Avoiding Idiosyncratic Volatility: Flow Sensitivity to Individual Stock Returns*

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Abstract

Despite positive and significant earnings announcement premia, we find that institutional investors reduce their exposure to stocks before earnings announcements. A novel result on the sensitivity of flows to individual stock returns provides a potential explanation. We show that extreme announcement returns for an individual holding lead to substantial outflows, controlling for overall performance, and they increase the probability of managers leaving the fund. Reducing the exposure to these stocks before the announcement mitigates the outflows. We build a model to describe and quantify this tradeoff. Overall, the paper identifies a new dimension of limits to arbitrage for institutions.

Keywords: News trading, mutual fund performance, fund flows, limits of arbitrage, financial constraints, earnings announcements
JEL Classification: G12, G23

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1 Introduction

Prior work has established that large returns are generated before earnings announcements.[1] In our sample period, the cumulative abnormal return in the two-week window ending on the earnings release date is on average 75 bps (see Figure 1), of which 19 bps are earned on the announcement day. The magnitude of these returns has spurred a quest for the economic channel driving this premium. The literature has provided a wealth of explanations. In particular, some authors argue that limited attention, private information, and lottery-like preferences lead retail investors to buy stocks ahead of the announcements (Frazzini and Lamont, 2007; Kaniel, Liu, Saar, and Titman, 2012; Liu, Wang, Yu, and Zhao, 2020), while limits to arbitrage prevent sophisticated institutional investors from taking advantage of the resulting premium. The evidence of higher idiosyncratic risk during these events may suggest costly arbitrage at these times (Barber, De George, Lehavy, and Trueman, 2013; Yang, Zhang, and Zhang, 2020). However, confirming prior evidence, we find that the risk-return tradeoff improves significantly for announcing stocks. Thus, it remains unclear why sophisticated investors do not take advantage of these opportunities.

Because institutional investors are in principle better suited to take advantage of this premium, in this paper, we study institutional transactions around earnings announcements.[2] Our main result is that institutions reduce their exposure to stocks before earnings announcements. That this finding holds irrespective of the direction of the earnings surprise (i.e. for positive, negative, and neutral surprises) suggests that the fund manager's private information on the upcoming announcement is unlikely to play a role.[3]

[1] The first evidence of an earnings announcement premium appears in Beaver (1968) and it has been subsequently confirmed by a large number of studies including Chari, Jagannathan, and Ofer (1988), Ball and Kothari (1991), Frazzini and Lamont (2007), Patton and Verardo (2012).

[2] We focus on the institutional transactions reported in the Ancerno dataset. This data is provided by a consulting firm, Abel Noser Holdings LLC, that works with institutional investors to analyze their trading costs. The dataset that is made available by this firm (known as Ancerno) contains detailed trading information of institutional investors including mutual funds and hedge funds. More details are provided in Section 3.

[3] While we do find that the order flow is more positive ahead of positive announcements, consistent with prior literature (e.g., Campbell, Ramadorai, and Schwartz, 2009), our focus is on how order flow ahead of announcements changes relative to other periods, without conditioning on the sign of the announcement.

We rationalize this behavior by documenting a new dimension of limits to arbitrage: fund flows are sensitive to extreme realizations of earnings announcement returns of *individual* portfolio holdings, even controlling for overall fund performance. To reduce exposure to these flows, fund managers shy away from earnings announcing firms and forgo part of the announcement premium. This evidence is corroborated in the cross-section of funds, where funds with more volatile fund flows reduce their exposure more.

Prior evidence has related the magnitude of the earnings announcement premium to both idiosyncratic (Barber et al., 2013; Yang et al., 2020) and systematic risk (Patton and Verardo, 2012; Savor and Wilson, 2016). Thus, as a first attempt to identify the channel behind institutional trading behavior, we study the relation between institutions' abnormal sales before earnings announcements and stock exposures to idiosyncratic and systematic volatility.

We find that institutions carry out substantially more abnormal sales ahead of earnings announcements for stocks with high idiosyncratic volatility, which is consistent with the literature that shows that the announcement premium correlates with idiosyncratic risk. This finding may lead to the conclusion that institutions avoid stocks with high idiosyncratic volatility because their risk-return tradeoff deteriorates as a result of the volatility spike. However, we find that the risk-return tradeoff—as measured by the information ratio—improves substantially around earnings announcements. Thus, a worse risk-return tradeoff is not the reason why idiosyncratic risk matters for institutions' abnormal sales.[4] Moreover, we find that institutions carry out less (not more) abnormal sales on stocks with high systematic volatility, suggesting that an increase in systematic risk around announcements is also not a viable explanation for the evidence.

[4]The role of idiosyncratic risk in explaining institutional abnormal sales could be consistent with the argument that information asymmetry increases ahead of announcements and, as a result, investors become reluctant to trade in these periods (Yang et al., 2020). However, avoidance of adverse selection would imply that both buy and sell trades decline as investors abstain from trading. Instead, we find that institutions sell *more* one day before the announcement, which is inconsistent with the fear of adverse selection. Also important, using our trade-level data, we document that the price impact of trades, a commonly-used proxy for information asymmetry, is not higher in the period ahead of announcements.

To further our understanding of the underlying channel, we develop a new hypothesis for the drivers of institutional trades. We conjecture that institutional investors' clients monitor and react to extreme realizations in the announcing stocks' returns.

This conjecture can be justified on several grounds. It can be the rational outcome of the learning process of the funds' clients who try to infer the portfolio manager's skill and risk-taking attitude from trade-level data. For example, to rationalize window dressing by institutional investors, Agarwal, Gay, and Ling (2014) argue that investors infer managerial ability by observing both reported performance and disclosed portfolio holdings, so that window dressing can be a rational response by fund managers. Alternatively, it can be founded on investors with limited attention who focus on salient events to make their fund allocation decisions. Consistent with this view, Solomon, Soltes, and Sosyura (2014) document that mutual fund investors react to the performance of portfolio holdings that are more prominent in the news.

To formalize this channel, we develop a stylized model in which the holding-level flow-performance sensitivity can lead to abnormal sales of announcing stocks despite the positive premium earned before the announcement. The mechanism is simple. The risk in the announcement return reduces fund managers' expected fee revenue because of the outflows associated with extreme return realizations.[5]

A legitimate question is how investors can learn about the performance of individual portfolio holdings and react to it during the following quarter. Mutual funds report holdings quarterly, and most of them monthly.[6] Thus, in the quarter following the earn-

[5]The model also shows that trading costs and fund-level flow-performance sensitivity are not supported as potential explanations. In particular, trading costs can only affect the magnitude of the trades, *but not the direction*. Moreover, fund-level flow-performance sensitivity encourages the institutions to buy more, rather than less, before the announcements because of the positive abnormal expected returns.

[6]U.S. mutual funds report their holdings as of the second and fourth fiscal quarter ends in the N-CSR form, no later than 10 days after quarter end. The first- and third quarter-end holdings are reported in the N-PORT form no later than 60 days after quarter end. Some families, e.g., Fidelity, report their holdings monthly, with a 30-day delay. Finally, many mutual funds do targeted and timely communications of their holdings and trades to the public outside of the standard reporting periods. See the examples in the Appendix. 2,438 out of the 2,989 equity mutual funds in our sample report their holdings monthly in Morningstar.

ings announcement, investors do observe the end-of-prior-quarter (or end-of-prior-month) reported holdings, and they can compare them to those from one quarter (or one month) before to infer whether the manager reduced or increased exposure to the announcing stock. For many funds, the information is even more timely as managers publicly communicate their most relevant trades to investors within a short delay. Finally, mutual funds publish semiannual shareholder letters, in which they provide commentary on their performance and trades (see, e.g., Hillert, Niessen-Ruenzi, and Ruenzi, 2021).

