Does Media Coverage of Stocks Affect Mutual Funds' Trading and Performance?

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We study the relation between mutual fund trades and mass media coverage of stocks. We find that funds exhibit persistent differences in their propensity to buy media-covered stocks. Moreover, this propensity is negatively related to their future performance. Funds in the highest propensity decile underperform funds in the lowest propensity decile by 1.1% to 2.8% per year. These results do not extend to fund sells, likely because of funds' inability to sell short. Overall, the findings suggest that professional investors are subject to limited attention. (*JEL* G11, G20, G23)

Recent literature provides increasing evidence that the mass media's coverage of individual stocks can influence individual investors' trading behavior (see, e.g., Barber and Odean 2008; Da et al. 2011; Engelberg and Parsons 2011; Tetlock 2011). In this paper, we extend this line of research by addressing the following question: does mass media coverage of individual stocks influence the trading and performance of professional investors, in particular, mutual fund managers?

Our point of departure is the same as that for studying the behavior of individual investors: buying or selling a stock involves a sequence of decisions that requires the investor's attention, a scarce cognitive resource (Kahneman 1973). For individual investors, who typically lack the resources to learn about

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the vast universe of securities, media coverage can play a significant role in putting certain stocks on their radar screen. For example, Barber and Odean (2008) show that individuals are more likely to trade "attention-grabbing" stocks featured in the media.

For professional investors, in contrast, mass media coverage of stocks could arguably play a less significant role, because institutions have more resources to process information than do retail investors. Moreover, because of lead times in the editorial process, mass print media are typically much slower at delivering information about stocks to the market than are professional newswires. Insofar as the market is efficient, fund managers would be unlikely to earn superior returns by reacting to articles in a mass media outlet, such as *The Wall Street Journal*. Hence, their trades and performance may not be related to mass media coverage at all. This will serve as our null hypothesis.

However, if fund managers—like individual investors—are subject to limited attention, then their investment decisions also would be influenced by "attention-grabbing" mass media coverage. Identifying stocks to trade from among thousands of potential listings still involves a high search cost. By drawing attention to certain stocks, mass media lower the search cost, making investors likely to trade the covered stocks more than those out of the media limelight. Because such trading behavior is motivated not by superior information but rather by a shortage of cognitive resources, we expect it to be associated with inferior investment performance. We call this the "limited attention hypothesis."

We begin by examining whether mutual funds' trading in the aggregate is influenced by media coverage of stocks. We then construct a measure that captures fund managers' propensity to trade media-covered stocks and relate these propensities to future fund performance in the cross-sectional fund analysis. Because mutual funds are usually not allowed to short sell stocks, the search cost is higher for buys than for sells: while managers can buy any stock listed on the market, they can sell only from the stocks already in their portfolio. Hence, the limited attention hypothesis would predict that (1) media coverage will have a larger impact on managers' buys than on their sells and (2) the relation between managers' propensity to trade stocks covered by the media and fund performance will be stronger for buys than for sells.

Our findings are as follows. First, we find that, in the aggregate, funds tend to buy more of those stocks that receive heavy media coverage. This result holds even after we control for size, liquidity, and several other stock characteristics that have been shown to influence funds' trades. We find that funds' sells, in contrast, are not significantly affected by stocks' media coverage.

Second, we find a negative relation between funds' propensity to buy stocks covered by the media and their performance in the cross-section. Funds in the strongest propensity decile underperform funds in the weakest decile by 1.1% to 2.8% per year, depending on the performance metric used. We do not find

such results for funds' sells, which is consistent with the conjecture that funds' inability to sell short reduces the media's influence on sells.

One alternative explanation for our result is the "flow-catering hypothesis." Solomon, Soltes, and Sosyura (2012) show that stocks with high past returns ("winner" stocks) in funds' portfolios attract investor flows only if they are recently featured in the media. Thus, media coverage of stocks that have performed well in the past appears to amplify individual investors' return-chasing behavior. If investors are attracted to funds that buy stocks heavily covered by the media, then fund managers may (rationally) buy these stocks because they want to cater to fund flows, rather than because of their own limited attention. However, our analysis reveals that fund flows are not related to the media coverage of purchased stocks in general. Thus, our documented media effect is unlikely to be explained by "flow catering."

Our analysis focuses on media coverage and not on the content of the news articles. One natural question then is whether it is coverage alone—which is a proxy for media attention—that drives our results rather than the news content of the articles. To address this question, we examine the tone of media articles (which can be viewed as a proxy for the positive or negative content in the articles) and whether managers buy or sell in accordance with it. We find that coverage of any kind—whether positive or negative—triggers more trades; in other words, the amount of coverage is a better predictor of trading than is the news content.[1]

Overall, our findings are consistent with the notion that attention is limited even for professional investors: specifically, they show a propensity to buy stocks covered by the media, and such behavior hurts their investment performance.

Our results contribute to the literature by exploring the connections between the media and capital markets. Several papers document that the overall amount of attention a stock receives affects its valuation (e.g., DellaVigna and Pollet 2009; Hirschleifer et al. 2009; Fang and Peress 2009). But so far, attention-driven trading mainly has been established for individual investors, not for professional fund managers. Moreover, the effect on stock returns is generally found over relatively short horizons, for example, a few days. By showing that professional investors—who collectively influence market prices—are subject to limited attention, our paper takes an important step toward relating media-driven trading behavior to asset pricing patterns.[2] We further contribute to

[1] This finding is consistent with those reported by Engelberg and Parsons (2011).

[2] Besides our paper, that by Corwin and Coughenour (2008) is the only other, to our knowledge, that documents limited attention among professionals. They show that NYSE specialists reduce the provision of liquidity for some of their assigned stocks when they are distracted by events affecting other stocks. Their setup does not allow for an analysis of the effect of limited attention on investment performance.

the literature by showing that this limitation affects investment performance beyond the very short run.

Our paper is also related to the literature on mutual fund performance. Prior papers indicate that manager and fund characteristics are related to skill.[3] In particular, a number of recent papers document that concentrated portfolios perform better.[4] One possible explanation for portfolio concentration is that attention is limited: under scarce cognitive resources, managers may be better able to develop specialized knowledge by focusing attention on a narrow set of stocks. Our paper identifies a new manager/fund characteristic that predicts fund performance and provides novel evidence that limited attention hurts fund performance.

Our result is related to those of Kacperczyk and Seru (2007), who quantify the extent to which funds' trades are influenced by changes in consensus analyst recommendations, which they call reliance on public information (RPI). They find that RPI has a negative relation with fund performance. Broadly speaking, our paper and that of Kacperczyk and Seru (2007) both support the notion that fund performance is negatively related to managers' tendency to rely on public information. Furthermore, we show that the number of newspaper articles about a stock alone can affect trading and performance. Our empirical setup thus offers a direct way to gauge the effect of limited attention on fund trades and performance.

1. Data and Descriptive Statistics

Our dataset combines information on stocks' media coverage with mutual fund performance and holdings. We collect comprehensive media coverage data from NexisLexis for all NYSE stocks and 500 randomly selected NASDAQ stocks for the period 1/1/1993–12/31/2002.[5] We include articles published about our sample stocks in four daily newspapers with nationwide circulation: *USA Today*, *The Wall Street Journal*, *The New York Times*, and *The Washington Post*; together, they account for 11% of the average weekday newspaper circulation in the United States. Fang and Peress (2009) argue that the coverage in these four papers is likely to be representative of most of the coverage of the corporate sector.[6] In each calendar quarter of the 10-year

[3] For example, Chevalier and Ellison (1999) document that younger managers and managers who attended colleges with higher average SAT scores earn higher returns. Chen et al. (2004) indicate that smaller funds tend to outperform larger funds because of diseconomies of scale in the fund management industry. Cremers and Petajisto (2009) show that funds that deviate most from their benchmark indexes outperform their benchmarks, both before and after expenses.

[4] Kacperczyk, Sialm, and Zheng (2005) find that mutual fund managers who hold industry-concentrated portfolios perform better after controlling for risk and style differences. Nanda, Wang, and Zheng (2004) provide evidence that fund families following more focused investment strategies across funds perform better.

[5] These data are the same as those used by Fang and Peress (2009).

