance on buy-side research.

limitations. For example, the self-reported data used by Cheng, Liu and Qian (2006) may be contaminated because fund families' may exaggerate their reliance on proprietary buy-side research, and Kacperczyk and Seru's (2007) approach does not isolate the effect of buy-side research. Therefore, their findings need validation with direct measures of buy-side research.

In this paper, we examine a unique proprietary database of stock research by buy-side analysts. These analysts work for a large fund management company (the company) with well over $200 billion under management. We combine this buy-side research database with data on the equity holdings of mutual funds managed by the company to address the following questions regarding buy-side research: does buy-side research have investment value? How does the investment value of buy-side research compare with that of sell-side research for the same stocks? How do portfolio managers working for the company utilize its in-house and sell-side research? Does the reliance on buy-side research affect the performance of the portfolios?

The primary responsibility of the buy-side analysts we study is to produce estimates of the "excess return" for each stock they cover. The excess return, which we refer to as buy-side alpha, is the difference between the return the analyst expects a stock to earn based on her estimate of the firm's fundamental value and the discount rate she uses to value it.[3] The entire cross-section of the buy-side alpha estimates produced by the team of analysts resides in an online database that can be accessed in real time by all fund managers employed by the company. Our data consists of monthly snapshots of the complete cross-section of buy-side alpha estimates produced by the team of analysts covering large cap US stocks between 1980 and 2007. Since we are interested in benchmarking buy-side research against sell-side recommendations from I/B/E/S, we restrict our attention to data from 1994 to 2007.

[3] All the analysts working for the company have to use the same proprietary fundamental valuation model. The model relies on the analysts' estimates of future earnings and profitability. To limit biases in valuations, some of the inputs are not made by the analyst covering the stock but by a team of senior analysts for all stocks. For example, the senior analyst team sets the discount rate for each stock.

We conduct two tests to examine the investment value of the buy-side alphas. First, we compare the returns on portfolios of stocks constructed based on the buy-side alphas. We find that, during the month following portfolio formation, portfolios of stocks with the higher buy-side alphas earn higher returns. Both the raw and risk-adjusted returns of stocks with highest buy-side alphas are an economically and statistically significant 40 basis points higher than returns of stocks with the lowest alphas. Second, we examine the returns on zero investment portfolios with long positions in stocks whose alpha estimates have risen and short positions in stocks whose estimates have fallen. We find that these portfolios generate an economically meaningful excess return of up to 60 basis points in the first quarter after formation. Overall, these findings indicate that buy-side alphas have short-term investment value.

Buy- and sell-side research can be viewed as substitutes. We find that they are quite different for the set of stocks covered by both sets of analysts. The buy-side alphas are decreasing in consensus sell-side recommendations. Moreover, changes in buy-side alphas are negatively correlated with changes in consensus sell-side recommendations; consensus sell-side recommendations fall (increase) for stocks whose buy-side alphas rise (fall). These patterns suggest that, although the buy-side analysts interact extensively with sell-side analysts and have access to sell-side research reports, they do not simply copy sell-side research.

Therefore, we compare the investment values of buy- and sell-side research. Specifically, we compare the performance of portfolios constructed on the basis of changes in buy side alphas and consensus sell-side recommendations. We find that, for up to one quarter after their formation, portfolios based on buy-side alpha increases (upgrades) generate higher risk-adjusted returns than portfolios based on consensus sell-side upgrades. Over the same time horizons, portfolios based on buy-side alpha decreases (downgrades) generate lower returns than portfolios based on consensus sell-side downgrades. However, this performance difference is not statistically significant. This evidence suggests that buy-side alpha changes, especially buy-side upgrades, have greater investment value than sell-side recommendation changes. The superior

performance of buy-side upgrades is consistent with prior evidence that sell-side analysts tend to issue inflated recommendations (Womack, 1996).

To see whether differences in the investment values of buy- and sell-side research vary across stocks, we examine whether buy- and sell-side upgrades and downgrades perform differently for stocks that are hard to value. We find that buy-side alpha changes outperform sell-side recommendation changes by a significantly greater margin for stocks that have higher return or cash flow volatility. Moreover, for these stocks, both buy-side upgrades and downgrades outperform sell-side recommendation upgrades and downgrades, respectively. This evidence suggests that, at least part of the superior performance of buy-side analysts could arise from their superior skills, as opposed to differences in analyst incentives.

To gain insight into how fund managers use the buy- and sell-side research, we study the sensitivity of the stock trades made by the company's portfolio managers to changes in buy-side alphas and consensus sell-side recommendations. We find that managers buy stocks that have been upgraded by the buy-side analysts and sell stocks that have been downgraded. Moreover, larger buy-side upgrades (downgrades) are associated with larger additions to (reductions in) holdings. The sensitivity to buy-side research remains strong after we control for changes in sell-side recommendations. This evidence indicates that, despite access to sell-side research, the portfolio managers consider buy-side research as an essential input to their investment decisions.

Since our sample of mutual funds is dominated by large cap and value-oriented funds, there is little cross-sectional variation in sell-side coverage of their holdings. However, buy-side coverage of the holdings varies significantly. Therefore, we examine whether the managers' response to sell-side research varies with buy-side coverage. We find that trades become less sensitive to changes in consensus sell-side recommendation as the level of buy-side coverage rises. We also find that trades in stocks that are covered by buy-side analysts are insensitive to changes in the consensus sell-side recommendations. However, trades in stocks that are not

covered by buy-side analysts are sensitive to and consistent with changes in the consensus sell-side recommendations.

One interpretation of these results is that the portfolio managers believe that sell-side research is not informative for the large capitalization stocks in which they tend to invest (Frankel, Kothari and Weber, 2006; and Loh and Stulz, 2010). Therefore, we repeat the analysis after controlling for the stocks' market capitalizations. We still find that trades are only sensitive to changes in consensus sell-side recommendations when there is no buy-side coverage for the stock. It appears, therefore, that even though buy- and sell-side research may be substitutes, the portfolio managers pay little attention to sell-side research when buy-side research is available. The managers may be more responsive to buy-side research because they have timely and exclusive access to complementary soft information from the in-house buy-side analysts and only limited access to such information from sell-side analysts. They may also prefer buy-side research because it affords them greater job security; poor performance may be more palatable to the company if it arises from a reliance on buy- rather than sell-side research.

Several studies suggest that sell-side research spills over to related firms by influencing investors in these firms (Chan and Hameed, 2006; and Hameed, Morck, Shen and Young, 2010). We test for spillovers from buy-side research by examining how buy-side alpha changes affect trades in stocks belonging to the same two-digit SIC industry, i.e., related stocks. We find evidence of spillovers that vary with the availability of buy-side coverage. Specifically, when no buy-side analyst covers a stock, portfolio managers tend to buy (sell) the stock following buy-side upgrades (downgrades) of related stocks. This pattern suggests that portfolio managers infer information on stocks without buy-side coverage from buy-side alpha estimates of related stocks. Moreover, this result supports the idea that the managers value buy-side research and do not use it only because they are concerned about job security.

Our final set of tests focuses on the effect of buy-side research on fund performance. We examine how the performance of the fund portfolios varies with two alternative measures of their

reliance on buy-side research. The first measure is the percentage of the portfolio's stock holdings covered by buy-side analysts. The second measure, in the spirit of Kacperczyk and Seru (2007), proxies for reliance on buy-side research by the sensitivity of past trades to buy-side alpha revisions. We find that portfolio performance improves with the reliance on buy-side research. This indicates that the managers successfully capitalize on the investment value of the buy-side research.

The remainder of the paper is organized as follows: Section 2 contains a discussion of related research. In Section 3, we describe our sample. Section 4 contains tests of the investment value of the buy-side research, including comparisons of the investment values of buy- and sell-side research. In Section 5, we examine the sensitivity of fund trades to buy- and sell-side research. Section 6, contains our analysis of the effect of buy-side research on fund performance. Section 7 contains a summary of our findings and our conclusion.