Consistent with this conjecture, we present a novel and important empirical finding. Fund investors react to the performance of individual portfolio holdings controlling for the total fund performance over different horizons and with different risk controls. Extreme realizations in the earnings announcement returns of individual stocks in the fund manager's portfolio lead to substantially larger fund outflows. Digging deeper, we find that flows are highly sensitive to the earnings announcement return of the lowest performing stock in the fund's portfolio in the prior quarter. Thus, the flow sensitivity to extreme earnings announcement returns is asymmetric with significant more weight given to the lowest performing stocks in the portfolio.

We next relate this component of the flow-performance sensitivity to institutional investors' trading behavior. We focus on the 331 U.S. domestic equity mutual funds that result from matching Ancerno data to the CRSP Mutual Fund database. In this sample, we are in the unique position to link fund flows to the trades before earnings announcements. Providing a motive for institutions to stay away from the announcing stocks, we document that reducing exposure to announcing stocks before the earnings release mitigates the fund outflows caused by extreme return realizations. This finding unifies our evidence suggesting that funds are inclined to reduce exposure to announcing stocks to decrease the likelihood of experiencing large outflows in the event of extreme announcement realizations.

This evidence points to the preemption of fund outflows as the motive for institutions to avoid the uncertainty related to scheduled news. An out-of-sample prediction emerging from this explanation is that the trading behavior that we identify will be stronger for institutional types more exposed to investor redemptions. To test this conjecture, we first focus on hedge funds, these institutions being more exposed than mutual funds to investor redemptions at times of higher uncertainty (Ben-David, Franzoni, and Moussawi (2012)).[7] We find that hedge funds with a one-standard-deviation higher flow volatility decrease order flow by as much as 22.8% more of their average daily trading volume one day prior to earnings announcements. This evidence supports the notion that hedge funds with higher exposure to redemptions try to preempt investor withdrawals by reducing volatility in individual stock holdings.[8]

We test the same conjecture using the 331 mutual funds with daily holdings, for which we have fund characteristics data such as flows, age, and performance. Consistent with the hedge fund evidence, we find that mutual funds with higher flow volatility have a more negative order flow in the announcing stocks.[9]

Finally, we study the potential relationship between the magnitude of the earnings announcement premia and institutional abnormal sales. If institutions decrease their order flow more strongly in some stocks, the pre-announcement premia of these stocks are potentially larger for the lack of a re-equilibrating force. Consistent with this conjecture, we find that the quintile of stocks with the most negative pre-announcement order flow displays a statistically significantly larger premium than the quintile of stocks with the most positive order flow by about 0.21% on the announcement day. This evidence complements the findings in Frazzini and Lamont (2007) and Liu et al. (2020) that high-premium stocks

[7]Ideally, we would like to show that the finding of a significant relationship between fund outflows and the returns of the worst performing stock in the portfolio also applies to hedge funds. However, this analysis requires holdings data for individual hedge funds, which are not available to outside observers. This information, however, is often available to the fund investors, who can therefore react to it. The hedge-fund holdings reported in 13F filings are aggregated at the management company level, which is different from the fund level, our unit of analysis.

[8]In further analysis, reported in the Appendix, we find that the most financially constrained hedge funds—as measured by short lockup or redemption notice periods, higher redemption frequency, young age, and bad past performance—decrease their order flow the most prior to earnings announcements.

[9]We further find that young funds and those with bad past-quarter performance decrease their order flow by more before and during earnings announcements. These results are consistent with an attempt by institutions with a less stable funding base to preempt outflows.

experience the highest levels of retail buying. Our results show that institutional investors are likely to take the opposite side of retail trades and our paper provides a motive for this behavior.

The rest of the paper is organized as follows. Section 2 places our paper in the context of different strands of literature. Section 3 describes the data and defines the main variables in our analysis. Section 4 studies trading behavior around earnings announcements. In Section 5, we explore and test the possible channels behind more negative institutional order flow. In Section 6, we propose a model featuring a new channel: flow-performance sensitivity to individual stock holdings' earnings announcement returns and provide empirical evidence in support of this conjecture. Section 7 relates trading behavior to measures of exposure to investor redemptions. Section 8 investigates the relationship between institutional trades and the announcement premia. Section 9 concludes.

2 Literature Review

First, this paper relates to a literature studying investors' behavior around news releases. Frazzini and Lamont (2007) document that small/individual investors on average buy before the earnings announcements and earn a return premium during these events. While Frazzini and Lamont (2007) attribute this premium to the announcement catching small investors' attention, Kaniel et al. (2012) conjecture that institutions might be averse to trading too aggressively before earnings announcements for fear of litigation or adverse publicity. The evidence in this paper complements these results by establishing a volatility-avoidance mechanism that motivates the institutions to decrease their exposures to stocks before earnings announcements.

Focusing on institutional investors, several studies find that institutions exploit private information as they can predict the direction of news including earnings announcements (e.g. Irvine, Lipson, and Puckett (2007), Campbell et al. (2009), Baker, Litov, Wachter, and Wurgler (2010), Hendershott, Livdan, and Schürhoff (2015)).[10] Unlike these papers, we study how institutional order flow changes in the window that precedes the news release relative to other periods, and we investigate the trading direction irrespective of the direction of the news. In particular, Campbell et al. (2009) and Hendershott et al. (2015) relate the order flow before the news release to the direction of the earnings surprise and find that more institutional buying predicts positive surprises. Our analysis differs in that we study order flow before the announcement in comparison to order flow in periods away from announcements, and find that institutions decrease their exposure to the stocks involved in the event. Like us, Huang, Tan, and Wermers (2020) use Ancerno data to investigate institutional trading, but different from us they study unscheduled news and find that institutions trade in the direction of news after the release, but not in anticipation.

Second, our results relate to recent theories arguing that the pre-announcement premium is a compensation for uncertainty resolution (e.g. Laarits (2020), Hu, Pan, Wang, and Zhu (2022), and Ai, Bansal, and Han (2021)) and to the supporting empirical evidence around earnings announcements (Gao, Hu, and Zhang, 2021; Ni, Pan, and Poteshman, 2008). Since we find that institutions decrease exposure to stocks with high idiosyncratic volatility more before earnings announcements, and that stocks with the largest institutional sales have the largest earnings announcement premium, our new findings corroborate evidence in Barber et al. (2013) and Yang et al. (2020) that the earnings announcement premium increases substantially with a stock's idiosyncratic risk.

Third, our novel finding that fund investors react to the performance of individual stock holdings during earnings announcements, in addition to the fund performance, reveals a new dimension of the flow-performance sensitivity. Existing literature on the flow-performance sensitivity of mutual funds largely focus on the reaction to fund performance as measured from total returns (e.g., Chevalier and Ellison (1997), Sirri and Tufano (1998), Berk and Green (2004), Huang, Wei, and Yan (2007)). One exception is Solomon et al. (2014) who

[10] Also conditional on the direction of earnings announcement shocks, Luo, Ravina, Sammon, and Viceira (2023) document that retail investors trade as contrarians after large earnings surprises.

study how media coverage of mutual fund holdings affects fund flows. We show that investors pay attention and react to the performance of individual fund holdings around earnings announcements as well. This original fact opens up new directions of research on mutual fund investors' behavior. Furthermore, our results that fund flows react to extreme earnings realizations are broadly consistent with the rank effect in Hartzmark (2015). That is, individuals are more likely to sell the extreme winning and extreme losing positions in their portfolio.