[6] LexisNexis assigns a "relevance score" to an article's coverage of a company. We only consider articles that have relevance scores above 90% and which constitute "major references" to a company. Scores in the 80%–89%

period, we count the total number of articles published in the four newspapers about each firm in our sample. The stocks in our media sample are then matched by name to the CRSP stock database and to mutual fund holdings data.

Our mutual fund sample is constructed by merging the CRSP Survivor-Bias-Free Mutual Fund Database with the Thompson Financial CDA/Spectrum holdings database using the MFLink provided by Wharton Research Data Services (WRDS). The CRSP mutual fund database includes information on fund returns, total net assets, fees, investment objectives, fund age, and other fund characteristics. The CDA/Spectrum database provides stockholdings of individual mutual funds collected from the funds' SEC filings or voluntary reports. We restrict our analysis to open-end domestic equity mutual funds. Specifically, we include funds that CDA/Spectrum classifies as aggressive growth (AG), growth (G), and growth and income (GI), and we exclude index funds. For funds with multiple share classes, we eliminate the duplicated funds and compute the fund-level variables by aggregating across the different share classes.[7] We also exclude those funds that hold fewer than ten stocks and those that manage less than $5 million. Fund holdings are merged with the CRSP monthly stock file and the Compustat database to obtain stock-level information, such as market capitalization or B/M ratio. Our data are adjusted for stock splits and dividends. Fund trading is inferred from changes in fund holdings.[8]

Table 1 shows descriptive statistics for our media data. Panel A tabulates the fraction of firms covered by all four newspapers combined, as well as by each paper separately. Coverage is measured on a quarterly basis and then averaged across quarters in a given year. One observation is that 80% of our sample stocks, which are primarily large NYSE stocks, are covered during an average quarter. *The Wall Street Journal* and *The New York Times* provide the most coverage, featuring one-half to two-thirds of our sample stocks during a quarter; *The Washington Post* and *USA Today* provide considerably less, 11% and 3%, respectively. Panel B shows statistics conditional on being covered. This panel reveals that media coverage is skewed: the median number of articles about a stock is two per quarter, whereas the mean is about four, closer to the 75th percentile. Finally, panel C shows a transition matrix among types of media coverage from quarter to quarter. Each quarter, we assign the sample of stocks to no-, low-, and high-coverage bins. We first identify no-coverage stocks and then split the remaining stocks into two equal-size groups: the high-

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range are described as "strong passing references," and those in the 50%–79% range are described as "weak passing references."

[7] For most variables, we use a value-weighted average for the fund-level observation. For fund age, we use the oldest of all share classes.

[8] Funds typically report holdings quarterly, in April, July, October, and January. When a fund does not follow this schedule, we use its most recent report to infer its holdings in these months.

Table 1
Media data descriptive statistics

Panel A: % of stocks covered by

	Any newspaper	WSJ	NYT	WP	UT
1993	85.44%	61.77%	53.59%	9.36%	3.94%
1996	85.52%	54.77%	65.48%	9.32%	3.20%
1999	80.82%	66.69%	45.29%	12.96%	3.04%
2002	75.59%	57.73%	44.91%	15.59%	3.15%
All years	81.84%	60.24%	52.32%	11.80%	3.33%

Panel B: Conditional coverage statistics

	Mean	Median	75th percentile	Max
1993	3.88	2	4	164
1996	3.72	2	4	108
1999	4.29	2	4	109
2002	4.93	2	5	88
All years	4.21	2	4	117

Panel C: Transition matrix between coverage types

	No coverage	Low coverage	High coverage
No coverage	53.12%	40.01%	6.87%
Low coverage	12.91%	66.85%	20.23%
High coverage	3.51%	29.73%	66.77%

This table presents quarterly media coverage statistics. Panel A tabulates the percentage of our searched firms covered in a quarter by any of the four major newspapers combined and by each of the newspapers separately. Panel B tabulates the number of articles per stock per quarter conditioned on having coverage. For brevity, we tabulate these statistics for select individual years: 1993, 1996, 1999, and 2002 and the overall average. Panel C tabulates the transition matrix between coverage types between consecutive quarters.

(above median) and low- (below median) coverage groups. The transition matrix indicates that the intensity of media coverage is persistent, as the diagonal elements in this matrix are much larger than the off-diagonal elements; in other words, a stock with no (low-, high-) coverage tends to continue to have the same coverage. These patterns are consistent with those reported by Fang and Peress (2009).

Table 2 provides summary statistics on the mutual fund sample. Because we do not have media data for all stocks held by all funds, we exclude funds that have less than half of their holdings in stocks belonging to our search list. This raises the question of whether our fund sample differs from the fund universe. We address this question in panel A of Table 2, which compares our fund sample with the CRSP fund universe. It shows that our fund sample is similar to the CRSP fund universe in terms of performance, but a little larger and older, with slightly lower expense ratios and turnover. We will control for these fund characteristics and fund investment styles in the regression analysis.

Panel B tabulates the proportion of funds' buys and sells that are accounted for by our searched sample of stocks. For each quarter t, we calculate the dollar

Table 2
Comparing our sample with the overall fund universe

Panel A: Comparing all-funds universe with our sample

	Fund universe	Our sample	*t*-stat
NAV	866	983	−2.22**
Expense ratio	0.0132	0.0125	5.92***
Turnover	0.93	0.81	5.69***
Age	20.18	20.95	−3.51***
1-factor alpha	−0.0006	−0.0010	0.70
3-factor alpha	−0.0013	−0.0015	0.82
4-factor alpha	−0.0015	−0.0012	−0.51

Panel B: Percentage of trades accounted for by searched stocks

	All funds	Aggressive growth	Growth	Growth/income
Buys	70.81%	58.89%	66.30%	84.80%
Sells	71.35%	58.42%	66.71%	84.51%

This table presents statistics pertaining to the representativeness of our sample. Media coverage data are collected from LexisNexis for all NYSE stocks and 500 randomly selected NASDAQ stocks. Because this set of stocks (which we call our "searched universe") does not contain all listed stocks, we exclude funds that do not hold any of the stocks in the searched universe. Panel A compares key fund characteristics between the overall fund CRPS/Thomson Financial fund universe and our fund sample. Panel B tabulates the mean percentage of funds' trades (dollar value) accounted for by our searched universe of stocks in each quarter. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

value of fund f's buys and sells in stock i as follows:

$$\$buy_{f,i,t} = price_{i,t} \times (nshares_{f,i,t} - nshares_{f,i,t-1}),$$
$$\text{if } nshares_{f,i,t} >= nshares_{f,i,t-1} \quad (1A)$$

$$\$sell_{f,i,t} = -price_{i,t} \times (nshares_{f,i,t} - nshares_{f,i,t-1}),$$
$$\text{if } nshares_{f,i,t} < nshares_{f,i,t-1} \quad (1B)$$

where $price_{i,t}$ is stock i's price at the end of quarter t, and $nshares_{f,i,t}$ and $nshares_{f,i,t-1}$ are fund f's holdings in stock i at the end of quarters t and t-1, respectively.[9] Overall, our sample of stocks represents roughly 70% of funds' trades. The proportion is highest for GI funds (about 84%), followed by G funds (66%) and AG funds (58%). These differences may be driven by the fact that AG funds tend to be smaller and more concentrated in small-cap stocks, whereas our searched sample consists mainly of large NYSE stocks. Overall, these numbers indicate that stocks in our sample account for a significant portion of funds' trades.

2. Aggregate Pattern: Media Coverage and Fund Trading

Table 3 investigates the relation between aggregate fund trading and the amount of media coverage a stock receives. For each stock, we calculate the total

[9] Stock prices and number of shares data are all adjusted for stock splits and dividends. Specifically, we merge mutual fund holding data with CRSP stock data and use the cumulative adjustment factor to make the necessary adjustments.