2. Related research

Our study is closest to Groysberg, Healy, Chapman and Shanthikumar (2010) and Frey and Herbst (2011) that also examine buy-side research using proprietary data obtained from large fund management companies. Like our analysis, Groysberg et al (2010) benchmarks the performance of buy-side research against the performance of sell-side research. However, unlike our analysis, it does not examine the impact of buy-research on the trades or performance of affiliated funds. Moreover, in contrast to our findings, Groysberg et al (2010) conclude that sell-side research is more valuable than buy-side research. This difference regarding the value of buy-side research differs likely arises from the difference in our research designs. We compare buy- and sell-side research for stocks covered by both sets of analysts, while Groysberg et al (2010) evaluate the investment value of sell-side research using the entire universe of stocks covered by sell-side analysts. In fact, they conclude the difference in the investment value of these two sets of

research is primarily attributed to the investment value of sell-side research for stocks that are not covered by buy-side analysts.

Frey and Herbst (2011) examine the value of research on European stocks produced by buy-side analysts employed by a large European fund manager. Like us, Frey and Herbst (2011) conclude that buy-side research has investment value, fund managers rely more on buy- than sell-side information, and increased reliance on buy-side research leads to better fund performance. However, their study does not benchmark the performance of buy-side against sell-side research. Moreover, because their study does not control for the reliance of funds on sell-side research, it is not clear to what extent its findings on the relation between buy-side research and fund performance are driven by managers' usage of information from sell-side research.

Cheng, Liu and Qian (2006) also study reliance on buy-side research and its effect on fund performance. Instead of using direct measures of buy-side research, this study utilizes survey data compiled by Nelsons Directory of Investment Managers. Their primary variable of interest is a statistic on each fund company's reliance buy-side research, limiting its usefulness in studying the influence of buy-side research across individual stocks and funds. However, like us they find that fund performance improves with increased reliance on buy-side research.

3. Data and sample

A large global fund management company has given us access to data on research produced by its team of buy-side analysts. The company has maintained a sizable team of analysts since 1980. The analysts gather information via meetings with company management (about 7,000 meetings in a typical year), reviews of company files, interviews with industry contacts, and reviews of relevant articles from various publications. They frequently communicate with sell-side analysts and receive sell-side analyst reports. However, the company's guidelines for the analysts explicitly state that they should minimize their reliance on inputs from sell-side analysts.

The analysts are required to produce estimates of the intrinsic value of each stock they cover through fundamental analysis using a proprietary valuation model. They use this intrinsic valuation to estimate each stock's expected return. Their main output, "alpha", is the difference between a stock's expected return estimate and the discount rate they use to value it.[4] The analysts do not provide any explicit stock recommendations other than these alphas to portfolio managers. Starting in 1980, the fund company has maintained a system to keep track of the buy-side alpha estimates. Portfolio managers employed by the company have real time access to these estimates via the system. The company maintains an archive of monthly snapshots of the alpha estimates and has given us access to the entire dataset. To facilitate comparisons with sell-side research, however, we only focus on data from 1994 to 2007 when we have information for both buy-side alpha and sell-side recommendations.

3.1. Buy- and sell-side analyst coverage

Typically, each buy-side analyst in our sample covers multiple stocks and only one analyst covers a stock. Table 1 presents data on the evolution of the company's buy-side coverage. The number of analysts employed by the company has risen steadily over time. However, the number of stocks covered by the research team has remained constant around 500. As a result, the number of stocks covered by each analyst has dropped significantly, from about 60 stocks/analyst in the 1990s to about 22 stocks/analyst in the 2000s. The turnover rate in the analyst team is relatively low.[5] Moreover, unlike sell-side analysts who often concentrate on researching stocks from a single industry, these analysts cover stocks from 3 to 5 industries based upon 2-digit SIC code.

[4] Individual analysts do not have any discretion over the discount rate they use for a stock. A team of senior analysts sets the discount rates and several other model parameters for each stock.

[5] In unreported analysis, we find that the tenure of an average buy-side analyst in our sample is about 5 years. Hong and Kubik (2003) report that although an analyst remains in their I/B/E/S sample for over four years on average, 14.32% of their sample analysts change brokerage houses each year.

We infer the buy-side analysts' valuation signals from their estimated alphas: they expect stocks with higher alphas to outperform stocks with lower alphas. Consistent with the company's perspective, we view an increase in alpha as a recommendation "upgrade" and a decrease in alpha a recommendation "downgrade". Since extremely small alpha changes could be due to rounding errors, we view alpha changes ranked in the lowest 5% in absolute value as equivalent to a "no change" recommendation. Lastly, to reduce the influence of stale alpha estimates, we focus our analysis on actively covered stocks. We define an actively covered stock as one where a buy-side analyst has changed at least one of the parameters for firm fundamentals used to compute the firm's value during at least two quarters in a specific year.

We obtain sell-side analyst recommendations from the I/B/E/S historical detailed recommendation files, which start from 1994. We only consider sell-side recommendations that have been issued within the past 180 days. While there is typically only one buy-side alpha estimate for each stock during each month, there are recommendations from multiple sell-side analysts. Therefore, we compare the buy-side alpha estimates with consensus sell-side recommendation for each stock. To facilitate these comparisons, we also reverse the I/B/E/S recommendation code so that the favorable recommendation has a value of 5 while the least favorable one has a value of 1. More than 90% of the stocks covered by buy-side analysts also have sell-side coverage. We focus our analysis on the set of stocks that is covered by both buy- and sell-side analysts. This ensures that our findings are not influenced by the differences in the coverage of the two sets of analysts. However, when it is appropriate, we also extend our analysis to include stocks that are not covered by both sets of analysts.

Since the company manages primarily large-cap value funds, the buy-side analysts follow stocks that are comparable to those in the S&P 500 universe. Panel A of Table 2 presents summary statistics for stocks covered by both buy- and sell-side analysts. These are mostly large cap stocks with mean market values in excess of $18 billion. Since almost all the stocks have large market capitalizations, in our subsequent analysis, we will focus on equally-weighted

portfolios of these stocks. Consistent with their large market capitalizations, these stocks are, on average, followed by more than 6 sell-side analysts. Finally, the average book-to-market ratio of this set of stocks is about 0.49 suggesting that the firms are "healthy".[6]

3.2. Fund characteristics and holdings

From Thomson Reuters, we collect data on the stock positions of equity mutual funds managed by the fund management company during our sample period.[7] This data is in the form of quarter end "snapshots" of portfolio holdings. Following Kacperczyk and Seru (2007), we infer each fund's purchases and sales from changes in its quarterly positions. We compute each fund's performance using the value-weighted DGTW (1997) adjusted-return on its quarterly stock holdings with the value of each holding as the weight.[8] For a fund to be included in our sample, it has to hold at least 10 stocks and have a minimum total net asset (TNA) value of $5 million.

Panel B of Table 2 reports summary statistics for funds in our sample. The number of funds each year varies between eight and 48. The average TNA of the funds is $441 million. The average fund holds a portfolio of more than 100 stocks. These statistics are not surprising given that the company is well established and has maintained a well-regarded research team since the 1980s. The average stock held by these funds has market capitalization of $27 billion, which is consistent with the tendency of the buy-side analysts to primarily cover stocks that are comparable to those in the S&P 500 universe. Therefore, overall, it appears that the buy-side research is tailored to serve the interests of funds managed by the company. However, the funds make significant investment in stocks that are not covered by the buy-side analysts. On average, while more than 93% of the funds' holdings are followed by sell-side analysts, only 55% of the

[6] We measure the book-to-market ratio (B/M) as the ratio of book value to market value of equity, as of the prior December.