Fourth, our findings resonate with the evidence in the literature on window dressing by institutional investors (e.g., Agarwal et al., 2014; Lakonishok, Shleifer, Thaler, and Vishny, 1991). While window-dressing institutions buy winners and sell losers right before the disclosure dates of portfolio holdings in order to manipulate investors' perception of their skill, our results suggest that managers trade out of stocks that are potentially exposed to large drawdowns to preempt outflows. In both cases, the motive for institutional trades comes from the conjecture that investors pay attention to the performance of individual portfolio holdings.

Finally, this study also contributes to a large literature on how the funding conditions of institutional investors affect their trading behavior. For example, Giannetti and Kahraman (2018) provides evidence that open-end organizational structures undermine incentives for asset managers to capture long-term mispricing, Franzoni and Giannetti (2019) find that the affiliation to financial conglomerates gives hedge funds more stable funding and affects their risk taking at times of crisis, Cotelioglu, Franzoni, and Plazzi (2021) report that hedge funds that are more constrained exhibit a strong shift from liquidity provision towards liquidity consumption when funding condition tighten, and Glossner, Matos, Ramelli, and Wagner (2020) show that during the COVID-19 market crash, institutional investors seek shelter in firms with better corporate financial strength. More generally, our results are consistent with the theory of Shleifer and Vishny (1997) arguing that the fear of redemptions limits fund managers' ability to exploit profit opportunities.

3 Data and Summary Statistics

Abel Noser Holdings LLC (formerly Ancerno Ltd. and Abel/Noser Corporation) is a consulting firm that works with institutional investors to analyze their trading costs. The institutions whose trades are analyzed include pension funds, mutual funds, and hedge funds. The dataset that is made available by this firm (known as Ancerno) contains detailed information regarding trade amount, date, time (for a subset of the observations), and trading costs. Our version of the data ranges from January 1999 to December 2014. Prior literature has pointed out that Ancerno is devoid of survivorship and backfill biases.[11]

We follow the procedure in Cotelioglu et al. (2021) to identify asset management companies, which operate mutual funds and hedge funds. In the end, this procedure allows us to identify 99 distinct hedge fund management companies that are present in Ancerno at various times throughout the sample. We single out mutual funds residually as the managers that are not hedge funds or pension funds. To identify pension funds, we use the *clienttype* variable, as done in e.g. Puckett and Yan (2011). The Appendix Section A.1 provides more details on the procedure to identify institutions in Ancerno.

Table 1 reports the summary statistics for our transaction data from the Ancerno database, the total number of fund managing firms for mutual funds (MF) and hedge funds (HF) separately. We obtain the earnings announcements days from Compustat. As shown in Panel D of Table 1, we have 339,901 earning announcements from 1999 to 2014.

We use the quarterly holdings data on U.S. active equity mutual funds from the Thomson Reuters database and data on fund characteristics from the CRSP mutual fund database. To ensure that the time period of this analysis is consistent with our transaction analysis, we include in the sample 2,989 U.S. active equity mutual funds from 1999 to 2014. Following the data cleaning process of Kacperczyk, Sialm, and Zheng (2008), we remove bond, money market, balanced, index, ETF/ENF, international, and sector funds.

[11]Indeed, the characteristics of stocks traded and held by Ancerno institutions and the return performance of the trades have been found to be comparable to those in 13F mandatory filings (Puckett and Yan (2011), Anand, Irvine, Puckett, and Venkataraman (2012)).

Following Van Binsbergen, Han, Ruan, and Xing (2022b), we also identify 331 U.S. domestic equity mutual funds in the Ancerno database using the variable *clientmgrcode*, which is only available between 1999 to 2010 in Ancerno. These funds are identified by comparing the transaction data in Ancerno with the quarterly holdings data in the Thomson Reuters databases.[12]

Panel A of Appendix Table A1 reports the summary statistics of the 2,989 U.S. active equity mutual funds with quarterly holdings data and the 331 funds with daily holdings and transaction data. The characteristics of the 331 funds are similar to the characteristics of an average fund in the CRSP mutual fund database, both at the aggregate level as well as separately for each year. In addition, the average value-weighted fund net return of these 331 mutual funds is 5.15% per year, close to the 4.94% per year for all equity mutual funds in the CRSP mutual fund database. The only difference is that they are, on average, slightly larger than the average fund in CRSP. Abel Noser's clients are more likely to be large funds than small funds. This difference is also documented by other studies using Ancerno data, such as Puckett and Yan (2011), who also provide evidence that institutions are not submitting their trades to Abel Noser selectively.[13]

3.1 Measures of Institutional Trades

To study aggregate institutional trading around earnings announcements and other event days, we first aggregate the trades in number of shares of all the institutions in the Ancerno data by stock and day. Then, to make trade-size comparable across stocks, we standardize the daily order imbalance by the average absolute daily order imbalance in stock j in the six months (126 business days) prior to the event window [-20, 20] as follows

$$trades_{j,t} = (Buys_{j,t} - Sells_{j,t}) \Bigg/ \frac{\sum_{s=-146}^{-21} |Buys_{j,s} - Sells_{j,s}|}{126}, \tag{1}$$

[12] This method of identifying mutual funds from Ancerno is first developed by Busse, Chordia, Jiang, and Tang (2021). Refer to Van Binsbergen et al. (2022b) for more details on these 331 funds. For the trades of each stock by each of these 331 funds in each quarter, the Thomson Reuters database agrees with the Ancerno in 95.9% of the cases in terms of the direction.

[13] See the Appendix of Puckett and Yan (2011).

where $Buys_{j,t} - Sells_{j,t}$ is the net number of shares of stock j on day t traded by institutions in Ancerno, which is positive for net purchases and negative for net sales. $|Buys_{j,s} - Sells_{j,s}|$ is the absolute value of the net number of shares traded on day $s \in [-146, -21]$. $trades_{j,t}$ is the standardized institutional trades of stock j on day t. The number of shares are adjusted by share splits and mergers. For robustness purposes, we also define the trade variable standardizing alternatively by the total daily volume in CRSP or by number of shares outstanding.

For the fund-level analysis, we aggregate the trades of each stock by each fund per day (at the fund-stock-day level). Since several funds trade only one day per month, we cannot use the trading days in the past six months for the standardization. Instead, we calculate the average absolute net number of shares traded by fund i on stock j using all the trading days of fund i on stock j in Ancerno, and we use this average number of shares traded to standardize this trading measure at the fund-stock-day level as follows

$$trades_{i,j,t} = (Buys_{i,j,t} - Sells_{i,j,t}) \Big/ \frac{\sum^{T} |(Buys_{i,j,s} - Sells_{i,j,s})|}{T} \,, \tag{2}$$

where $Buys_{i,j,t} - Sells_{i,j,t}$ is the net number of shares of stock j traded by fund i on day t, and T is the total number of trading days that fund i traded stock j in the Ancerno.

From Panel E of Table 1, we learn that both trade measures defined above are on average positive, consistent with a growing size of the asset management industry over our sample period. The positive average size of trades is reflected in a positive intercept in our regressions with trades as a dependent variable. For this reason, we will always talk about *abnormal* trades when discussing our results because our focus is on the deviations from the positive trend in the growth of the industry.