Table 3
Media coverage and trading activity: Univariate comparison

	Percentage trading in			*t*-stats for differences		
	No-media stocks	Low-media stocks	High-media stocks	No - low	Low - high	No - high
Panel A: All funds						
Buys	1.52%	2.41%	4.51%	−8.22***	−11.94***	−18.17***
Sells	1.75%	2.93%	4.53%	−12.58***	−10.39***	−18.15***
Panel B: Aggressive growth funds						
Buys	2.44%	4.03%	3.64%	−6.00***	0.91	−2.85***
Sells	1.97%	3.22%	3.60%	−5.98***	0.64	−2.79***
Panel C: Growth funds						
Buys	2.00%	3.11%	4.75%	−6.69***	−6.48***	−11.75***
Sells	1.65%	2.56%	4.17%	−7.26***	−6.13***	−9.45***
Panel D: Growth/income funds						
Buys	0.98%	1.70%	4.34%	−8.64***	−13.87***	−18.43***
Sells	0.83%	1.54%	3.34%	−7.93***	−10.79***	−16.14***

This table reports funds' buys and sells in stocks with different amounts of media coverage in the previous quarter. The percentage of buys/sells is calculated as dollar amount of buys/sells, as in Equations 1A and 1B, aggregated over all funds and scaled by the aggregate value of funds' holdings of the same set of stocks at the end of the previous quarter. Funds buys and sells are inferred from quarterly changes in fund holdings. Each quarter we divide the sample of stocks into no-, low-, and high-media coverage groups. No-coverage stocks are first identified, and the remaining stocks are then split into two equal-size groups: the high- and low-coverage groups. The fund investment styles (viz., Aggressive Growth, Growth, and Growth/Income) are defined in the CDA/Spectrum mutual fund holdings data. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

dollar value of buys and sells in each quarter by all funds in the sample. These stock-level trading amounts are then summed by coverage type (no-, low-, and high-coverage, as described above) to measure the value of aggregate trading for all stocks of a coverage type. Finally, the resulting numbers are scaled by the funds' aggregate holdings of the same set of stocks at the end of the previous quarter. Thus, the numbers reported represent the aggregate buys/sells in these stocks as a percentage of total fund holdings.

Results in Table 3 indicate that, in the aggregate, mutual funds trade high-coverage stocks more than low- and no-coverage stocks. For example, total buys in high-coverage stocks are on average 4.51% of funds' aggregate prior holdings, whereas total buys in low- and no-coverage stocks are 2.41% and 1.52% of holdings, respectively. Thus, buying in high-coverage stocks is almost three times as intense as in no-coverage stocks. Similar patterns hold for sells. Panels B–D indicate that AG, G, and GI funds all exhibit the tendency to trade high-coverage stocks more; but GI (AG) funds seem to exhibit the strongest (weakest) preference for high-coverage stocks.

In Table 4, we estimate panel regressions of funds' buys and sells scaled by funds' total net assets (TNA) on stocks' (lagged) media coverage measures and control variables. Four media coverage measures are examined. The first measure is the log of (one plus) the number of newspaper articles about a firm in a given quarter. The second measure is a discrete variable, "coverage type,"

Table 4
Media coverage and trading activity: Panel regression

Panel A: Buys/TNA

	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
Media 1 - log(number of articles)	0.0065	2.37**				
Media 2 - coverage type			0.0027	1.02		
Media 3 - covered indicator					−0.0104	−2.65***
Media 4 - high-coverage indicator					0.0139	3.72***
Stock turnover	0.3328	12.86***	0.3389	12.80***	0.3386	12.90***
Size	−0.0249	−1.06	−0.0318	−1.41	−0.0286	−1.26
Size squared	0.0024	2.94***	0.0027	3.47***	0.0026	3.27***
B/M	−0.0001	−0.10	−0.0001	−0.02	−0.0001	−0.07
Past return	0.0047	7.72***	0.0046	7.66***	0.0046	7.68***
Quarter fixed effects	yes		yes		yes	
Fund fixed effects	yes		yes		yes	
Clustered by firm	yes		yes		yes	
Number of observations	1,600,958		1,600,958		1,600,958	
R^2	0.481		0.481		0.481	
Panel B: Sells/TNA						
Media 1 - log(number of articles)	0.0011	0.33				
Media 2 - coverage type			−0.0004	−0.12		
Media 3 - covered indicator					−0.0008	−0.15
Media 4 - high-coverage indicator					−0.0001	−0.01
Stock turnover	0.1981	5.02***	0.1999	5.06***	0.1999	5.07***
Size	0.0685	1.41	0.0681	1.39	0.0681	1.38
Size^2	0.0011	0.65	0.0011	0.66	0.0011	0.65
B/M	−0.0015	−1.52	−0.0015	−1.53	−0.0015	−1.52
Past return	0.0118	13.73***	0.0118	13.68***	0.0118	13.69***
Quarter fixed effects	yes		yes		yes	
Fund fixed effects	yes		yes		yes	
Clustered by firm	yes		yes		yes	
Number of observations	883,797		883,797		883,797	
R^2	0.679		0.679		0.679	

This table reports panel regression results of mutual fund trades on media coverage types. The dependent variable is fund buys (panel A) and sells (panel B) during a quarter, scaled by fund TNA at the end of the last quarter. Media 1–4 are four different measures of a stock's media coverage. All media measures are lagged and reflect the previous quarter's media coverage. *Log*(*number of articles*) is log of one plus the number of articles about a stock in the past quarter. *Coverage type* is a discrete variable equaling 0, 1, and 2 if the stocks has no-, low-, or high-coverage in the past quarter, respectively. *Covered indicator* is a dummy variable equaling one if the stock has media coverage and zero otherwise in the past quarter. *High coverage indicator* is a dummy variable equaling one if the stock has above-medium coverage and zero otherwise in the past quarter. Stock turnover is the natural log of one plus the previous quarter's dollar trading volume divided by the stock's market capitalization. Size is the natural log of the market capitalization of equity, measured at the end of the previous quarter. *Size squared* is the square of size. B/M is the book-to-market ratio of the stock measured at the end of the previous quarter. Past return is a discrete variable indicating the decile rank of the stock's return in the previous quarter; one indicates the lowest return decile, and ten indicates the highest return decile. Standard errors are clustered at the stock level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

which equals 0, 1, and 2 for no-, low-, and high-coverage types, respectively. The third and fourth measures are binary variables: the "Covered indicator" ("High-coverage indicator") equals one if the stock received media coverage (above-median coverage) and zero otherwise. All media measures are lagged and reflect the previous quarter's media coverage. The control variables include stock turnover, firm size, size squared (to capture potential nonlinearity in the relationship between trading and firm size), book-to-market ratio, and past returns. We include quarter and fund fixed effects and cluster the standard errors by stock.

Panel A shows that more coverage is associated with more fund buys after controlling for relevant firm characteristics. In the first model, the coefficient estimate on the log number of articles is positive and significant; in the second model, the coefficient estimate on the coverage type is also positive, though not significant; finally, the third model is suggestive of a nonmonotonic relationship: highly covered stocks are bought more intensely but stocks less highly covered are not. Our finding that mutual fund buys are positively related to a stock's media coverage is linked to, but distinct from, Falkenstein (1996) findings, which document that mutual fund holdings are positively related to a stock's "visibility," as proxied by its media coverage.[10] Panel B shows that, in contrast, funds' sells are not influenced by media coverage. This result differs from that of the univariate analysis in Table 3. It suggests that once we control for other stock characteristics, such as past returns and turnover, sells are no longer significantly related to media coverage.

Overall, these results indicate that the average fund tends to buy, but not sell, highly covered stocks more than other stocks. The stronger influence of media coverage on buys compared with sells is consistent with the notion that funds' attention is limited. As noted above, limited attention should manifest more strongly in buys than sells, because managers can usually sell only from the set of the stocks that they already hold, whereas they must choose which ones to buy from all listed stocks.

To examine the relation between institutional trades and media coverage within quarters, we obtained daily data on institutional trades from Abel Noser Solutions.[11] These data come with two limitations. First, they do not allow us to match individual funds to the CRSP Mutual Fund Database; therefore, we can only examine the dollar value of trades in the aggregate and cannot, for example, study trades scaled by TNA or relate the trading patterns to performance in the cross-section. Second, the dataset also contains trades by other types of institutions besides mutual funds (e.g., by hedge funds and pension funds); therefore, the Abel Noser Solution sample is not directly comparable to ours.

With these caveats in mind, Table 5 investigates the relation between media coverage and institutional trades at the daily frequency. Like Table 4, it shows that media coverage has a strong positive effect on institutional trades.[12] However, unlike Table 4, it shows that sells are significantly influenced by media coverage at the daily frequency. This difference may arise for two reasons. First, as already mentioned, the Abel Noser Solution data feature

[10] Falkenstein (1996) uses the number of news stories reported in major newspapers, including those used in our study.