[7] Since quite a few funds managed by the fund management company are foreign funds with significant US equity investments, they often cannot be matched to the CRSP mutual fund database or Morningstar data.

[8] Since our objective is to compare the impact of buy-side versus sell-side research on individual stocks invested by our sample funds, we focus on the performance of the equity portion of the fund portfolio instead of the after-fee performance of the entire fund.

stocks they invest in are covered by the buy-side analysts. There is also considerable dispersion in buy-side coverage of fund holdings; buy-side analysts cover 68% of the holdings of funds in the highest quartile of buy-side coverage, and only 26% of the holdings of funds in the bottom quartile.

3.3. Buy-side alphas and stock characteristics

In Panel A (Panel B) of Table 3, we present statistics that describe the relation between stock characteristics and buy-side alphas (buy-side upgrades and downgrades). To compute the statistics in Panel A, each month we sort stocks into quintile portfolios using buy-side alphas. The statistics we present are the time-series averages of statistics for each quintile portfolio over our sample period. There is considerable dispersion in average buy-side alphas across the quintile portfolios. For stocks in the highest quintile, the average buy-side alpha is 11.7%. In contrast, in the lowest quintile the average buy-side alpha is -4.53%. The difference between the average values of these two sets of buy-side alphas is highly significant.

The average sell-side recommendation for each of the quintile portfolios is between "hold" and "buy". This is consistent with prior research that argues that the fear of losing brokerage or investment banking businesses makes sell-side analysts reluctant to issue sell recommendations (Womack, 1996). Interestingly, the average sell-side recommendation for the highest buy-side alpha quintile is significantly lower than the average sell-side recommendation for the lowest buy-side quintile (3.51 vs 3.74). Moreover, the average sell-side recommendation declines monotonically in the average buy-side alpha. This suggests that buy-side analysts have very different views on the investment values of stocks than sell-side analysts, possibly because of differences in their valuation models or incentives.

The buy-side analysts assign lower alphas to stocks with higher prior quarter and prior month returns. Although the relation is not strictly monotonic, they also tend to assign lower alphas to stocks with lower book-to-market ratios. These patterns suggest that buy-side analysts

follow a contrarian valuation model. Consistent with the large-cap investment style of funds managed by the company and the evidence in Table 2, there is little variation in the market capitalization of the stocks across the quintile portfolios.

The last two columns of Panel A contain information on the return volatility and operating performance volatility of stocks. We use the standard deviation of net income in the past four quarters normalized by the average assets during the same period (*VOL_NI*) to capture the volatility of operating performance. We use the standard deviation of daily returns in the prior quarter (*VOL_RET*) to capture return volatility.[9] Higher values of these two variables indicate a more challenging information environment that makes it more difficulty for analysts to value stocks. There is little difference between the return and cash flow volatilities of high and low buy-side alpha stocks. This indicates that there is little difference between the information environments of stocks with high and low buy-side alphas, suggesting that buy-side alphas do not merely reflect information risk.

In Panel B, we present the time-series averages of the average characteristics of the stocks that are upgraded and downgraded by buy-side analysts each month in our sample period. Again, we find a strong inverse relation between the actions of buy- and sell-side analysts; stocks that are upgraded (downgraded) by buy-side analysts are on average downgraded (upgraded) by sell-side analysts. This is another indication that, although buy-side analysts have access to sell-side research, they reach different conclusions than sell-side analysts. The stocks buy-side analysts upgrade earn higher returns in the prior quarter (5.1%) than stocks they downgrade (3.6%). The stocks they upgrade also have lower book-to-market ratios than the stocks they downgrade (0.49 vs 0.50). The higher return on upgraded stocks suggests that buy-side analysts estimate changes are consistent with recent changes in the market's perception of the stocks. The

[9] We require four consecutive quarterly observations of net income to compute the volatility of cash flows and at least 30 observations of daily returns to compute the volatility of returns.

lower book-to-market ratio for upgraded stocks suggests that the buy-side analysts are more likely to upgrade stocks with that are viewed more favorably by investors.

4. The investment value of buy-side research

In this section, we present evidence on the investment value of the buy-side alpha estimates. First, we examine the returns of portfolios formed on the basis of these estimates. Then we examine the returns of portfolios formed on the basis of buy-side analyst upgrades and downgrades.

4.1. Returns from investing based on buy-side alphas

We first examine whether buy-side alphas can help predict future returns. Each month we form quintile portfolios based upon stocks' buy-side alphas and examine their future performance. In Panel A of Table 4, we present quintile portfolio returns for the first month following their construction. We present return estimates for both equally-weighted and value-weighted portfolios. During the first month following portfolio formation, equally-weighted portfolios of high buy-side alpha stocks generate higher raw returns than portfolios of low alpha stocks. Since high and low buy-side alpha stocks may have distinctively different risk profiles and stock characteristics, we also compare their DGTW stock-characteristic-based abnormal returns. The DGTW-adjusted returns on the equally-weighted portfolios increase monotonically from -4 basis points for the lowest quintile portfolio to 39 basis points for the highest quintile portfolio. This 43 basis point difference is statistically significant at the five percent level. We find a similar return spread when examining value-weighted buy-side alpha quintile portfolios (42 basis points).

In unreported analysis, we have also examined the performance of the buy-side alpha portfolios for holding periods longer than one month. The pattern of returns for one quarter holding periods is similar to the pattern of the one month returns presented in Panel A; returns increase with buy-side alphas and the differences between the returns on the highest and lowest

quintile portfolios are both statistically and economically significant. The buy-side alphas do not appear to have strong explanatory power beyond one quarter. These findings suggest that, like the investment value of sell-side analyst, the investment value of buy-side research is short-lived (see, for example, Womack, 1996; Barber, Lehavy, McNichols, and Trueman, 2001). The limited investment value of the buy-side alphas beyond one quarter is also consistent with Frey and Herbst (2011). They find that recommendations produced by buy-side analysts researching European stocks for a European fund management are informative for one month after the recommendation is issued.

4.2. Returns from investing based on changes in buy-side alphas

Changes in buy-side alpha estimates may also signal future returns. These changes are more likely to reflect the buy-side analysts' recent beliefs and thus, could be more timely indicators of analysts' assessments than their outstanding alpha estimates themselves. This is indeed the case for changes in consensus sell-side recommendations (see, for example, Jegadeesh, Kim, Krische, and Lee, 2004). Therefore, we also examine the investment value of *changes* in buy-side alphas.

Each month, we sort changes in buy-side alphas into three groups: upgrade, downgrade, and no change. We classify an alpha change as an upgrade (downgrade) if it is positive (negative). Since extremely small alpha changes could be due to rounding or input error, we classify alpha changes that are in the lowest 5% in absolute value as no change. To assess the investment value of buy-side alpha changes, we compare the performance of portfolios of upgraded and downgraded stocks. In Panel B of Table 4, we present returns on these portfolios in the first month after their construction. As we do in Panel A, we present raw and DGTW-adjusted return estimates for equal-weighted and value-weighted portfolios.

Both equally- and value-weighted portfolios of upgraded stocks produce higher raw returns and DGTW-adjusted returns then portfolios of downgraded stocks. For example, the

DGTW-adjusted return on the value-weighted portfolio of downgraded stocks is about -23 basis points compared with 30 basis points for the portfolio of upgraded stocks. The difference in returns between upgraded and downgraded stocks is economically large and statistically significant at the 1% confidence level.

In unreported results we find that the upgrade portfolios continue to outperform the downgrade portfolios for up to one quarter after their formation. The buy-side alpha changes do not appear to have any investment value past one quarter. Overall, the results in Table 4 suggest that both the buy-side alpha and its change have significant predictive power for short-term future returns.