4 Institutional Trading around Scheduled News

4.1 Institutional Order Flow around Earnings Announcements

We start our analysis by studying the direction of institutional trades around earnings announcements without conditioning on the sign of the surprise. Specifically, we measure abnormal institutional trades using the following regression, which is run separately for each day within the event window [-20, 20]:

$$trades_{j,t} = a + b_1 * EarningDay_{j,t} + \varepsilon_{j,t}, \tag{3}$$

where $trades_{j,t}$ is the standardized institutional trades of stock j on day t as defined in Eq. (1). $EarningDay_{j,t}$ equals one for the day under investigation (e.g., day [-1]) and zero for days outside the event window [-20, 20]. That is, we use the institutional order flow on days outside the event window [-20, 20] as the baseline. We denote the order flow that is lower than the baseline as abnormal sales, and the order flow that is higher than the baseline as abnormal purchases. Since the size of institutional investors such as mutual funds increases in our sample period, institutions have positive order flow on average. This fact leads to a positive estimate of a in Eq. (3).

The results are shown in Figure 2, Panel A. We find that institutions on average have abnormal sales in the ten days before and on the same day of the earnings announcements (days [-10, 0]), and they have abnormal purchases in the three days after the announcement (day [1, 3]). The order flow of institutions on day -1 is lower than the baseline by about 5.5% of average daily trading volume. Cumulating the estimates in the two trading weeks leading to the announcement, we find that institutions decrease their order flow in the announcing stock by a total of about 30% of the average daily trading volume. Therefore, our first main conclusion is that institutions reduce the pace at which they gain exposure to announcing stocks in the period leading to the announcement. Instead, institutions return to buying the announcing stock after the news release—for example, the abnormal order flow on day 1 is about 1.5%—but they do not fully recover the lost ground within the event window.[14] We report the regression results of Eq. (3) in Appendix Table A2 and also provide specifications with stock fixed effects and day fixed effects. Because of space constraints, in the tables, we focus on the three days before announcements where the abnormal sales are the largest. The results do not change much after including the stock fixed effects. They also remain significant after including the day fixed effects, but the magnitude becomes smaller arguably because earnings announcements tend to cluster on certain days.

Next, we study whether the main evidence originates from a decrease in purchases or an increase in sales. To this purpose, we investigate the volumes of institutional purchases and sales separately by replacing the net number of shares traded in Eq. (1) by the total number of shares bought or sold, both at the numerator and the denominator. The abnormal volumes of purchases and sales within the event window are calculated using Eq. (3) as well. Panels B and C of Figure 2 report the abnormal volumes of institutional purchases and sales in days [-10, -1].[15] We find that institutions consistently buy less in these ten days before earnings announcements. The magnitude varies between -2.7% to -10.1% of the prior-six-months' buy volume. In contrast, they sell 7.0% more just one day before the earnings announcements, arguably as the last resort for reducing stock exposure before the announcements.[16]

Importantly, the evidence in Figure 2 rules out fear of adverse selection as the main channel behind the observed institutional trading behavior. Prior literature finds that information asymmetry increases before earnings announcements (Yang et al., 2020), which leads to the prediction that investors withdraw from the market to avoid being adversely selected (see, e.g., Kim and Verrecchia, 1994). Our evidence in the Appendix Figure A5

[14]For robustness purposes, we standardize the trade variable alternatively by the number of shares outstanding (as in Figure A1) and by the total daily volume in CRSP (as in Figure A2). Our main findings hold for these alternative measures.

[15]We do not report the results for days [0, 10] to avoid impacting the scale of the chart. Indeed, both purchases and sales increase significantly in this window and their comparatively larger magnitude would make the estimates for days [-10, -1] less visible without impacting the interpretation of the results.

[16]Consistent with these findings, the probability of buy trades goes down and the probability of a sell trade goes up before earnings announcements, as reported in Figure A3.

indeed shows that total institutional trading volume decreases ahead of earnings announcements. However, this channel would also predict that both buy and sell trades decline in absolute value before the announcement. Instead, the figure shows that institutions increase their abnormal sales ahead of the announcement, which is unexplained by avoidance of adverse selection. In the Appendix Figure A6, we further investigate the evolution of the execution shortfall, which is a measure of the price impact of trades (Anand, Irvine, Puckett, and Venkataraman, 2013). The price impact is expected to deviate more in absolute value relative to days outside of the announcement window when information asymmetry goes up. We do not find an increase in price impact of either purchases or sales ahead of the announcement, which allows us to conclude that information asymmetry does not rise before the event.

One may conjecture that the decrease in order flow before the information release is entirely driven by negative earnings announcements and the fact that some institutions may have private information about the upcoming event. To test this possibility, we study institutional trades around earnings announcements with positive surprises, negative surprises, and no surprises separately. We calculate the earning surprises based on analysts' forecasts in the IBES database. The top (bottom) 25% earning surprises are defined as positive (negative) surprises and the other 50% as no surprises. As shown in Figure 3, our finding that institutional decrease order flow before earnings announcements holds for positive earning surprises, negative earning surprises, and no earning surprises. The magnitude of abnormal sales is somewhat larger for negative surprises than for positive surprises, which is consistent with Hendershott et al.'s (2015) finding that institutions trade in the direction of news. Indeed, in the cross-section of stocks, the pre-announcement order flow is relatively higher for stocks with positive surprises. However, in the aggregate, institutions reduce exposure to announcing stocks. After the announcement, as one may expect, the sign of order flow is in the same direction of the surprise.

Lastly, we ask whether this behavior is any different depending on the type of institutional investors. It does not seem to be the case. In fact, we find that both mutual and hedge funds on average decrease their order flow more in the period leading to earnings announcements as shown in the two panels of Figure 4.

4.2 Fund-Stock-Level Evidence

To exploit the granularity of the data, we run a regression at fund-stock-day level and include fund-day fixed effects as well as fund-stock fixed effects. In particular, fund-day fixed effects absorb fund behavior on a given day that is not specifically related to the announcing stock, whereas fund-stock fixed effect absorb the normal trading attitude of a fund towards the stock involved in the announcement. The regression is specified as below:

$$trades_{i,j,t} = a + b_1 * EarningDay_{j,t} + \varepsilon_{i,j,t}, \tag{4}$$

where $trades_{i,j,t}$ is the fund i's trades of stock j on day t defined as in Eq. (2). As reported in Table A3, our finding that institutions decrease their order flow on day [-1] remains significant in all settings. Although the abnormal trading volume remains negative for days [-3] and [-2], they become statistically insignificant. Arguably, moving to fund-level data leads to a loss of power because this analysis is conditional on funds that participate to trading; hence, we do not capture the behavior of funds who decrease their buying activity to zero, as they exit from the sample.

Because institutions decrease their exposure to stocks involved in the announcements, they free up some capacity in their portfolios. In the Online Appendix Table A4, we study how institutions reallocate their portfolios when earnings announcements are in proximity. In particular, we examine how the order flow into stocks with no anticipated earnings announcements varies as a function of the fraction of stocks for which earnings announcements are anticipated in the next ten days.[17] The main take away from this analysis is that in-

[17] In more detail, we sort all trading days into deciles based on the fraction of stocks for which earnings announcements are anticipated in the next ten days. "Decile n" is a dummy variable that equals one for trading days in decile n from 2 and 10. We use the trading days in Decile 1 (with the smallest fraction of stocks with earnings announcements anticipated within 10 days) as the baseline for this analysis.

stitutions reallocate their portfolios towards non-announcing stocks and to cash, when the fraction of announcing stocks in the next ten days increases.

5 Exploring the Channel

Having found that institutions, on average, display abnormally negative order flow before earnings announcements, we set out to explore possible explanations for this behavior.

5.1 Institutional Trades and Idiosyncratic vs. Systematic Volatility

Cohen, Dey, Lys, and Sunder (2007), Barber et al. (2013), and Yang et al. (2020) find that the earnings announcement premium correlates with idiosyncratic risk. Moreover, Patton and Verardo (2012) and Savor and Wilson (2016) argue that the earnings announcement premium is a compensation for the covariance between earnings announcement returns and systematic factor returns. These findings may suggest that institutions carry out abnormal sales before earnings announcements because of an expected spike in either idiosyncratic or systematic volatility. As a first attempt to identify the channel underlying the institutional trading behavior, in a stock-level analysis, we investigate the relationship between institutional trades before earnings announcements and idiosyncratic and systematic volatility during earnings announcements.