[11] According to our conversations with Abel Noser Solutions, the trading data come from 500 institutions over the period from 1997–2002. Abel Noser Solutions was formerly called Ancerno. Puckett and Yan (2011) provide more information about these data.

[12] In unreported analysis, we also examine the relation at weekly and monthly frequencies and find qualitatively similar results.

institutions other than mutual funds and include in particular asset managers who are not subject to short-sales constraints. For example, out of the 500 or so institutions covered by the data, 87 are hedge funds (Franzoni and Plazzi 2013). Second, in our analysis of mutual funds, we infer quarterly trading from changes in holding positions. To the extent that some media-driven trades are reversed within the quarter, the estimated effect will be weaker over quarters than over days.

Overall, Tables 4 and 5 reveal that media coverage affects institutional trades and that, in the case of mutual funds, it affects buys more than sells. But there is a high degree of heterogeneity across institution types with regard to their trading of high-media stocks. For example, some institutions, such as possibly hedge funds, stand ready to take the other side of mutual funds' trades by selling high-media stocks. In the next section we examine the cross-sectional variation in mutual funds' propensities to buy and sell high-coverage stocks and the relation between such propensities and future fund performance.

3. Media-Driven Trades and Fund Performance

3.1 Funds' propensity to buy and sell stocks covered by the media

To study the cross-sectional variation in funds' propensities to buy and sell high-coverage stocks, we regress, for each fund, its buys/sells (scaled by lagged fund TNA) on stocks' media coverage and controls. We then construct a shrinkage estimator based on the regression coefficients. Specifically, for each fund and quarter, we first estimate the following cross-sectional regression:

$$\frac{\$buy_{f,i,t}}{TNA_{f,t-1}} = \beta_{f,t} Coverage_{i,t-1} + \gamma_{f,t} Size_{i,t-1} + \delta_{f,t} Turnover_{i,t-1} + constant + \varepsilon_{f,i,t}, \quad (2)$$

where the dependent variable $\$buy_{f,i,t}$ is the dollar amount of fund f's buys in stock i during quarter t, and it is scaled by $TNA_{f,t-1}$, the total net asset of fund f at the end of quarter $t-1$ (the values are in percentages in the regression). The key coefficient is $\beta_{f,t}$, which measures the impact of stocks' lagged media coverage on the fund's buys.[13] Firm size and stock turnover are included as controls to ensure that $\beta_{f,t}$captures media coverage's effect on fund buys separate from the influence of firm size and liquidity.

[13] To alleviate endogeneity concerns, we do not include contemporaneous coverage in Equation (2): we want to capture the impact of media coverage on trades, rather than vice versa. In robustness checks, we confirm that our results hold when contemporaneous coverage is included in Equation (2).

Table 5
Media coverage and institutional trades: Daily frequency

Buys

	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
Media 1 - log(number of articles)	5.80	5.97***				
Media 2 - coverage type			3.74	5.81***		
Media 3 - covered indicator					4.13	5.49***
Media 4 - high coverage indicator					2.97	2.87***
Stock turnover	7.89	12.01***	7.89	12.01***	7.89	12.01***
Size	−41.82	−22.53***	−41.84	−22.55***	−41.83	−22.57***
Size squared	1.03	23.38***	1.03	23.41***	1.03	23.42***
B/M	−0.36	−5.80***	−0.36	−5.80***	−0.36	−5.80***
Past return	−0.01	−0.85	−0.01	−0.85	−0.01	−0.85
Time fixed effects	yes		yes		yes	
Clustered by firm	yes		yes		yes	
Number of observations	1,017,457		1,017,457		1,017,457	
R^2	0.23		0.23		0.23	
Sells						
Media 1 - log(number of articles)	7.07	5.07***				
Media 2 - coverage type			4.41	5.19***		
Media 3 - covered indicator					3.91	4.73***
Media 4 - high coverage indicator					5.39	3.38***
Stock turnover	8.46	10.08***	8.47	10.03***	8.48	10.04***
Size	−42.16	−19.09***	−42.21	−19.08***	−42.22	−19.09***
Size squared	1.04	19.87***	1.04	19.86***	1.04	19.87***
B/M	−0.43	−6.53***	−0.43	−6.52***	−0.43	−6.52***
Past return	0.03	1.78*	0.03	1.78*	0.03	1.78*
Time fixed effects	yes		yes		yes	
Clustered by firm	yes		yes		yes	
Number of observations	929,783		929,783		929,783	
R^2	0.23		0.23		0.23	

This table analyzes the impact of lagged media coverage on institutional investors' trading at the daily frequency. Institutional investors' trading data are from Abel Noser Solutions and cover the period from 1997–2002. The dependent variables are the daily total buys and sells (in millions of dollars) by all U.S. institutional investors in the sample. Media coverage variables (Media 1–Media 4) are defined in the same way as in Table 4. *Log*(*number of articles*) is log of one plus the number of articles about a stock in the day before. *Coverage type* is a discrete variable equaling 0, 1, and 2 if the stocks has no, low, or high coverage in the day before. *Covered indicator* is a dummy variable equaling one if the stock has media coverage and zero otherwise in the day before. *High-coverage indicator* is a dummy variable equaling one if the stock has above-medium coverage and zero otherwise the day before. Control variables are defined in Table 4. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

After estimating Equation (2) for each fund-quarter, we calculate fund f's PROPENSITY_BUY_MEDIA for quarter t as follows:

$$PROPENSITY\_BUY\_MEDIA_{f,t} = \frac{1}{\left(\frac{1}{\sigma^2_{f,t}} + \frac{1}{\sigma^2_{f,t-1}} + \frac{1}{\sigma^2_{f,t-2}} + \frac{1}{\sigma^2_{f,t-3}}\right)} * \left(\frac{\beta_{f,t}}{\sigma^2_{f,t}} + \frac{\beta_{f,t-1}}{\sigma^2_{f,t-1}} + \frac{\beta_{f,t-2}}{\sigma^2_{f,t-2}} + \frac{\beta_{f,t-3}}{\sigma^2_{f,t-3}}\right), \quad (3)$$

where $\beta_{f,t-q}$ is the key beta coefficient for the quarter t-q, and σ^2_{t-q} is the variance of that estimated coefficient (hence $1/\sigma^2_{t-q}$ is the precision of the estimated coefficient). In other words, PROPENSITY_BUY_MEDIA is the precision-weighted average beta coefficient based on four quarterly regressions (current

Table 6
Statistics of PROPENSITY_BUY_MEDIA and PROPENSITY_SELL_MEDIA

Panel A: Buys

	Mean	SD	P25	P50	P75
β	0.017	1.262	−0.058	0.003	0.071
PROPENSITY_BUY_MEDIA	0.011	0.560	−0.038	0.004	0.053
Panel B: Sells					
β	−0.124	10.183	−0.090	0.001	0.090
PROPENSITY_SELL_MEDIA	−0.004	0.646	−0.062	0.002	0.062

This table reports the summary statistics for funds' propensities to buy and sell media-covered stocks. Each quarter, we estimate cross-sectional regressions of funds' buys (analogously for sells) of individual stocks on the stocks' media coverage and size using the following equation:

$$\frac{\$buy_{f,i,t}}{TNA_{f,t-1}} = \beta_{f,t} Coverage_{i,t-1} + \gamma_{f,t} Size_{i,t-1} + \delta_{f,t} Turnover_{i,t-1} + constant + \varepsilon_{f,i,t},$$

where the dependent variable $\$buy_{f,i,t}$ is the dollar amount of fund f's buys in stock i during quarter t, and it is scaled by the fund's TNA at the end of the last quarter. The numbers are formulated as percentages in our regressions. $Coverage_{i,t-1}$ is the log of one plus the number of articles published about stock i during quarter $t-1$, and $\text{Size}_{i,t-1}$ is the (log of) the market capitalization of equity at the end of quarter $t-1$. $Turnover_{i,t-1}$ is the natural log of one plus the previous quarter's dollar trading volume divided by the stock's market capitalization. We then calculate PROPENSITY_BUY_MEDIA and PROPENSITY_SELL_MEDIA as the following shrinkage estimator using four quarters of estimation results:

$$PROPENSITY\_BUY\_MEDIA_{f,t} =$$

$$\frac{1}{\left(\frac{1}{\sigma^2_{f,t}} + \frac{1}{\sigma^2_{f,t-1}} + \frac{1}{\sigma^2_{f,t-2}} + \frac{1}{\sigma^2_{f,t-3}}\right)} * \left(\frac{\beta_{f,t}}{\sigma^2_{f,t}} + \frac{\beta_{f,t-1}}{\sigma^2_{f,t-1}} + \frac{\beta_{f,t-2}}{\sigma^2_{f,t-2}} + \frac{\beta_{f,t-3}}{\sigma^2_{f,t-3}}\right),$$

where σ^2_{t-q} is the variance of the estimated coefficient $\beta_{f,t-q}$. PROPENSITY_SELL_MEDIA is defined analogously. The reported statistics are calculated using the cross-section of funds in each quarter and then averaged across quarters.