5. Comparing buy- and sell-side research

Fund management companies can choose to invest on the basis of either buy- or sell-side research. Many studies find that sell-side recommendations, particularly recommendation changes, contain return relevant information beyond other known investment signals (see, e.g., Womack, 1996 and Jegadeesh, Kim, Krische and Lee, 2004). Therefore, fund management companies will invest resources in buy-side research only if it can provide investment value beyond that of sell-side research. We now assess whether this is indeed the case. To compare the investment values of buy- and sell-side research, we compare the investment performance of portfolios based on buy-side alpha changes and sell-side upgrades and downgrades. Since almost all the stocks in our sample are followed by multiple sell-side analysts, we focus on comparing buy-side alphas with consensus sell-side upgrades and downgrades.

Specifically, each month we form portfolios of the following six groups of stocks: stocks whose buy-side alpha rises, falls, and stays unchanged, and stocks whose consensus sell-side recommendation rises, falls and stays unchanged. Since there is little dispersion in the market capitalization of stocks that are covered by both buy-side and sell-side analysts, we focus on equally-weighted portfolios of each of these six groups of stocks. We then compute the raw and

DGTW-adjusted returns on these portfolios for a variety of holding periods following their construction. In Panel A of Table 5, we present the one-month holding period returns for the portfolios of stocks whose consensus sell-side recommendation rises, falls and stays unchanged. We also present differences in the returns of portfolios of stocks formed based on buy- and sell-side revisions.

The results indicate that stocks whose consensus sell-side recommendation rises slightly outperform stocks whose consensus recommendation falls. However, differences between returns of upgraded and downgraded portfolios are insignificant, possibly because our sample consists primarily of large stocks for which sell-side analyst research tends to be less informative (see, e.g., Frankel, Kothari and Weber, 2006 and Loh and Stulz, 2010). More interestingly, stocks that experience an increase in their consensus sell-side recommendations earn lower returns than stocks that are upgraded by buy-side analysts. The difference between the DGTW-adjusted returns of these portfolios over the first month after their formation is 25 basis points and is significant at the 5% significance level. This superior investment value of buy-side upgrades is consistent with the view that sell-side analysts have strong incentives to present overly optimistic views on stocks. However, this view is inconsistent with the fact that both the raw and DGTW-adjusted returns on portfolios of stocks downgraded by sell-side analysts, while between 16 and 18 basis points higher than portfolios of stocks downgraded by buy-side analysts, are statistically indistinguishable at conventional levels.[10] Overall, this evidence indicates that changes in buy-side alpha have greater investment value than changes in consensus sell-side recommendations. However, the difference arises primarily from the superior investment value of buy-side upgrades, and sell-side analysts' incentives to present overly optimistic views on stocks cannot fully explain the difference.

[10] In unreported analyses, we find similar performance differences between buy-side and sell-side analysts over the one quarter period following portfolio formation. However, these differences diminish for investment horizon longer than one quarter.

Our result that buy-side research has greater investment value differs from that of Groysberg, Healy, Chapman and Shanthikumar (2010). They show that buy-side buy recommendations underperform sell-side recommendations. Their investigation into the source of the difference in performance of buy- and sell-side analysts suggests that the performance difference arises largely from differences in the coverage of these two sets of analysts; the buy-side analysts in their sample, like in ours, tend to focus on large cap stocks. We adopt a more consistent approach to compare the performance of buy- and sell-side analysts; we study performance for stocks that are covered by *both* buy and sell-side analysts. As a result, our finding only concerns large cap stocks. Our evidence suggests that buy-side analysts at least outperform sell-side analysts for this subgroup of stocks. This finding is consistent with prior research that sell-side analyst reports are less informative for stocks with greater analyst coverage and larger market capitalization (see, e.g., Frankel, Kothari and Weber, 2006; Loh and Stulz, 2010).

To gain more insight into the causes of the difference in the investment values of buy- and sell-side research, we also examine the cross-sectional variations in this difference. It is particularly interesting to see how the information environment, especially the level of uncertainty analysts face when valuing stocks, affects this difference. Uncertainty ought to be the greatest for stocks with the most volatile performance. Therefore, we examine whether the difference between the investment values of buy- and sell-side upgrades and downgrades varies with a stocks' operating performance and returns volatility. We use the standard deviation of net income (*VOL_NI*) and daily returns in the prior quarter (*VOL_RET*) to capture the volatility of operating performance and return volatility, respectively.

Panel B (Panel C) of Table 5 presents the difference in the investment value of buy- and sell-side upgrades and downgrades separately for stocks with above and below median levels of return (operating performance) volatility. There is little difference in the performance of portfolios of stocks with low level of valuation uncertainty constructed based on buy- and sell-

side revisions. In contrast, stocks with high levels of valuation uncertainty that are upgraded by buy-side analysts outperform those upgraded by sell-side analysts by 52 (29) basis points a month based upon *VOL_RET* (*VOL_NI*). Moreover, stocks with high levels of valuation uncertainty that are downgraded by buy-side analysts underperform those downgraded by sell-side analysts by about 40 basis points a month. These differences are statistically significant. Therefore, the results in both panels show that the differences in the investment values of buy- and sell-side revisions are largely driven by the subgroups of stocks with above median level of valuation uncertainty. This pattern suggests that differences in valuation skills may contribute to the relative outperformance of buy-side analysts.[11]

6. Buy- and sell-side research and fund trades

Our dataset contains detailed stock-level buy-side analyst research, which allows us to directly examine the sensitivity of individual fund investments to buy-side research. Moreover we can examine how the sensitivity of investments to buy-side research varies across funds. Thus, we can overcome the problems faced by studies using indirect measures of buy-side research (se, e.g., Cheng, Liu and Qian, 2006; and Kacperczyk and Seru, 2007).

6.1. Fund trades

We first examine the effect of buy-side alpha changes and sell-side consensus recommendation changes on fund trades. Following Kacperczyk and Seru (2007), we use the percentage change in a fund's holdings of a stock in a given quarter, *TRADEPER*, to measure the fund's trade in the stock during the quarter. When a fund completely liquidates its position in a stock, we set *TRADEPER* to -100%. When it initiates a new position, we set *TRADEPER* to 100%. We winsorize *TRADEPER* at the 1% level to limit the impact of outliers. To estimate the

[11] It is also possible that the incentive structures of these two sets of analysts vary systematically with the level of valuation uncertainty and are at the root of the relation between differences in investment performance and investment uncertainty.

relation between fund trades, buy-side alpha revisions, and changes in sell-side recommendations, we regress *TRADEPER* on the contemporaneous change in buy-side alpha, *BREVISE*, and the contemporaneous change in consensus sell-side recommendations, *SREVISE*. In all the regressions, to account for the effect of return momentum on fund trades, we control for stock returns in the prior quarter, *PRET*. We also control for stocks' book-to-market ratios, *B/M*, to account for the effect of funds' propensity to follow value or growth investment strategies. All regressions include fund and time fixed effects. The t-statistics are calculated with standard errors that are clustered by stocks.

Table 6 contains coefficient estimates and their t-statistics from our regression models. The estimate of Model 1 shows that, when examined in isolation, buy-side alpha changes strongly influence fund trades; managers buy (sell) more of a stock that is upgraded (downgraded) by buy-side analysts. The estimate of Model 2 indicates that managers buy (sell) more of a stock that is upgraded (downgraded) by sell-side analysts. In all the reported models including Models 1 and 2, the coefficient estimates for *PRET* are consistently positive and significant indicating that funds are more likely to buy (sell) stocks with high (low) recent returns. Therefore, it appears that fund trades are influenced by a stock's return momentum. The coefficient estimates for *B/M* are consistently negative but are statistically significant only in models estimated using the entire set of fund holdings with sell-side coverage. This suggests that fund managers are more likely to buy (sell) stocks that are in (out of) favor with investors.