Given that the previous literature shows that the exposures to systematic factors increase during earnings announcement days, we estimate these exposures using earnings announcement days only. In particular, for each quarter and each stock j, we regress its earnings announcement returns on days 0 and 1 on Fama-French-Carhart 4 factors using daily data in the past five years to separate the idiosyncratic component from the systematic as follows:

$$Ret[0,1]_{j,t} = \alpha_j + \underbrace{\beta_{1,j} MKT_t + \beta_{2,j} SMB_t + \beta_{3,j} HML_t + \beta_{4,j} MOM_t}_{\text{systematic}} + \underbrace{\varepsilon_{j,t}}_{\text{idiosyncratic}} . \quad (5)$$

Then, every quarter, we calculate the 5-year-rolling idiosyncratic standard deviation of stock j's returns during earnings announcements $SD\ Ret[0,1]\ (Idio.)_{j,t}$ as the standard deviation of the sum of its idiosyncratic components on days [0] and [1] for all its earnings announcement in the window. The systematic standard deviation $SD\ Ret[0,1]\ (Syst.)_{j,t}$ is computed accordingly using the systematic components of returns.

Then, we estimate the following specification:

$$\begin{aligned} trades_{j,t} = & a + b_1 * SD\ Ret[0,1]\ (Idio.)_{j,t} \times EarningDay_{j,t} \\ & + b_2 * SD\ Ret[0,1]\ (Syst.)_{j,t} \times EarningDay_{j,t} \\ & + b_3 * ln(MarketCap)_{j,t} \times EarningDay_{j,t} \\ & + b_4 * SD\ Ret[0,1]\ (Idio.)_{j,t} + b_5 * SD\ Ret[0,1]\ (Syst.)_{j,t} \\ & + b_6 * ln(MarketCap)_{j,t} + b_7 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{j,t}, \end{aligned} \tag{6}$$

where $trades_{j,t}$ is defined as in Eq. (1). $EarningDay_{j,t}$ is the dummy variable for earnings day. $ln(MarketCap)_{j,t}$ is stock j's natural logarithm of market capitalization at the end of last quarter. All independent variables except the dummies are standardized to a mean of zero and a standard deviation of one. We include stock fixed effects υ_j. The summary statistics of the variables in this regression are reported in Table 1, Panel F.

Most prominently, the evidence in Table 2 indicates that institutions decrease their order flow more on stocks with high idiosyncratic volatility during earnings announcements in the three days before and on the same day as the earnings announcements. The effect is also economically significant as a one-standard-deviation increase in a stock's idiosyncratic volatility during earnings announcements leads to a 1.6% to 2.7% of average daily trading volume decrease in institutions' order flows on days -3 to 0, which is a sizable fraction of the abnormal sales before earnings announcements in Table A2.

This finding resonates with the evidence in Cohen et al. (2007), Barber et al. (2013), and Yang et al. (2020), who show that the earnings announcement premium increases substantially with a stock's idiosyncratic risk. Possibly, the stocks experiencing more abnormal sales are also those with the largest premium. We explore this conjecture in Section 8.

Table 2 also shows that institutions weakly increase (rather than decrease) their order flows more on stocks with high systematic volatility during earnings announcements in the three days before and on the same day as the earnings announcements. Therefore, the evidence is inconsistent with an explanation suggesting that institutions decrease their exposures to stocks before earnings announcements because systematic risk spikes at these times (Savor and Wilson, 2016).[18] Because the standard deviations are estimates of the true parameters, it is possible that slopes are biased towards zero. However, measurement error bias cannot explain the positive and significant coefficient on systematic volatility.

5.2 Expected Changes in Information Ratio

In the previous section, we find that institutions decrease their order flow more on stocks with high idiosyncratic volatility during earnings announcements. A possible reason is that mean-variance maximizing funds put less weight on stocks with lower information ratios, that is, the stocks with higher idiosyncratic risk and lower abnormal returns.[19]

To explore this channel, we plot the average information ratios of stocks around their earnings announcement days in the [-10, 10] window. Figure 5 reports the information ratios of daily abnormal returns and cumulative abnormal returns using a DGTW (Daniel, Grinblatt, Titman, and Wermers, 1997) adjustment. All information ratios are annualized. The information ratio of cumulative abnormal returns (in Panel B) increases from 0.08 on day -7 to 0.28 on day 0. All information ratios in days [-10, 0] are higher than the average information ratio of 0.04 on non-earnings announcement days outside the [-20, 20] event window. Thus, the risk-return tradeoff improves before the earnings announcements because the abnormal return at the numerator increase more than the idiosyncratic volatility at the denominator. Therefore, the conjecture that the risk-return tradeoff deteriorates before

[18]The findings hold when we include the standard deviations separately in the regressions, as reported in Table A8.

[19]This result is obtained, e.g., in the Treynor and Black (1973) model.

earnings announcements does not explain the evidence in Figure 2 showing that institutions decrease their order flow in this period.

In the Appendix Section A.4, we further investigate the cross-sectional relation between stocks' information ratios during earnings announcements and institutional trades before announcement. There is no evidence that institutions increase their order flow on stocks with high information ratios during earnings announcements in the three days before the earnings announcements. This result strengthens the puzzle suggesting that institutional trades do not pursue the best risk-return tradeoff ahead of earnings announcements. We obtain similar results using Sharpe ratios instead of information ratios.

In sum, neither the avoidance of systematic risk nor the deterioration of the risk-return tradeoff appears to be the channel for abnormal sales before earnings announcements. Institutions appear to avoid earnings announcements for another reason, and it should be a reason that closely relates to the high idiosyncratic risk during announcements. In the next section, we propose a new channel that can explain the avoidance of idiosyncratic risk.[20]

6 Holding-Level Flow-Performance Sensitivity

The evidence so far points to a connection between institutional attempts to decrease stock exposure ahead of scheduled news and the desire to avoid idiosyncratic volatility. However, this relation appears puzzling given that the average U.S. equity mutual fund holds a very well diversified portfolio of about 94 stocks, on average. Idiosyncratic volatility spikes coming from scheduled news have a negligible impact in such large portfolios over the quarterly horizon. Why, then, should the fund manager care about uncertainty in the earnings announcement return of an individual stock?

[20] Further evidence that institutions trade to avoid idiosyncratic volatility comes from a generalization of our main result. In the Appendix Section A.6, we show that institutions carry out abnormal sales before anticipated volatility spikes. In particular, we use the OptionMetrics database to construct a measure of anticipated spikes in 10-day and 30-day implied volatility. We find a significantly negative relationship between volatility spikes and abnormal institutional trades in Ancerno, even controlling for time and stock fixed effects.

One possibility is that managers' clients dislike extreme realizations of idiosyncratic risk during earnings announcements (i.e., fund flows react negatively to them). In that scenario, fund managers should care about them as well because the fund's revenues are a function of assets under management. This conjecture can be justified as following from the clients' inference process of managerial skill and risk-taking behavior from trade level data. Alternatively, it can originate from the behavior of investors with limited attention focusing on salient events to make their fund allocation decisions.[21] In this paper, we model this behavior in a reduced form, and leave the exploration of the underlying channel to future work.