quarter and three lags). The propensity to sell stocks covered by the media, PROPENSITY_SELL_MEDIA, is defined analogously.[14]

Table 6 reports statistics for funds' PROPENSITY_BUY_MEDIA and PROPENSITY_SELL_MEDIA measures. We first observe that media coverage has, overall, a positive impact on funds' buys (panel A). Both the raw β coefficients and the shrinkage estimators are positive on average. In contrast, media's impact on sells is less clear (panel B). In fact, the average β and the shrinkage estimators are negative, although their medians are positive. Moreover, the coefficients for sells are less precisely estimated, as indicated by their larger standard deviations. The coefficient estimates imply that, for a fund with the average PROPENSITY_BUY_MEDIA measure, a stock with a median

[14] Our results are robust to different ways the PROPENSITY measures can be constructed. In an earlier version of the paper, we estimated Equation (2) for dollar trades, that is, without scaling by funds' TNA, and then defined PROPENSITY as in Equation (3). We also used the Partial R^2 associated with the media coverage variables in an equation similar to Equation (2), with multiple lags of media coverage to measure PROPENSITY. As a third alternative, we used the standardized coefficients of the same equation (we thank an anonymous referee for this suggestion). Results based on these alternative methods are qualitatively similar to those reported here.

Table 7
Correlation between propensity to buy and sell media-stocks and other fund characteristics

	PROPENSITY BUY_MEDI	PROPENSITY SELL_MEDIA	Expenses	Turnover	Fund size	Age	New money growth
PROPENSITY BUY_MEDIA	1						
PROPENSITY SELL_MEDIA	0.05	1					
Expenses	0.01	−0.03	1				
Turnover	0.02	−0.02	0.18***	1			
Fund size	−0.01	0.03	−0.37***	−0.07	1		
Age	−0.01	0.00	−0.13	−0.04	0.46***	1	
New money growth	−0.01	0.02	−0.03	−0.08	0.02	−0.11*	1

This table presents correlation coefficients between PROPENSITY_BUY_MEDIA and PROPENSITY_SELL_MEDIA and other fund characteristics. Expenses is the funds' expense ratio. Turnover is the funds' annual turnover. Fund Size is the log of the fund's TNA. Age is the log of years since fund inception. New Money Growth is the percentage flow of funds into a mutual fund in a quarter, calculated as the difference between current TNA and lagged TNA multiplied by the fund return, scaled by lagged TNA. *, **, *** indicate significance of the correlation coefficients at the 10%, 5%, 1% levels, respectively.

coverage of two articles over a quarter (Table 1) experiences an extra $232K in buys, roughly 60% of the median quarterly trade size for buys ($389K in our sample).[15] We also note that the statistics are positively skewed—the median propensity measures are considerably smaller than the averages—indicating that some funds display a very strong propensity to buy media-covered stocks.

Table 7 reports the correlations between funds' PROPENSITY_BUY_MEDIA, PROPENSITY_SELL_MEDIA, and other fund characteristics. It shows that our propensity measures are not significantly correlated with other fund characteristics, alleviating potential concerns that any cross-sectional relation between PROPENSITY measures and performance is driven by another fund characteristic.

If funds' propensity to buy high-coverage stocks reflects managers' limited attention, then we would expect this propensity to be persistent. Results reported in Table 8 confirm this hypothesis. The table shows that three years after sorting funds on their PROPENSITY_BUY_MEDIA measure, funds with the highest PROPENSITY measure (those initially in quintile 5) continue to display significantly positive PROPENSITY measures that are higher than funds initially in quintile 1. PROPENSITY_SELL_MEDIA does not display a similar persistence.

3.2 Fund performance

In this section, we examine the relation between funds' propensities to trade media-covered stocks and their future performance. Under the limited attention hypothesis, fund managers trade high-coverage stocks for the same reasons that

[15] Table 1 indicates that the median number of articles featuring a covered stock in a quarter equals two. Because coverage is measured in log in regression (2), the additional buys for a stock with average coverage over a noncovered stock amount to 0.011x(ln(3)-ln(1))=0.0118% of the fund's TNA. Because the average TNA is $1,965M in our sample, this implies 0.0118%x$1,965M=232K in additional buying.

Table 8
Persistence in the PROPENSITY measures

Quintile	1 year	2 years	3 years
PROPENSITY_BUY_MEDIA			
1 (low)	−0.0477***	0.0065	0.0083**
2	0.0001	0.0082	0.0022
3	0.0062	0.0040	0.0106
4	0.0178	0.0098	0.0053
5 (high)	0.0822***	0.0243***	0.0241***
High–low	0.1299***	0.0178***	0.0158**
t-stat (high–low)	15.6425	2.7681	2.4111
PROPENSITY_SELL_MEDIA			
1 (low)	−0.1007***	−0.0041	−0.0196*
2	−0.0054	−0.0007	−0.0026
3	−0.0020	−0.0044	−0.0037
4	0.0173	0.0077	0.0004
5 (high)	0.0836	−0.0051	−0.0055
High–low	0.1843***	−0.0009	0.0141
t-stat (high–low)	17.7221	−0.0901	1.1498

This table examines the persistence of the PROPENSITY measures. It compares the PROPENSITY measures 1, 2, and 3 years after initial sorting. We sort funds into quintiles by their PROPENSITY measures and then compare the high and low quintiles differences over various horizons. For individual quintiles, *, **, and *** indicate whether the average is significantly different from zero at the 10%, 5%, and 1% levels, respectively. For High–Low, *, **, and *** indicate whether the difference is significantly different from 0 at the 10%, 5%, and 1% levels, respectively.

individual investors do: these stocks are on their radar screen. Because such trading is not motivated by superior information, we expect it to be unrelated or negatively related to their performance.

We use five performance measures: the CAPM alpha, the Fama-French 3-factor alpha, Carhart's 4-factor alpha, the conditional 4-factor alpha based on Ferson and Schadt (1996), and the manipulation-proof measure proposed by Ingersoll et al. (2007). The factor-model alphas have been widely used in the fund literature. To calculate alphas, for each fund in each month, we estimate factor loadings from the time-series regressions of excess fund returns on factor returns using data for the previous 36 months. Alphas are then calculated as the realized fund return minus the expected fund return.

Ingersoll et al. (2007) show that popular performance measures, such as the alpha and the Sharpe ratio, can be gamed and that an unskilled fund manager may appear skillful based on these measures. They propose a manipulation-proof measure based on historical fund returns as follows:

$$\hat{\theta} = \frac{1}{(1-\rho)\Delta t} \ln\left(\frac{1}{T}\sum_{t=1}^{T}[(1+r_t)/(1+r_{ft})]^{1-\rho}\right) \tag{4}$$

where T is the total number of observations over the performance evaluation period, Δt is the length of time between observations (i.e., 1/12 for our monthly return sample), r_t is a fund's rate of return for month t, and r_{ft} is the risk-free rate at month t. ρ can be viewed as a relative risk-aversion coefficient in order to make holding the benchmark portfolio optimal for uninformed managers.

Ingersoll et al. estimated that ρ is between 2 and 4 if the CRSP value-weighted return is the benchmark portfolio. Our test results are qualitatively similar when we use $\rho = 2$ to 4 respectively. For brevity's sake, we report results using $\rho = 3$ in the tables. Thus, the manipulation-proof performance measure is calculated using the monthly fund return and risk-free rate with a relative risk-aversion coefficient of three.