In Model 3, we simultaneously consider the effect of buy and sell-side revisions. Consequently, the estimate uses only the set of holdings covered by both buy- and sell-side analysts. The coefficient estimate for *BREVISE* is 0.019 and statistically significant at the 1% level, very close to the estimate for *BREVISE* in Model 1, where we do not account for the effect of *SREVISE*. The insensitivity of the *BREVISE* coefficient estimate to changes in the regression model indicates that the relation between buy-side research and fund trades is stable. In contrast,

the coefficient estimate for *SREVISE* in Model 3 is perceptibly smaller than in Model 2 and is statistically insignificant.

There could be several, non mutually-exclusive, explanations for the changes in the coefficient estimates for *SREVISE* between Models 2 and 3. For example, managers may have an intrinsic preference for buy-side research. Therefore, when they can choose between buy- and sell-side research, even though the sell-side research may have investment value, they only pay attention to the buy-side. This preference for buy-side research may arise either because the managers have greater access to the buy-side analysts or because they are less likely to be penalized for poor performance if they rely on their dedicated buy-side analysts.[12] It is also possible that managers pay less attention to sell-side research for stocks that are also covered by buy-side analysts, because these are typically large cap stocks for which sell-side research has little investment value (see, e.g., Frankel, Kothari and Weber, 2006; Loh and Stulz, 2010).

Although these explanations are not necessarily mutually exclusive, we try to gauge which explanation is more likely by explicitly controlling for the effect of stock market capitalization. In Model 4, we drop *BREVISE* and replace it with two interaction terms. The first term is the interaction between *SREVISE* and a dummy variable that takes the value of 1 if the stock is covered by a buy-side analysts and zero otherwise, *BCOVER*. The second is the interaction between *SREVISE* and a dummy variable that takes the value of 1 for stocks that are ranked in the top quintile in terms of market cap according to NYSE/AMEX size breakpoints and zero otherwise, *LARGE*. The coefficient estimate for the interaction between *SREVISE* and *BCOVER* is negative and significant while the coefficient estimate for the interaction between *SREVISE* and *LARGE* is insignificant. Moreover, the coefficient estimates for *SREVISE* are only positive and statistically significant in Models 2 and 4 which are estimated using entire set of

[12] Relying on the buy-side analysts may protect managers for two reasons. First, a manager who performs poorly because he has ignored research from a buy-side analyst will likely have to justify why he ignored the research. Second, if all managers rely on buy-side research, it is less likely that any one manager will stand out from the rest when things go badly.

fund holdings but insignificant in Model 3, which is estimated using only the set of fund holdings with buy-side research. This pattern suggests that managers pay little attention to sell-side research on stocks that are covered by the buy-side analysts. However, their trades respond to sell-side research when no buy-side research is available. Thus, it appears that fund trades become less sensitive to sell-side research because managers prefer buy-side research and not because of poor quality sell-side research for stocks with large market capitalizations.

Some of the inferences we have drawn about the relative effects of buy-side alpha and sell-side recommendation changes thus far are based on the slightly more than 50% of fund holdings that covered by both buy- and sell-side analysts. Existing studies of sell-side research, however, examine its effect on all stockholdings covered by sell-side analysts (almost 96% of our sample). Therefore, in most of our subsequent analysis, to simultaneously examine the effect of buy- and sell-side research using the entire set of stockholdings covered by sell-side analysts, we use an augmented version of *BREVISE*. The new variable, *BREVISE2*, is equal to *BREVISE* if the stock has a buy-side alpha revision and 0 (rather than missing) otherwise.

We employ *BREVISE2* to estimate Models 5 and 6 using the entire set of stockholdings to revisit the issues we have examined using Models 1 through 4. The Model 5 estimate suggests that fund trades are sensitive to both buy-side and sell-side revisions. In Model 6, we include an interaction term between *SREVISE* and *%BCOVER*, which is the percentage of the fund's stockholdings covered by buy-side analysts. This variable proxies for a manager's preference for buy-side research. By including this interaction term in the model, we can examine the cross-sectional variation in the sensitivity to sell-side research across funds. The coefficient estimate for this term is negative and significant. This indicates that sell-side revisions have a weaker effect on managers' trading decisions when their fund's stockholdings enjoy more extensive buy-side coverage. This finding demonstrates that the preference for sell-side research varies systematically across funds depending on the overlap between buy-side coverage and fund investments. This finding is symmetric to the evidence in Cheng, Liu and Qian (2006) that funds

rely on buy-side research more when the sell-side coverage on the stocks held by the fund is less extensive.

6.2. Trades in stocks not covered by buy-side analysts

Prior studies have documented that investors use information about one stock to price other stocks in the same industry that are likely affected by similar fundamentals (see, e.g., Chan and Hameed, 2006; and Hameed at al, 2010). Moreover, investment strategies that set industry exposure based on sell-side analyst stock recommendations generate abnormal returns (see, e.g., Kadan, Madureira, Wang and Zach, 2011). Similarly, it is possible that buy-side research on a stock has investment value for related stocks and induces fund managers to trade in related stocks. These spillovers from buy-side research may be relatively important because the buy-side analysts cover only a subset of the stocks held by the company's funds. Therefore, we now examine how fund trades are affected by industry level buy-side information and how this information spills over to individual firms.

To proxy for industry level analyst information, we construct the variable *SICREVISE*, the average value of *BREVISE2* for all stocks in the same two-digit SIC industry in the same quarter (excluding the stock that is under consideration). We also decompose this variable into two parts, *SICREVISE_NOBR* and *SICREVISE_BR.* The first part, *SICREVISE_NOBR* equals *SICREVISE* if a stock is not covered by a buy-side analyst and zero otherwise. The second part, *SICREVISE_BR* equals *SICREVISE* if a stock is covered by a buy-side analyst and zero otherwise. The sensitivity of funds trades to these proxies for industry level buy-side research captures the effect buy-side revisions on fund trades of other stocks in the same industry and thus, information spillovers from buy-side research.

In Table 7, we present estimates of regressions of fund trades, *TRADEPER*, on the industry level buy-side coverage measures. The regressions control for sell-side recommendation revisions (*SREVISE*), buy-side alpha changes *(BREVISE2*) for individual stocks, the fraction of

fund holdings covered by buy-side analysts (*%BCOVER*), the stock's past return (*PRET*), and its book-to-market ratio (*B/M*). Each regression also includes, *SICTRADE*, the average trading in all stocks in the same industry. This controls for trades made to adjust industry weights.

The coefficient estimates for *SICREVISE* are uniformly positive but statistically insignificant. However, the coefficient estimates for *SICREVISE_NOBR* are positive and significant while the coefficient estimates for *SICREVISE_BR* are negative and significant. The significant coefficient estimates for *SICREVISE_NOBR* and *SICREVISE_BR* indicate that buy-side research generates information spillovers for stocks belonging to the same industry. The positive coefficient estimates for *SICREVISE_NOBR* indicate that, when a stock is not covered by the buy-side, fund managers tend to buy (sell) it when buy-side analysts upgrade (downgrade) other stocks in the same industry. Therefore, it appears that managers use changes in buy-side estimates as investment signals for related stocks that are not covered by the buy-side. The negative coefficient estimates for *SICREVISE_BR* suggest that there is a different spillover dynamic for stocks that are covered by buy-side analysts; fund managers view related stocks with buy-side coverage as substitutes and are less likely to buy (sell) a stock when buy-side analysts upgrade (downgrade) related stocks. We also find strongly positive coefficient on *SICTRADE*, suggesting that fund trades in stocks in the same industry are correlated, perhaps because of the influence of macroeconomic factors or investor sentiment. Finally, the coefficient estimates for *BREVISE2*, *SREVISE*, *SREVISE* $\times$ *%BCOVER* and other control variables are similar to those reported earlier in Table 6.