The conjecture of a holding-level flow-performance sensitivity presumes that fund investors can observe the fund's holdings and trades and react to them in the next quarter. This assumption is plausible given the frequency at which funds report their holdings. U.S. mutual funds report their second- and fourth-fiscal-quarter-end holdings in the N-CSR form, no later than 10 days after quarter end. The first- and third quarter-end holdings are reported in the N-PORT form no later than 60 days after quarter end. Importantly, most mutual funds communicate their holdings and trades to the public outside of the standard reporting periods in a more timely manner. In our sample, 2,438 funds out of the total of 2,989 mutual funds report their holdings monthly in Morningstar, and funds also communicate with their clients about their portfolio holdings through informal channels upon their requests. In their communication, they mention specifically whether they were holding some worse and best performing stocks in the corresponding period and whether these stocks are still in the portfolio.[22]

Later, in Section 6.6 (and Section A.5 in the Appendix), we show that fund flows react to holding-level earnings announcement returns already in the month (week) following the

[21] Solomon et al. (2014) document that mutual fund investors react to the performance of portfolio holdings that are more prominent in the news.

[22] In the Appendix Section A.2, we discuss two case studies of fund families that provide holdings information more frequently and timely than the mandatory reporting periods. Overall, the regulatory framework and this anecdotal evidence suggest that investors can have information that is sufficiently frequent and timely for them to react in the next quarter.

announcement. Also relevant, Hillert et al. (2021) show that investor flows react to the content of semi-annual shareholder letters, which contain descriptions of the performance of individual portfolio holdings.

In what follows, we develop a simple model that generates the main finding of this paper, i.e., the abnormal sales of announcing stocks, starting from the assumption that fund investors react to the performance of individual portfolio holdings. The model highlights a tradeoff between earning the announcement premium and avoiding the cost of redemptions that follow extreme returns. We first show that the assumption of holding-level flow-performance sensitivity is validated in the data. Then, we provide an empirical quantification of the tradeoff that funds face before the announcements as resulting from the model.

6.1 A Model with Flow-Performance Sensitivity to Holding-Level Earnings Announcement Returns

We posit a fund manager who faces investors that allocate their capital as a function of both the fund portfolio's performance and performance of individual stock holdings. The fund incurs variable trading costs. Because we show in Section 5 that neither avoidance of systematic risk nor a pursuit of high risk-return tradeoff appears to be the channel for abnormal sales before earnings announcements, we assume that the fund manager is risk neutral to isolate the new channel.

We use a simplified version of the framework in Gârleanu and Pedersen (2013) and focus on the unconditional abnormal returns during earnings announcements. The fund has n stock holdings in its portfolio. We define the quarterly returns of these n holdings by a vector r. The event-time returns of the portfolio holdings around their earnings announcements are defined by the vector

$$r^e = \alpha^e + \varepsilon^e, \tag{7}$$

where the earnings announcement returns of different stocks can be realized on different days of the quarter. α^e is the unconditional mean of returns during earnings announcements. The vector ε^e are earnings announcement shocks, and the variance of each ε_j^e for stock j is σ^2.

At the beginning of each quarter, the fund decides on holdings h of the n securities and trades Δx of each security that are carried out ahead of earnings announcements. For our purposes, we only need to focus on the trade-level decision. We make the assumption that the dollars that are used to add/reduce the positions ahead of the announcement are subtracted/added from/to cash. This assumption simplifies our analysis.

As is standard in the literature, we let the fund flow in dollar depend on the portfolio return of the fund. We label this effect the fund-level flow-performance sensitivity (fund-level FPS). In addition, we introduce the new posited channel and let fund flows depend on stock holdings' performance during earnings announcements. We call this component of the FPS the holding-level flow-performance sensitivity (holding-level FPS).

$$flow = \rho\left(h'r + \Delta x' r^e\right) + \eta \sum_j [(h_j + \Delta x_j) g(\varepsilon_j^e)], \tag{8}$$

Vector h is the dollar holdings of n stocks at the beginning of the quarter and vector Δx is the dollar trading amounts before earnings announcements.[23] In writing total fund returns like in Eq. (8), we simplify the analysis by abstracting away from the fund's trades other than the trades before the earnings announcements. The purpose is to focus the analysis uniquely on the trades before the announcements. The parameter ρ captures the fund-level FPS.[24] The subscript j indexes the stocks in the portfolio, and η is the flow sensitivity—assumed constant across holdings—to each holding j's earnings announcement unexpected return ε_j^e.

Because we learn from Table 2 that fund managers respond negatively to idiosyncratic

[23]Alternatively, we can write the model as a function of portfolio weights w and the changes in portfolio weights Δw and all results hold (as shown in the Section A.9).

[24]We assume a linear FPS at the fund level for simplicity. Assuming a convex fund-level FPS, as it is empirically the case, would lead to stronger risk taking, but the mitigating effect on risk taking coming from the holding-level FPS would remain unaltered.

risk during earnings announcements, we specify the holding-level FPS so that fund investors react negatively to the realizations of idiosyncratic risk in the announcement.[25] Thus, we let the function $g(\cdot)$ be non-positive and concave in a stock holding's earnings announcement unexpected return ε_j^e. In particular, we assume a quadratic function and let $g(\varepsilon_j^e) = -(\varepsilon_j^e)^2$. Then, Eq. (8) becomes

$$flow = \rho\left(h'r + \Delta x' r^e\right) - \eta \sum_j [(h_j + \Delta x_j)(\varepsilon_j^e)^2]. \tag{9}$$

Eq. (9) shows that flows are a decreasing function of the square of the unexpected returns during earnings announcements, after controlling for the fund-level FPS. Because of the assumed concavity, extreme realizations receive higher weight.

The conjectured shape of holding-level FPS in Eq. (9) can be validated empirically. Then, to guide our empirical analysis, we formulate the following two testable hypotheses.

Hypothesis 1 *Fund flows depend negatively on the extreme realizations of the portfolio holdings' returns during earnings announcements.*

Moreover, the presence of the traded amount Δx_j in the second term of Eq. (9) implies that

Hypothesis 2 *Purchases of a stock ahead of the announcement strengthen the relationship between flows and announcement returns.*

Following the literature (e.g., Gârleanu and Pedersen, 2013), we assume a quadratic trading costs with parameter λ to capture the price impact of trading

$$TC(\Delta x) = \frac{1}{2}\lambda \Delta x' \Delta x. \tag{10}$$

[25] Appendix Figure A7 plots the standard deviations of daily returns around earnings announcements. The plot shows that the increase in the standard deviation of abnormal returns during earnings announcement days is about the same magnitude as that of raw returns, indicating that the volatility spike during earnings announcement days is largely idiosyncratic rather than systematic. Therefore, it makes sense to treat ε_j^e in Eq. (8) as a proxy of idiosyncratic returns.

Using the expression for fund flow in Eq. (9), the change in fund size q is

$$\Delta q = (1+\rho)\left(h'r + \Delta x' r^e\right) - \eta \sum_j [(h_j + \Delta x_j)(\varepsilon_j^e)^2] - \frac{1}{2}\lambda \Delta x' \Delta x, \tag{11}$$

where the first term captures the portfolio return, from both holdings and trades, as well as the fund-level FPS. The second term is the holding-level FPS, and the third term is the cost of trading before earnings announcements.