Table 9 uses panel regressions to investigate the relation between funds' propensity to buy or sell high-coverage stocks and future fund performance. The dependent variable is funds' monthly alpha and the main independent variables are funds' PROPENSITY_BUY_MEDIA decile rank (panel A) and PROPENSITY_SELL_MEDIA decile rank (panel B). We group funds into deciles rather than rely on the point estimate of the propensity measures to reduce estimation noise. As control variables, we include fund size, fund family size, fund expense ratio, turnover, fund age, investment style indicators, and the average size of stocks held by the funds.

Table 9 indicates a strong negative relation between PROPENSITY_BUY_MEDIA and fund performance. The coefficient estimate on the propensity decile rank is negative and significant in all regressions. Because alphas are measured in basis points, the negative 2.6 coefficient estimate in the CAPM model indicates that a 10% increase in PROPENSITY_BUY_MEDIA rank is associated with a 2.6 basis points reduction in monthly CAPM alpha. Thus, funds in the top PROPENSITY_BUY_MEDIA decile underperform funds in the lowest decile by 2.8% (2.6 x 9 x 12 basis points) per year. Similar calculations reveal underperformance ranging from 1.1% to 1.9% in the other models of alpha. On the other hand, we find that there is generally no relation between PROPENSITY_SELL_MEDIA and fund performance. The coefficient estimates are only a small fraction of those for PROPENSITY_BUY_MEDIA and not statistically significant. The coefficient estimates on the control variables are consistent with prior evidence. For example, we find that a fund's expense ratio, age, and average firm size are negatively related to its performance.

In summary, we uncover a strong negative relation between funds' propensity to buy high-coverage stocks and their performance. Funds with the strongest propensity (top 10%) to buy media-covered stocks underperform funds with the weakest propensity by 1.1% to 2.8% per year, depending on the performance metric. The relation between funds' propensity to sell media-covered stocks and their subsequent performance is much weaker. These findings are consistent with the hypothesis that a strong propensity to buy stocks with media coverage results from limited attention among fund managers.

4. Additional Analysis

In this section, we consider alternative explanations and robustness checks.

Table 9
Propensity to buy and sell media-covered stocks and future fund performance: Panel regressions

Panel A: PROPENSITY_BUY_MEDIA and future fund performance

	CAPM alpha		3-factor alpha		4-factor alpha		Cond'l 4-factor alpha		Manipulation -proof measure	
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
PROPENSITY decile	−2.619	−6.85***	−1.055	−3.50***	−1.739	−5.85***	−1.287	−3.84***	−1.585	−3.93***
Fund size	0.001	1.29	0.002	3.06***	0.001	0.05	−0.001	0.09	0.001	1.32
Fund family size	0.000	−0.59	−0.001	−2.07**	−0.001	−1.18	−0.001	−0.59	0.000	−0.49
Expense	−1.094	−5.08***	−1.320	−7.78***	−1.165	−6.95***	−1.208	−6.40***	−0.648	−2.88***
Turnover	−0.002	−1.11	0.000	−0.41	−0.007	−6.25***	−0.004	−3.20***	−0.010	−6.86***
Age	−0.007	−2.94***	−0.007	−3.89***	−0.004	−2.23**	−0.003	−1.66*	−0.005	−1.89*
Aggressive growth	−0.006	−1.22	0.006	1.45	−0.013	−3.39***	0.002	0.55	−0.019	−3.26***
Growth	−0.002	−0.67	0.006	2.90***	−0.005	−2.52**	0.002	0.73	−0.012	−4.35***
Average firm size	−0.011	−6.86***	0.002	1.71*	−0.005	−4.09***	0.001	0.81	−0.008	−4.74***
Intercept	0.047	4.04***	−0.018	−1.94*	0.029	3.20***	0.016	1.59	0.245	19.87***
Year fixed effects	yes		yes		yes		yes		yes	
Clustered by fund	yes		yes		yes		yes		yes	
Observations	21,592		21,592		21,592		21,592		21,592	
R^2	0.131		0.071		0.088		0.054		0.775	
Panel B: PROPENSITY_SELL_MEDIA and future fund performance										
PROPENSITY decile	−0.331	−0.85	0.251	0.82	0.288	0.96	0.154	0.45	−0.066	−0.16
Fund size	0.001	0.97	0.002	3.11***	0.001	0.16	−0.001	−0.03	0.001	1.17
Fund family size	0.000	−0.11	−0.001	−1.59	0.001	−0.72	−0.001	−0.34	0.000	0.12
Expense	−1.454	−6.47***	−1.274	−7.23***	−1.139	−6.55***	−1.203	−6.16***	−0.939	−3.99***
Turnover	−0.001	−0.87	0.001	−0.26	−0.007	−6.07***	−0.004	−3.12***	−0.010	−6.67***
Age	−0.008	−3.35***	−0.008	−4.17***	−0.005	−2.63***	−0.004	−1.94*	−0.007	−2.75***
Aggressive growth	−0.008	−1.63	0.003	0.80	−0.017	−4.24***	0.000	0.05	−0.019	−3.46***
Growth	−0.001	−0.53	0.006	2.96***	−0.005	−2.59***	0.002	0.71	−0.011	−4.17***
Average firm size	−0.011	−6.57***	0.002	1.95*	−0.005	−3.71***	0.001	0.93	−0.007	−4.41***
Intercept	0.038	3.16***	−0.030	−3.18***	0.015	1.59	0.006	0.60	0.242	18.96***
Year fixed effects	yes		yes		yes		yes		yes	
Clustered by fund	yes		yes		yes		yes		yes	
Observations	20,605		20,605		20,605		20,605		20,605	
R^2	0.133		0.070		0.086		0.053		0.772	

This table examines the relation between funds' future performance and their propensity to buy (PROPENSITY_BUY_MEDIA, Panel A) and sell (PROPENSITY_SELL_MEDIA, Panel B) media-covered stocks using panel regressions. PROPENSITY_BUY_MEDIA and PROPENSITY_SELL_MEDIA are estimated according to Equations (2) and (3) for each fund quarter and used to sort funds into deciles. The dependent variables are measures of funds' performance over the next quarter, denominated in basis points per month. *PROPENSITY decile* is the decile rank of the relevant propensity measure. *Fund size* is the natural log of one plus the fund's TNA. *Fund family size* is the natural log of one plus the fund family TNA. *Expense* is the fund's expense ratio. *Turnover* is the funds' annual turnover. *Fund age* is the log of years since fund inception. *Aggressive growth* and *Growth* are indicator variables for fund styles, respectively. *Average firm size* is the average size score on a scale from one (small cap) to five (large cap) of the stocks the fund holds. All independent variables are lagged by one quarter. The *t*-statistics reported are based on robust standard errors clustered by fund. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 10
The flow-catering hypothesis: Managers' incentives to buy stocks with media coverage

Dependent var: Next quarter new money growth

Average media coverage	−0.0134			
	(−0.56)			
Log (Average media coverage)		0.0410		
		(0.29)		
% of stocks with media coverage			−0.6215	
			(−0.84)	
% of stocks with high media coverage				−0.1472
				(−0.24)
Alpha (t-1)	93.1327***	93.4617***	92.9165***	93.2289***
	(19.76)	(19.84)	(19.78)	(19.81)
Alpha (t-1)^2	−254.9298**	−254.5129**	−253.9812**	−254.5423**
	(−2.55)	(−2.56)	(−2.54)	(−2.55)
Alpha (t-2)	78.0797***	78.2784***	77.8035***	78.0982***
	(15.88)	(15.86)	(15.66)	(15.81)
Alpha (t-2)^2	−136.0846	−135.9954	−136.1300	−136.0653
	(−1.25)	(−1.24)	(−1.25)	(−1.25)
Controls	yes	yes	yes	yes
Quarter fixed effect	yes	yes	yes	yes
Style fixed effect	yes	yes	yes	yes
Cluster by funds	yes	yes	yes	yes
Observations	23,093	23,093	23,093	23,093
R^2	0.061	0.061	0.061	0.061