7. Reliance on buy-side research and fund performance

Kacperczyk and Seru (2007) show that fund performance decreases with reliance on public information. One implication of this finding is that funds that rely more heavily on in-house research produced by a strong team of buy-side analyst information should outperform. Cheng, Liu and Qian (2006) provide supporting evidence based on survey data. However, as we

have argued earlier, these tests do not cannot conclusively establish a link between reliance on buy-side research and fund performance. Therefore, we now reexamine this relationship using direct measures of reliance on buy-side research constructed from our data.

We measure a fund's performance by the value weighted *DGTW*-adjusted return of its quarterly stock holdings. We use two measures of a fund's reliance on buy-side research. Model 6 in Table 6 indicates that fund trades are more sensitive to buy-side research when a greater proportion of their funds' holdings that are covered by the buy-side analysts. Thus, the variable *%BCOVER*, the fraction of a fund's holdings that is covered by buy-side analysts, reflects the relative weighting the manager places on buy-side research. Consequently, this variable is a measure of a fund's reliance on buy-side research.

Our second measure is a statistic capturing the sensitivity of the fund's holdings to changes in buy-side alpha revisions, *BUY_R2*. This measure of reliance on buy-side research is similar to the "reliance on public information" (*RPI*) measure employed by Kacperczyk and Seru (2007). To construct *BUY_R2*, each quarter, for each fund, we run a cross-sectional regression of *TRADEPER* on buy-side revisions during the last four quarters. We then define *BUY_R2* as the unadjusted R-Square of regression.[13] Since buy-side alpha revisions are relatively infrequent and we need continuous buy-side coverage of stocks for four quarters to construct *BUY_R2*, we employ the variable *BREVISE2*, which equals *BREVISE* when a buy-side revision exists in the period and zero otherwise, to estimate the regressions from which we infer *BUY_R2*. Using data on sell-side coverage and consensus sell-side recommendation revisions, we employ identical procedures to construct *%SCOVER* and *SELL_R2*, sell-side counterparts of *%BCOVER* and *BUY_R2*, respectively.

To estimate the effect of reliance on buy-side research on fund performance, we regress fund performance on our buy- and sell-side research reliance measures. In all specifications, we

[13] Note that this measure of sensitivity to buy-side information does not discriminate between funds that trade in the same or in the opposite direction as buy-side revisions.

control for fund size as measured by total net asset value to account for the impact of fund size on fund performance (Chen, Hong, Huang, and Kubik, 2004). In addition, since Cremers and Petajisto (2009) show that active fund management leads to better performance, we control for the manager's activity level of using the ratio of the total number of trades over the total number of stocks held by the fund each quarter, *ACTIVE*.

Model 1 in Table 8 focuses on the effect of analyst coverage on fund performance. The coefficient estimate for *%BCOVER* is positive and statistically significant, indicating that funds that invest more heavily in stocks with buy-side research earn superior returns. Specifically, the coefficient estimate indicates that the switch from investing in stocks with no buy-side coverage to a portfolio with 100% buy-side coverage can raise a fund's excess return by at least 82 basis points abnormal return per quarter. The coefficient estimate for *%SCOVER* is statistically insignificant, likely because there is little variation in the level of sell-side coverage.

In Model 2, we use the sensitivity of fund trades to analyst revisions to measure the reliance on research. Once again, the coefficient estimate for reliance on buy-side research (*BUY_R2*) is positive and statistically significant. According to this estimate, a 10% increase in *BUY_R2* will raise a fund's abnormal return by 46 basis points per quarter. Once again, reliance on sell-side research has no effect on fund performance. These results suggest that funds whose trades are more responsive to buy-side research produce superior returns and are consistent with the finding that fund performance improves with reliance on buy-side information by Kacperczyk and Seru (2007) and Cheng, Liu and Qian (2006).

The Model 3 estimates confirm the earlier results as the coefficients for both *%BCOVER* and *BUY_R2* are positive and significant while the coefficients for *%SCOVER* and *SELL_R2* are statistically insignificant. Consistent with Chen, Hong, Huang, and Kubik's (2004) evidence that fund size negatively impacts performance, the coefficient estimates for *FUNDSIZE* are negative for all specifications. Finally, fund performance increases with the level of active management, as indicated by the significantly positive coefficient on *ACTIVE*.

8. Conclusion

We provide insights into a subject that is difficult to research because it is proprietary and confidential: buy-side research. We examine proprietary data on a team of buy-side analysts working for a large global fund management company. We find that the research produced by the analysts has investment value; portfolios constructed based on this research earn positive abnormal returns for up to one quarter from the publication of the research. This research also has greater investment value than research produced by the average sell-side analyst, especially when there is a lot of valuation uncertainty surrounding a stock. The portfolio managers employed by the company buy stocks the buy-side analysts upgrade and sell stocks they downgrade. Their trades in related stocks also appear to respond to these upgrades and downgrades. The managers appear to use sell-side research only when buy-side research is unavailable. The managers' reliance on buy-side research leads to improved performance while reliance on sell-side research has little effect on performance.

Although our findings are based upon data from a single fund management firm, the fact that they are largely consistent with survey evidence in Cheng, Liu and Qian (2006) and Frey and Herbst's (2011) study of buy-side research data from a European firm suggests that they have the potential to speak to the buy-side industry more generally. In addition, our finding that buy-side research has significant investment value, despite the existence of well-established sell-side research, helps explain why large fund management companies heavily invest in their in-house research teams.

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Table 1: Summary Statistics on Buy-Side Analyst Research

This table presents an annual count of the number of analysts and stocks in our sample of buy-side research. The sample period is 1994 to 2007. The table also presents the average number of stocks covered by each analyst during the year.

Year	*# of Analysts*	*# of Stocks Covered Per Analyst*	*# of Stocks*
1994	8	64.63	554
1995	11	61.88	552
1996	8	70.00	593
1997	9	71.38	619
1998	10	61.56	624
1999	11	59.78	619
2000	17	31.75	556
2001	20	23.88	413
2002	18	23.94	429
2003	25	21.58	438
2004	23	22.20	464
2005	26	20.70	498
2006	28	19.69	534
2007	28	23.55	568

Table 2: Summary Statistics on Sample Stocks and Sample Funds

Panel A of the table reports summary statistics for stocks that have both buy- and sell-side analyst coverage. Each month, we calculate the cross-sectional mean, median, standard deviation, and the interquartile range of the following stock characteristics: buy-side alpha, consensus sell-side recommendation, revision of buy-side alpha, revision of consensus sell-side recommendation, the number of sell-side analysts covering the stock, market capitalization (in $mm), book-to-market ratio (B/M), and past returns. Market capitalization, B/M and past returns are measured as of the prior quarter end. The time-series averages of summary statistics for these variables are reported. Panel B of the table reports summary statistics of our sample funds. Each year we report the number of funds in our sample, their average total asset value in millions, the average number of stocks held by each fund, the percentage of fund holdings with buy-side coverage (*%BCOVER*), the percentage of fund holdings with sell-side coverage (*%SCOVER*), the average size (in $mm) and book-to-market ratio of fund holdings.