The manager chooses Δx to maximize the expected increase in revenue

$$\max_{\Delta x} E(\Delta q \cdot f), \tag{12}$$

where f is the percentage fee charged on assets under management, which we assume constant for our purposes, consistent with the empirical evidence of infrequently-changing fund fees. Then, this maximization is equivalent to[26]

$$\max_{\Delta x} E(\Delta q) = (1+\rho)\left(h'\alpha_0 + \Delta x' \alpha^e\right) - \eta \sum_j [(h_j + \Delta x_j)\sigma_j^2] - \frac{1}{2}\lambda \Delta x' \Delta x. \tag{13}$$

Taking the derivative with respect to each Δx_j gives the F.O.C.

$$\Delta x_j^* = \frac{\alpha_j^e(1+\rho) - \sigma_j^2 \eta}{\lambda}. \tag{14}$$

Based on Eq. (14), the implication of the holding-level FPS is that *a fund chooses to reduce its exposure before earnings announcement if and only if the cost of potential outflows associated with extreme earnings announcement returns dominates the benefit from the earnings announcement premium.*

The average premium α^e before an earnings announcement is sizeable, up to 75 bps if the position is taken ten days before the announcement, and 19 bps if the position is taken the day before the announcement (see Figure 1). Therefore, it has to be the case that the cost arising from the potential outflows is also large, enough to offset the premium. In section 6.4, we use the estimates from the next empirical analysis to calibrate the relevant parameters

[26]Based on our assumptions, we have that $E[g(\varepsilon_j^e)] = -\sigma_j^2$.

in Eq. (14) and confirm that the outflows following extreme earnings announcement returns are substantial and outweigh the benefits from investing in announcing stocks.

As shown in Eq. (14), the optimal trading amount Δx_j^* is a decreasing function of the volatility of individual stocks σ_j^2. Thus, the model delivers the result that motivated its construction. In particular, institutional order flow before earnings announcements decreases with the stock's idiosyncratic volatility during earnings announcements consistent with the evidence in Table 2.

Moreover, Eq. (14) shows that the abnormal sales of institutions before earnings announcements can neither be caused by the trading costs nor the fund-level FPS. Since the trading cost parameter λ is in the denominator, it only affects the magnitude of trades, rather than the direction. As in Gârleanu and Pedersen (2013), a fund with higher trading costs trades less toward the optimal portfolio, but always in the same direction.[27] The fund-level FPS is not a valid channel to explain institutional abnormal sales ahead of earnings announcements. In fact, the parameter ρ magnifies the positive effect of the premium α^e on trades.

6.2 A Dynamic Model

The event-time returns of the portfolio holdings around their earnings announcements are defined by the vector

$$r^e = \alpha^e + \varepsilon^e, \tag{15}$$

where the earnings announcement returns of different stocks can be realized on different days of the quarter.

$$\Delta q = (1+\rho)\left(h'r + \Delta x' r^e\right) - \eta \sum_j [(h_j + \Delta x_j)(\varepsilon_j^e)^2] - \frac{1}{2}\lambda \Delta x' \Delta x, \tag{16}$$

[27] Theoretically, a fund with proportional trading costs, e.g., as in commissions per share traded, might not trade at all if the commissions are higher than the expected abnormal return α^e, but it would never change the direction of a trade. Nowadays, the commissions of trading in the stock market is less than one bps per dollar, which is substantially smaller than the earnings announcement premium, ranging between 19 and 75 bps.

6.3 Flow-Performance Sensitivity to the Standard Deviations of Earnings Announcement Returns

Next, we test the new Hypotheses 1 and 2 using data on the 331 U.S. active equity mutual funds for which we have both daily transactions and fund flows.

For our tests, we define percentage fund flows of mutual fund i in quarter t as in Berk, Van Binsbergen, and Liu (2017) and Sialm and Zhang (2020)

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}(1 + R_{i,t})}{TNA_{i,t-1}(1 + R_{i,t})}, \tag{17}$$

where $TNA_{i,t}$ is the total net asset (TNA) for fund i's managing firm at the end of quarter t in the CRSP mutual fund database, and $R_{i,t}$ is the quarterly return of fund i's managing firm during quarter t.[28]

We carry out these tests at the fund level. Thus, as a proxy for the magnitude of the dispersion in realized earnings announcement returns, we compute the standard deviation on earnings announcement returns across the fund's holdings. The coefficient on this variable allows us to test Hypothesis 1. To capture the fund's trading activity, we compute the average trade across the fund's holdings in the [-10, -1] window before the announcement. For comparison, we also consider the average trades in the post-announcement window [0, 10]. Then, we estimate the following specification

$$\begin{aligned} Flow_{i,t} = & b_1 * SD\,Ret[0,1]_{i,t-1} \\ & + b_2 * SD\,Ret[0,1]_{i,t-1} \times Signed\,Volume[-10,-1]_{i,t-1} \\ & + b_3 * Signed\,Volume[-10,-1]_{i,t-1} \\ & + b_4 * Past\,Ranks_{i,t-1} + b_5 * Past\,Returns_{i,t-1} \\ & + b_6 * Fund\,Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t}, \end{aligned} \tag{18}$$

where $SD\,Ret[0,1]_{i,t-1}$ is the standard deviation of all holdings' returns on earnings an-

[28] The denominator $TNA_{i,t-1}(1+R_{i,t})$ is in time-t dollar amount, which is consistent with the numerator. It guarantees that a fund that ends up with no capital ($TNA_{i,t} = 0$) has an outflow of -100%.

nouncement days [0, 1] in fund i's portfolio in quarter $t-1$. $Signed\,Volume[-10,-1]_{i,t-1}$ is fund i's across-stocks average of the trades in the ten days before the earnings announcement. The trade in each stock is measured as the signed number of shares traded divided by the average absolute number of shares traded in this stock by fund i in all trading days. $Past\ Ranks_{i,t-1}$ and $Past\ Returns_{i,t-1}$ control for fund performance ranks and returns in the past quarter, half year, year, and three years. $Past\,Ranks_{i,t-1}$ has a value of one for the best performing funds, and zero for the worst. $Fund\,Characteristics_{i,t-1}$ include controls for the fund's same-quarter return, age, turnover, expense ratio, ln(TNA), past-year flow volatility, return volatility, and number of stocks in the portfolio.[29] To reduce the noise in our measure of standard deviation $SD\ Ret[0,1]_{i,t-1}$, we only include fund-quarters with at least 30 stocks in the portfolio into our analysis. Panel B of Appendix Table A1 reports the summary statistics of the key variables. The specification also includes time fixed effects υ_t.

As shown in column (1) of Table 3, we find a negative and significant relationship between the fund flows and the standard deviation of earnings announcement returns, consistent with Hypothesis 1. This result is even more striking considering that we control for different dimensions of the fund's portfolio performance.[30] Thus, the effect is independent of the typical flow-performance sensitivity. In terms of magnitude, a one-standard-deviation increase in the standard deviation of holdings' earnings announcement returns (2.6% from Panel B of Table A1) leads to an additional fund outflow of -0.47% (-0.178*2.6%) per quarter. For comparison, we estimate the fund-level FPS ρ by regressing the quarterly fund flows on the fund's last quarter return as in Table A13. We get a fund-level FPS of 0.116, that is, a one-standard-deviation decrease (-11.1%) in the fund's quarterly return leads to a fund outflow of -1.29% (-11.1%*-0.116) in the next quarter. Therefore, the economic magnitude

[29] We use monthly fund returns for the calculation of return volatility in Table 3. However, we show in Table A11 of the Appendix that our results on holding-level FPS also hold when we include the standard deviation, skewness, and minimum value of daily fund returns in the past year as control variables.

[30] In Appendix Table A12, we also control for the non-linear relation between past fund performance and fund flows as well as for Morningstar ratings, and this result still holds.

of holding-level FPS is more than one-third (-0.47%/-1.29%) of the fund-level FPS.