This table investigates whether buying media-covered stocks drives future fund inflow. We regress next quarter fund flow (New Money Growth, and NMG) on media measures of stocks bought, lagged fund performance, and other controls. Average media coverage is the average number of articles about a stock in the last quarter. Alpha is the fund's CAPM alpha. Other controls include standard deviation of alpha, log TNA, log fund age, expense ratio, and turnover. Controls include stock size, B/M ratio, and past returns.t-statistics appear in the parenthesis. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

4.1 The flow-catering hypothesis

Solomon, Soltes, and Sosyura (2012) show that winner stocks in funds' portfolios attract investor flows only if they were recently featured in the media. In other words, media coverage attracts fund investors' attention and makes stocks' winner status more prominent, amplifying investors' tendency to chase fund returns. If fund investors are attracted to media-covered stocks, and if they channel money (fund flow) into funds that hold such stocks, then fund managers should rationally buy these stocks to cater to investors' taste. In this case, managers' purchases of media-covered stocks are not the consequence of their own limited attention but of their clients' and flow-catering is a rational response from the manager. Because stocks with media coverage tend to earn lower returns than those without coverage (Fang and Peress 2009), we find that such funds underperform. We call this alternative explanation the "flow-catering hypothesis."[16]

We test this hypothesis by examining whether fund flows are responsive to managers' buying of media-covered stocks, as they would be if managers rationally buy media-covered stocks to cater to fund inflows. We regress future (next quarter) fund flow (New Money Growth) on the media coverage of stocks

[16] We thank an anonymous referee for suggesting this alternative hypothesis.

purchased and a number of control variables that have been shown to drive fund flows, including current and lagged quarterly alphas and their squared terms.[17] Table 10 reports the results. To conserve space, only key variables are reported. The estimation results indicate that none of the media measures are significant, suggesting that media coverage of stocks bought by funds has limited impact on future fund flows. This invalidates a necessary condition for the flow-catering hypothesis.[18]

4.2 Media coverage and reliance on public information (RPI)

Our paper is related to that by Kacperczyk and Seru (2007), which shows that fund managers' reliance on public information is negatively related to their performance. The authors measure a fund's reliance on public information (RPI) as the R^2 from a regression of the fund's trades on changes in consensus analyst recommendations—their proxy for public information—and show that it negatively predicts fund returns. Mass media are another source of public information, one that is arguably even more public than analysts report, given the broader audience. In Table 11 we examine whether our finding is a manifestation of the RPI effect. We rerun the main performance regression controlling for the RPI measure.[19] We find that PROPENSITY_BUY_MEDIA remains significant in predicting returns with a coefficient of similar magnitude to those in Table 9, suggesting that the mass media effect is not subsumed by the RPI effect.

4.3 Positive versus negative media coverage

Our media coverage variable bears no sign; that is, we measure only the presence of articles, not their content or tone, which can be positive or negative. Do managers buy/sell based on media coverage regardless of its content, or do they buy/sell based on the positive/negative news reported by the media? The former corresponds with our limited attention hypothesis: media coverage grabs managers' attention and moves stocks onto their radar screen. These stocks are then more likely to be purchased, regardless of the nature of the news that earned them the media coverage. The latter suggests that managers rely on the information contained in news reports and trade in the same direction.

Because we do not have the full text of the articles, we are unable to use linguistic content analysis to measure their tone directly. We use instead the

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[17] These control variables include the standard deviation of alpha, log TNA, log age, expense ratio, and turnover (e.g., Barber, Odean, and Zheng 2005). Year and investment-style fixed effects are also included. Standard errors are clustered by fund.

[18] However, we believe that our results are not inconsistent with the main finding of Solomon, Soltes, and Sosyura (2012). We show that buying media coverage stocks in general do not attract future flows, whereas they show that buying winner stocks with media coverage attract future flows. In unreported tests, we find qualitatively similar results to Solomon, Soltes, and Sosyura (2012).

[19] We thank Kacperczyk and Seru for kindly sharing the RPI data with us.

Table 11
Reliance on public information

Panel A: PROPENSITY_BUY_MEDIA and future fund performance

	CAPM alpha		3-factor alpha		4-factor alpha		Cond'l 4-factor alpha		Manipulation -proof measure	
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
PROPENSITY decile	−2.755	−6.42***	−1.044	−3.09***	−1.752	−5.26***	−1.419	−3.79***	−1.811	−4.06***
RPI decile	0.073	0.15	−0.327	0.88	−0.077	−0.21	−0.729	−1.77*	0.185	0.37
Controls	yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes	
Clustered by fund	yes		yes		yes		yes		yes	
Observations	19,340		19,340		19,340		19,340		19,340	
R^2	0.132		0.068		0.089		0.052		0.777	
Panel B: PROPENSITY_SELL_MEDIA and future fund performance										
PROPENSITY decile	−0.352	−0.81	0.079	0.23	0.079	0.24	−0.054	−0.14	−0.129	−0.28
RPI decile	−0.107	−0.22	−0.436	−1.15	−0.217	−0.58	−0.753	−1.80*	0.032	0.06
Controls	yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes	
Clustered by fund	yes		yes		yes		yes		yes	
Observations	18,608		18,608		18,608		18,608		18,608	
R^2	0.13		0.066		0.085		0.050		0.779	

This table reports "horse race" results for the predictive fund return regression. We investigate the relative strength of two key variables—the PROPENSITY measure (PROPENSITY decile) and the RPI measure from Kacperczyk and Seru (2007) (KS_RPI Decile)—in predicting future fund returns. The regression specification is otherwise identical to that in Table 9. Controls include fund size, fund family size, expense ratio, turnover, fund age, aggressive growth and growth indicators, and average size of the firm held by the fund. *, **, and *** indicates significance at the 10%, 5%, and 1% levels, respectively.

contemporaneous stock return to infer the tone of the articles. For each media-covered article, we calculate the stock's raw return, market-adjusted return, and DGTW-benchmark-adjusted return over the 2-day window from the day before to the day of the coverage.[20] We then apply the sign of the return measures to the coverage indicator and sum the resulting measure for each stock-quarter to obtain quarterly signed media coverage variables by stock. Finally, we calculate funds' propensities to buy/sell according to positive/negative coverage by re-estimating Equations (2) and (3) using the signed media measures.[21] We call the resulting measures "mass media RPI" because they capture the extent to which managers trade in the same direction as the tone of the media coverage.[22]

To compare the predictive power of the different measures, we include PROPENSITY and mass media RPI (the signed Propensity) in the same regression.[23] Results are reported in Table 12. We find that PROPENSITY_BUY_MEDIA has a stronger predictive power for fund performance than for mass media RPI. The fact that buying based on media coverage (captured by PROPENSITY_BUY_MEDIA) is a more important negative predictor of future performance than is buying based on content (captured by mass media RPI) suggests that the inferior performance for strong propensity funds is more likely to be driven by limited attention than by managers' reliance on public information.

Finally, we use intra-quarter trading data from Abel Noser Solutions to test whether fund managers are more likely to buy/sell stocks based on media coverage (which is a proxy for attention) or based on positive/negative content. Specifically, we regress aggregate daily buys and sells on lagged signed media coverage measures for stocks (positive or negative) and other stock-level controls.[24] If managers trade on the content reported in the mass media, we would expect them to trade in the same direction as the media tone: positive coverage should be associated with more buys and fewer sells, whereas negative coverage should be associated with more sells and fewer buys. If, on the other hand, they trade only based on coverage—a proxy of attention—then

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[20] We downloaded the DGTW benchmark portfolio data from Russ Wermers's Web site and calculated value-weighted daily benchmark returns using the benchmark composition. The DGTW benchmark is based on Daniel et al. (1997).

[21] In Kacperczyk and Seru (2007), the RPI measure is calculated as the R^2 of a regression of fund trades on changes in analyst recommendations. In the results reported here, we formulated the mass media RPI measure using the same shrink estimator technique as in the calculation of the PROPENSITY measures (the only difference is that signed media variables are used). In unreported analysis, we also calculated mass media RPI using an R^2 formulation in the spirit of Kacperczyk and Seru (2007). Results are qualitatively similar to those reported here, namely, that the PROPENSITY measure dominates the RPI measures.