Panel A: Stock Characteristics

	Buy-Side Alpha	***Sell-Side Consensus***	***Buy-Side Revision***	***Sell-Side Revision***	***# of Sell- Side Analysts***	***Size***	***B/M***	***Return***
Mean	4.0537	3.6318	0.0300	-0.0035	6.7173	18,360	0.4912	0.0392
Median	4.4607	3.6175	0.0304	0.0000	6.1054	7,803	0.4052	0.0334
Stdev	5.8324	0.6338	2.2736	0.4181	3.6939	34,244	0.3608	0.1590
P25	0.1483	3.0919	-0.9986	-0.0060	4.0422	3,813	0.2450	-0.0515
P75	8.2663	4.0331	1.0476	0.0060	8.7289	16,429	0.6364	0.1205

Panel B: Fund Characteristics

Year	***# of Funds***	***Total Net Assets***	***# of Holdings***	***% BCOVER***	***% SCOVER***	***Size***	***B/M***
1994	8	9,358	180	0.5325	0.8303	4,276	0.6217
1995	10	22,019	149	0.4988	0.8566	5,574	0.7062
1996	11	34,743	131	0.4925	0.8748	7,814	0.6112
1997	10	48,456	127	0.5470	0.9113	10,050	0.5366
1998	16	32,418	101	0.5951	0.9400	21,790	0.4172
1999	21	24,298	102	0.6033	0.9368	34,565	0.4418
2000	28	30,796	103	0.5954	0.9479	43,601	0.3747
2001	29	35,370	113	0.5380	0.9654	33,305	0.4206
2002	35	24,625	110	0.5184	0.9746	28,971	0.4269
2003	48	27,754	103	0.5283	0.9681	32,397	0.5714
2004	46	167,162	97	0.5389	0.9601	37,332	0.5046
2005	46	43,511	103	0.5505	0.9540	39,738	0.4610
2006	37	53,030	108	0.5337	0.9549	39,938	0.4487
2007	48	63,728	99	0.5948	0.9614	41,053	0.4407

Table 3: Characteristics of Stocks with Different Buy-Side Alphas

In Panel A we present statistics for quintile portfolios constructed on the basis of buy-side alphas. Each month we sort stocks into quintile portfolios according to their buy-side alphas. We then compute the mean value of the following stock characteristics for each portfolio: buy-side alpha, consensus sell-side recommendations, prior month return (*MRET*), prior quarter return (*QRET*), market capitalization (*Size*), book-to-market ratio (*B/M*), volatility of daily returns in the prior quarter (*VOL_RET*), volatility of operating performance in the prior four quarters (*VOL_NI*). Differences in these stock characteristics between the top and the bottom quintiles are presented at the bottom along with the t-statistics. Panel B presents similar statistics for portfolios formed on monthly revisions of buy-side alpha.

Panel A: Buy-side alphas

Quintile	*Buy-Side Alpha*	*Sell-Side Consensus*	*MRET*	*QRET*	*Size*	*B/M*	*VOL_RET*	*VOL_NI*
1	-4.5324	3.7417	0.0373	0.1049	18970	0.4355	0.0231	0.0106
2	1.0807	3.6922	0.0219	0.0601	20582	0.4821	0.0197	0.0082
3	4.4454	3.6320	0.0134	0.0379	16642	0.5105	0.0188	0.0075
4	7.4380	3.5965	0.0058	0.0187	18165	0.5080	0.0193	0.0078
5	11.7658	3.5061	-0.0158	-0.0232	17675	0.5160	0.0225	0.0106
Spread	16.2982***	-0.2356***	-0.0531***	-0.1282***	-1294	0.0805***	-0.0006**	-0.0001
	(118.62)	(-26.31)	(-14.76)	(-19.26)	(-1.04)	(11.60)	(-2.07)	(-0.20)

Panel B: Buy-side alpha revisions

Revision	*Buy-Side Revision*	*Sell-Side Revision*	*MRET*	*QRET*	*Size*	*B/M*	*VOL_RET*	*VOL_NI*
Downgrade	-1.7316	0.0237	0.0080	0.0363	17999	0.5032	0.0204	0.0089
No change	-0.0003	-0.0058	0.0057	0.0337	14691	0.4818	0.0243	0.0118
Upgrade	1.7607	-0.0291	0.0200	0.0509	20097	0.4854	0.0205	0.0089
Spread	3.4923***	-0.0528***	0.0120***	0.0146***	2097***	-0.0179**	0.0001	0.0000
	(37.34)	(-11.33)	(4.93)	(3.41)	(3.28)	(-2.30)	(0.27)	(0.16)

Table 4: The Investment Value of Buy-Side Alpha

This table presents the returns on portfolios constructed based on buy-side alphas and alpha revisions. Each month we form equal-weighted and value-weighted quintile portfolios based upon stocks' buy-side alpha and examine their performance in the following month. Panel A reports one month holding period raw returns and DGTW-adjusted abnormal returns for these portfolios as well as their average alphas. Return spreads between top and bottom quintile alpha portfolios are reported at the bottom of the panel along with their t-statistics (in parentheses). Panel B reports one month holding period raw returns and DGTW-adjusted abnormal returns for upgrade, no change and downgrade portfolios based upon the change of monthly alphas. We also present returns from a zero cost portfolio that buys upgraded stocks and sells downgraded stocks and their t-statistics (in parentheses).

Panel A: Buy-side alpha-based portfolios

Alpha Quintiles	***Raw_EW***	***Raw_VW***	***Adj_EW***	***Adj_VW***	***# of stocks***
1	0.00701*	0.0060	-0.0004	-0.0015	76.70
	(1.80)	(1.54)	(-0.31)	(-1.42)	
2	0.0088***	0.0092***	0.0007	0.0011	78.00
	(2.86)	(2.80)	(0.75)	(1.16)	
3	0.0092***	0.0096***	0.0010	0.0012	78.23
	(3.01)	(3.06)	(1.11)	(1.27)	
4	0.0116***	0.0109***	0.0032***	0.0029**	75.05
	(3.26)	(3.01)	(2.95)	(2.53)	
5	0.0115***	0.0094**	0.0038**	0.0026*	79.56
	(2.58)	(2.43)	(2.43)	(1.90)	
Spread	0.0045	0.0034	0.0043*	0.0042**	
	(1.23)	(0.93)	(1.92)	(2.10)	

Panel B: Buy-side alpha revision-based portfolios

	Revision	***Raw_EW***	***Raw_VW***	***Adj_EW***	***Adj_VW***	***# of stocks***
Downgrade	-1.7270	0.0061*	0.00470	-0.00147	-0.0023**	173.61
		(1.92)	(1.48)	(-1.52)	(-2.51)	
No change	-0.0003	0.0109**	0.0098**	0.0024	0.0018	37.39
		(2.34)	(2.22)	(1.25)	(0.98)	
Upgrade	1.7526	0.0119***	0.0115***	0.0045***	0.0030***	176.54
		(3.60)	(3.57)	(4.48)	(3.93)	
Spread		0.0058***	0.0068***	0.0069***	0.0053***	
		(3.36)	(3.36)	(4.26)	(3.83)	

Table 5: Comparing the Investment Value of Buy- versus Sell-Side Revisions

In Panel A, we present raw and DGTW-adjusted abnormal returns for one-month holding periods on portfolios of stocks whose consensus sell-side recommendation rises, falls or stays unchanged. In Panel A, we also present differences in the raw and DGTW-adjusted abnormal returns for one-month holding periods on portfolios formed based on sell- and buy-side revisions. In Panel B, we present these return differences separately for portfolios of stocks with above and below median return volatility. In Panel C, we present these return differences separately for portfolios of stocks with above and below median income volatility. t-statistics are presented in parentheses.