[22] The three return metrics—raw, market-adjust, and DGTW-benchmark adjusted—give us three variants of the mass media RPI measure. They all produce consistent results. We calculated daily DGTW benchmark returns for each stock using the DGTW benchmark compositions from Russ Wermers's Web site. The benchmark returns are calculated using the method in the original Daniel et al. (1997) paper.

[23] For brevity, we report only the mass media RPI results based on DGTW-benchmarked returns; other return measures yield consistent results.

[24] For brevity we report only the daily results. Weekly and monthly results are qualitatively the same.

Table 12
Reliance on signed media coverage (mass media RPI)

Panel A: PROPENSITY_BUY_MEDIA and future fund performance

	CAPM alpha		3-factor alpha		4-factor alpha		Cond'l 4-factor alpha		Manipulation -proof measure	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
PROPENSITY decile	−2.521	−6.53***	−1.025	−3.36***	−1.684	−5.58***	−1.326	−3.91***	−1.563	−3.94***
Mass media RPI decile	−1.226	−3.18***	−0.618	−2.03**	−0.790	−2.63***	−0.615	−1.82*	−0.681	−1.71*
Controls	yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes	
Clustered by fund	yes		yes		yes		yes		yes	
Observations	20,007		20,007		20,007		20,007		20,007	
R^2	0.128		0.066		0.084		0.051		0.775	
Panel B: PROPENSITY_SELL_MEDIA and future fund performance										
PROPENSITY decile	−0.218	−0.55	0.317	1.01	0.364	1.17	0.050	0.14	−0.132	0.32
Mass media RPI decile	−0.154	−0.39	−0.316	−1.01	−0.133	−0.43	−0.166	−0.48	−0.087	−0.21
Controls	yes		yes		yes		yes		yes	
Year fixed effects	yes		yes		yes		yes		yes	
Clustered by fund	yes		yes		yes		yes		yes	
Observations	19,315		19,315		19,315		19,315		19,315	
R^2	0.126		0.065		0.083		0.050		0.777	

This table investigates whether fund managers' reliance on the direction of news contained in the media coverage can explain our results. Managers' reliance on directional information (good versus bad news) is measured by Mass Media PRI. We assign positive and negative signs to the media coverage based on abnormal stock returns on the day of and the day before the media coverage. Results reported here are based on DGTW characteristic-adjusted daily returns. Section 4.3 of the text details the calculation of the mass media RPI measure. The regression reported below is a horse race between the PROPENSITY measure (PROPENSITY decile) and the mass media RPI measure in predicting future fund returns. The regression specification is otherwise identical to that in Table 9. Controls include fund size, fund family size, expense ratio, turnover, fund age, aggressive growth and growth indicators, and average size of the firm held by the fund. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 13
Trading on coverage or trading on news?

Panel A: Buys

	Coef.	t-stat	Coef.	t-stat
Lagged signed coverage positive	6.15	5.43***		
Lagged signed coverage negative	4.36	5.13***		
Lagged signed articles positive			3.49	6.36***
Lagged signed articles negative			2.25	5.33***
Controls	yes		yes	
Time fixed effects	yes		yes	
Clustered by firm	yes		yes	
Observations	1,017,457		1,017,457	
R^2	0.23		0.23	
Panel B: Sells				
Lagged signed coverage positive	3.38	2.96***		
Lagged signed coverage negative	7.96	5.63***		
Lagged signed articles positive			2.45	3.53***
Lagged signed articles negative			4.7	4.92***
Controls	yes		yes	
Time fixed effects	yes		yes	
Clustered by firm	yes		yes	
Observations	929,783		929,783	
R^2	0.23		0.23	

This table investigates whether managers trade in the directions of the tones in the media coverage. We use 2-day DGTW-benchmark adjusted returns around a media coverage event (stock-day) to infer the tones of the coverage. The dependent variables are the daily aggregate buys and sells (in millions of dollars) from the Abel Noser Solutions dataset. The key independent variables are signed media coverage measures at the stock level. Lagged signed coverage positive (negative) is an indicator variable that equals one if the stock has received overall positive (negative) coverage in the past week (or month) and zero otherwise. Lagged signed articles positive (negative) is a discrete variable that equals the number of positive (negative) articles the stock has received in the past week (or month). Control variables include stock turnover, size, size squared, B/M ratio, and past returns. Thus, the specification is similar to that in Table 4. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

we would expect both type of tones to be associated with more trading. The results presented in Table 13 reveal that positive and negative tones are significantly associated with both more buys and sells. In unreported analysis, we confirmed that this effect holds in our mutual fund dataset at the quarterly frequency as well. These results provide further support for our interpretation that coverage draws attention, which in turn leads to more trading and that such attention-driven trades hurt performance.

4.4 Managerial turnover and the PROPENSITY measures

In our final test of the limited attention hypothesis, we examine whether the PROPENSITY measure changes when fund managers change. Recall that in Table 8, we showed PROPENSITY to be persistent. To the extent that limited attention is an attribute of individual managers, we expect this persistence to be affected when managers change.[25]

[25] We thank the Editor for suggesting this test and Professor Prachi Deuskar from University of Illinois at Urbana-Champaign for sharing her data on fund manager turnover (Deuskar et al. 2011).

Table 14
Fund manager turnover and PROPENSITY change

PROPENSITY_BUY_MEDIA	Average change in quintile rank	*t*-stat
Funds with manager change	−0.490	−2.30**
Funds without manager change	−0.014	−0.62
Difference	−0.477	−2.59***
PROPENSITY_SELL_MEDIA		
Funds with manager change	−0.122	−0.93
Fund without manager change	0.008	0.44
Difference	−0.129	−0.92

This table compares the change in average quintile ranks for funds that experienced manager turnover with the same quintile change for funds that do not experience manager turnover. For each set of funds, we report the average difference in their PROPENSITY quintile ranks five quarters after the manager turnover event compared with their PROPENSITY quintile ranks one quarter before the turnover event. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Table 14 compares the average change in PROPENSITY quintile ranks for funds that experienced manager turnover to the same change for funds that do not experience manager turnover. To clearly identify the relation between individual managers and the PROPENSITY measure, we focus on single-manager funds, as opposed to funds managed by teams. Table 14 indicates that funds with manager changes experience a significant reduction in their PROPENSITY quintile ranks by about half a quintile (0.49), or 10% in terms of the overall fund rank, whereas funds without manager changes experience no significant changes. The difference is highly significant. Thus, manager turnover is associated with significant changes in the fund's PROPENSITY measure, consistent with the notion that limited attention is a manager characteristic. Furthermore, it is interesting to note that manager change is accompanied by large reductions in the PROPENSITY measure, suggesting that high PROPENSITY (low-performing) managers are replaced by better managers who are less susceptible to limited attention.

5. Conclusions

Recent research offers increasing evidence that media affects individual investors' trading behavior by drawing their limited attention to certain assets. We extend the analysis by asking whether and how mass media influences the way professional managers trade. To do so, we construct a measure of a mutual fund's propensity to buy or sell stocks covered in the media. Our empirical findings suggest that, on average, funds tend to buy stocks with media coverage more heavily than those without. Funds' sells, on the other hand, are less influenced by media coverage. In the cross-section, we find that funds with a strong propensity to buy media-covered stocks underperform both funds with a weak propensity and passive benchmarks by about 1.1%–2.8% per year. This underperformance is strong for fund buys but is virtually nonexistent for sells.

We also document that funds with a strong propensity to buy high-coverage stocks exhibit persistence in this trading behavior.

We show that these findings are most consistent with the hypothesis that professional fund managers—at least a subset of them—are subject to limited attention; mass media coverage moves stocks onto their radar screen, and trading on media coverage hurts performance. Alternative explanations, such as managers buying media-covered stocks to cater to investor preference for such stocks, or managers trading on content reported in the media, are less consistent with our results. While prior literature has presented evidence that individual investors suffer from limited attention, our contribution is to show that even professional investors are not impervious to this bias. Our findings raise a number of additional questions. For example, if individuals and some mutual funds exhibit similar trading behaviors driven by limited attention, which investors take the other side of their trades, and what are the return implications? And have investors become more or less attention driven over time? Whereas information-technology enhancement and learning would predict less attention-driven trades, the exploding volume of information would predict otherwise. We leave the exploration of these questions to future research.

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