Panel A: Sell-side performance and the difference between sell and buy-side performance

Revision	***Adj_Sellside***	***Raw_Sellside***	***Adj(Sell-Buy)***	***Raw(Sell-Buy)***
Downgrade	0.0003	0.0077**	0.0017	0.0016
	(0.23)	(2.18)	(1.30)	(1.01)
No change	0.0016**	0.0095***	-0.0009	-0.0014
	(2.26)	(2.85)	(-0.49)	(-0.64)
Upgrade	0.0020*	0.0104***	-0.0025**	-0.0015
	(1.85)	(3.15)	(-2.17)	(-1.21)
Upgrade minus Downgrade	0.0017	0.0027		
	(1.07)	(1.51)		

Panel B: Difference between sell- and buy-side performance and return volatility

	Revision	***Adj(Sell-Buy)***	***Raw(Sell-Buy)***
Low Vol_Ret	Downgrade	-0.0003	-0.0004
		(-0.32)	(-0.38)
	No change	0.0017	-0.0003
		(1.09)	(-0.18)
	Upgrade	0.0003	0.0009
		(0.27)	(0.83)
High Vol_Ret	Downgrade	0.0041*	0.0033
		(1.89)	(1.37)
	No change	-0.0011	-0.0010
		(-0.49)	(-0.40)
	Upgrade	-0.0052**	-0.0040**
		(-2.49)	(-1.78)

Panel C: Difference between sell- and buy-side performance and income volatility

	Revision	***Adj(Sell-Buy)***	***Raw(Sell-Buy)***
Low Vol_NI	Downgrade	-0.0009 (-0.76)	-0.0006 (-0.41)
	No change	-0.0002 (-0.12)	0.0005 (0.23)
	Upgrade	-0.0017 (-1.21)	-0.0012 (-0.83)
High Vol_NI	Downgrade	0.0045** (1.97)	0.0035 (1.51)
	No change	-0.0018 (-0.73)	-0.0029 (-1.08)
	Upgrade	-0.0029* (-1.72)	-0.0014 (-0.80)

Table 6: Buy-Side versus Sell-Side Revisions and Mutual Fund Trades

This presents the effect of buy-side alpha changes and sell-side consensus recommendation changes on fund trades. We regress the percentage change of a fund's holding of each stock on the change of buy-side alpha (*BREVISE*) and the change of consensus sell-side recommendation (*SREVISE*), controlling for the prior quarter return of the stock (*PRET*) and its book-to-market ratio (*B/M*). In Model 4, we include interaction terms between sell-side revision and a dummy variable indicating buy-side coverage of a stock (*BCOVER*), and between the sell-side revision and a dummy variable that takes the value of one for stocks that are ranked in the top quintile in terms of market cap according to NYSE/AMEX size breakpoints and zero otherwise (*LARGE*). In Model 5, we replace *BREVISE* with *BREVISE* 2 which fills in missing buy-side alpha changes with 0. In Model 6, we interact sell-side revision with the percentage of fund holdings with buy-side coverage. All regressions include fund and time fixed effects. t-statistics computed with standard errors that are clustered by stock are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
BREVISE	0.0195***		0.0196***			
	(8.78)		(8.80)			
SREVISE		0.0163***	0.0003	0.0267***	0.0165***	0.0323***
		(2.72)	(0.02)	(3.94)	(2.77)	(4.31)
SREVISE* %BCOVER						-0.0471**
						(-2.35)
% BCOVER						0.2871***
						(10.55)
PRET	0.1917***	0.1498***	0.1923***	0.1465***	0.2116***	0.2116***
	(3.78)	(8.26)	(3.79)	(8.09)	(11.56)	(11.57)
B/M	-0.0242	-0.0278***	-0.0235	-0.0235**	-0.0255***	-0.0252***
	(-1.42)	(-2.81)	(-1.37)	(-2.36)	(-2.61)	(-2.60)
BREVISE2					0.0178***	0.0176***
					(10.89)	(10.76)
SREVISE*BCOVER				-0.0350**		
				(-2.02)		
SREVISE*LAREGE				0.0017		
				(0.10)		
BCOVER				-0.0294***		
				(-3.55)		
LARGE				0.0417***		
				(4.47)		
Constant	0.0320	-0.0940**	0.0403	-0.0975**	-0.1410***	-0.2666***
	(0.64)	(-2.41)	(0.76)	(-2.49)	(-3.51)	(-6.42)
Observations	40,287	87,666	39,894	87,666	87,666	87,666
R-squared	0.0585	0.0300	0.0575	0.0307	0.0336	0.0350

Table 7: The Industry Spillover Effect of Buy-Side Revision

This table presents estimates of the effect of industry level buy-side information on fund trades. We regress the percentage change of a fund's holding of each stock on an estimate of the industry-level change in buy-side alpha. In Models 1 and 2, the industry level buy-side alpha revision is, *SICREVISE*, the average value of *BREVISE2* for all the stocks in the same two-digit SIC industry in the same quarter (excluding the stock that is under consideration). In Models 3 and 4, we split SICREVISE into two variables: *SICREVISE_NOBR* and *SICREVISE_BR*, where *SICREVISE_NOBR* equals *SICREVISE* when a stock is not covered by a buy-side analyst and zero otherwise, and *SICREVISE_BR* equals *SICREVISE* if a stock is covered by a buy-side analyst and zero otherwise. All models control for sell-side recommendation revisions (*SREVISE*), buy-side alpha changes (*BREVISE2*), the fraction of fund holdings covered by buy-side analysts (*%BCOVER*), the average trading in all stocks in the same industry (*SICTRADE*), the stock's return in the past quarter (*PRET*), and its book-to-market ratio (*B/M*). All regressions include fund and time fixed effects. t-statistics computed with standard errors that are clustered by stock are reported in parentheses.

	(1)	(2)	(3)	(4)
SREVISE	0.0135**	0.0271***	0.0134**	0.0262***
	(1.98)	(3.02)	(1.97)	(2.92)
SREVISE* % BCOVER		-0.0402*		-0.0376*
		(-1.79)		(-1.67)
% BCOVER		0.2443***		0.2489***
		(7.58)		(7.72)
PRET	0.2124***	0.2128***	0.2234***	0.2240***
	(10.41)	(10.43)	(10.74)	(10.77)
B/M	-0.0163	-0.0160	-0.0164	-0.0161
	(-1.36)	(-1.35)	(-1.36)	(-1.36)
BREVISE2	0.0156***	0.0154***	0.0180***	0.0180***
	(8.96)	(8.88)	(9.35)	(9.31)
SIC REVISE	0.0006	0.0007		
	(0.22)	(0.27)		
SICTRADE	0.3274***	0.3242***	0.3273***	0.3240***
	(21.60)	(21.41)	(21.60)	(21.39)
SICREVISE_NOBR			0.0064**	0.0067**
			(2.23)	(2.32)
SICREVISE_BR			-0.0069**	-0.0070**
			(-2.15)	(-2.18)
Constant	0.1056***	0.0406	0.1044***	0.0381
	(3.58)	(1.34)	(3.53)	(1.26)
Observations	62,948	62,948	62,948	62,948
R-squared	0.0714	0.0724	0.0718	0.0728

Table 8: Reliance on Buy- versus Sell-Side Research and Fund Performance

In this table, we present estimates from regressing fund performance on measures of reliance on buy- and sell-side research. We measure a fund's quarterly performance by the value-weighted DGTW-adjusted return of its quarterly stock holdings with each stock's weight being its proportion of the value of the fund's holdings at the beginning of the quarter. For Model 1, we measure reliance on buy- and sell-side research by the percentage of stock holdings that are covered by each type of analysts (*%BCOVER* and *%SCOVER*, respectively). For Model 2, we measure reliance on buy-side (sell-side) research by the R-square from a cross-sectional regression of fund trade on buy-side (sell-side) revisions in the previous four quarters. We control for fund size as proxied by total net asset value (*FUNDSIZE*) and active trading as proxied by the ratio of the total number of trades over the total number of stocks held by the fund each quarter (*ACTIVE*). All models include time fixed effects. *t*-statistics computed with standard errors that are clustered by stock are reported in parentheses.

	(1)	(2)	(3)
Intercept	-0.0104	-0.0078	-.0283*
	(-0.86)	(-1.55)	(-1.76)
FUNDSIZE	-0.0009	-0.0012*	-0.0009
	(-1.60)	(-1.94)	(-1.61)
ACTIVE	0.0011**	0.0008*	0.0012***
	(2.05)	(1.79)	(2.73)
% BCOVER	0.0082***		0.0063**
	(3.83)		(2.25)
% SCOVER	0.0247		0.0170
	(1.27)		(1.14)
Buy_R2		0.0463***	0.0279**
		(3.93)	(2.08)
Sell_R2		-0.0071	-0.0083
		(-0.31)	(-0.35)
Observations	792	757	757
R-squared	0.2812	0.3184	0.3251