In column (2), we find evidence consistent with Hypothesis 2. Purchasing the stock before the announcement magnifies the flow reaction to the holding-level standard deviation on earnings announcements. In terms of magnitude, a one-standard-deviation increase in $Signed\,Volume[-10,-1]_{i,t-1}$ (1.03 from Panel B of Table A1) decreases the coefficient of $SD Ret[0,1]_{i,t-1}$ by $1.03 \times (-0.114) = -0.118$, which is about two thirds of the unconditional effect of $SD\ Ret[0,1]_{i,t-1}$ on fund flows (-0.178 as reported in column (1)).

In our benchmark setting, we use raw returns to avoid taking a stand on the correct asset pricing model. As a robustness check, we also use Fama-French-Carhart 4 factor alphas. In this case, the findings are even stronger, as reported in column (4) to (6), arguably because the exposure to systematic risks is controlled for.

Finally, the trades in the [0, 10] window have an insignificant effect on the holding-level FPS, as shown in Appendix Table A10, which also reports the slopes on the all the other control variables.

6.4 Quantifying the Tradeoff Between Expected Premium and Outflows

Next, we quantify the tradeoff between the expected announcement premium and the outflows resulting from the holding-level FPS, as summarized in Eq. (14).

Because flows are scaled by total assets in Eq. (18), to be able to use the estimates from this equation to calibrate the parameters of Eq. (9), we need to express trades as a fraction of total assets as well. In particular, we define the variable $\Delta Weight[-10,-1]_{i,t-1}$ as the sum across holdings of the dollar amounts traded in the ten days before the announcement divided by the fund's total net assets (TNA). To compute this variable, we use the stock prices and fund TNA at the beginning of each quarter.

Using the new trade variable $\Delta Weight[-10,-1]_{i,t-1}$, the specifications in columns (3) and (6) of Table 3 provide us with an estimate of the parameter η for the holding-level FPS.

In our calibration, we use 1.541 from column (3) to be conservative.[31] For ρ, we use 0.116, which comes from the estimation in Appendix Table A13. We use the average standard deviation across stocks in the [0, 1] two-day window, at 0.073 from Table A1, Panel B, as an estimate for σ_j^2. Finally, we use 75 bps for the expected announcement premium α^e over the window [-10, 0] as an upper bound. Lower values for the premium would make buying the announcing stock even less likely.

Based on this calibration, we can study the tradeoff in Eq. (14). We quantify the incentive to buy $\alpha^e(1+\rho)$ as $0.0075 \times (1 + 0.116) = 0.0084$. The disincentive to buy, $\sigma_j^2\eta$, is quantified at $0.073 \times (-1.541) = -0.112$. Thus, the disincentive to buy by far outweighs the incentive, leading to the conclusion that the model correctly predicts that institutions will reduce the exposure to announcing stocks, consistent with the empirical evidence.

We also compute the disincentive to buy using a more conservative measure based on investors' flow response to strongly negative realizations of earnings announcement returns (i.e., a dummy variable "$D\_Lowest[0, 1]$", which equals one for funds with the lowest earnings announcement returns in the lowest quintile of all the funds in last quarter). As estimated in Appendix Table A14, the disincentive to buy, $\sigma_j^2\eta$, is at least $0.2 \times (-0.117) = -0.0234$ (the product of the probability that this dummy equals one and the coefficient of the interaction term), which still has a substantially larger magnitude than the incentive to buy (0.0084). This result suggest that the disincentive to buy by far outweighs the incentive even in our conservative setting, unless the parameter $\rho = 0.116$ for fund-level flow performance sensitivity is more than 17 times larger, which is almost impossible according to existing estimates in the literature.

[31] It is worth noting that the lower significance of $\Delta Weight[-10, -1]_{i,t-1}$ in Table 3 arises because this variable is a noisier measure of funds' abnormal trades before announcement than $SignedVolume[-10, -1]_{i,t-1}$, as it is not standardized by a fund's average daily trading volume on normal trading days. Despite this, the two trade measures have similar quantitative implications for the holding-level FPS. In detail, the effect of a one-standard-deviation increase in pre-announcement trades on the holding-level FPS, the coefficient on $SD\ Ret[0, 1]_{i,t-1}$, estimated using $\Delta Weight[-10, -1]_{i,t-1}$, at $0.107 \times (-1.541) = -0.165$, is similar to the corresponding effect estimated using $Signed\,Volume[-10, -1]_{i,t-1}$, at $1.03 \times (-0.114) = -0.118$.

6.5 The Shape of the Holding-Level Flow-Performance Sensitivity (FPS)

The focus of the analysis in this section is on the motives for institutional investors to decrease their exposure to stocks experiencing earnings announcements. The evidence of a holding-level FPS provides a plausible channel for this behavior. While a comprehensive analysis of the determinants of holding-level FPS is beyond the scope of this paper, in the remainder of this section, we investigate more thoroughly the shape of the function relating investor flows to portfolio holdings' performance.

To this end, we break down the cross-sectional distribution of portfolio holdings' return realizations during earnings announcements and study how flows react to different percentiles of this distribution. Because we do not need trade-level data for this analysis, we use the entire sample of U.S. active equity mutual funds for which we have quarterly holdings. To ensure that the time period is consistent with our trade-level analysis, we include only observations from 1999 to 2014.[32] This analysis helps to corroborate our previous finding in a larger sample.

Specifically, we regress quarterly fund flows on different percentiles of the cross-sectional distribution of earnings announcements returns of portfolio holdings in the prior quarter

$$\begin{aligned} Flow_{i,t} = & b_1 * Lowest\ Ret[0,1]_{i,t-1} \\ & + b_2 * Pctile\ X_{i,t-1} + b_3 * Highest\ Ret[0,1]_{i,t-1} \\ & + b_4 * Past\ Ranks_{i,t-1} + b_5 * Past\ Returns_{i,t-1} \\ & + b_6 * Fund\ Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t}, \end{aligned} \tag{19}$$

where *Lowest* $Ret[0,1]$ is the return of the lowest performing stock on earnings announcement days [0, 1] in the fund's portfolio last quarter. "Pctile X" is the earnings announcement return on days [0, 1] at the Xth percentile of the distribution across holdings. *Highest* $Ret[0,1]$ is the return of the highest performing stock on earnings announcement days [0, 1]. Panel B of Appendix Table A1 reports the summary statistics of the key vari-

[32] Performing this analysis using the entire sample from 1961 to 2019 yields equivalent results.

ables. For convenience of interpretation, we standardize all independent variables to a mean of zero and a standard deviation of one, and express quarterly flows in basis points for this analysis.

Table 4 reports the estimates. In column (1), for this larger sample of funds, we replicate the main result from the previous analysis that flows respond to the standard deviation of announcement returns. The next columns report the new evidence. In the univariate analysis in columns (2) to (10), we find positive coefficients for returns below the 25th percentile and negative coefficients for returns above the 75the percentile. Since the returns below the 25th percentile are mostly negative and those above the 75th percentile are mostly positive, this result is consistent with our assumption that the function $g(\varepsilon)$ in Eq. (8) is concave. It is worth noting that the effect of $SD\ Ret[0,1]_{i,t-1}(std)$ on fund flows (46.6 bps) is largely captured by returns at both tails of the distribution, such as the lowest returns and returns at the 5th, 10th, 90th, and 95th percentiles. The t-statistics are also larger for these tail returns.

More interestingly, in the multivariate regression in column (11) of Table 4, we find that the return of the lowest performing stock dominates returns in other percentiles as a predictor of fund flows suggesting that fund investors are more sensitive to the return of the lowest performing stock than to the rest of the distribution. Thus, we find that the holding-level FPS is largely asymmetric with significant more weight given to extremely negative returns. Being beyond the focus of this paper, we leave the explanation of the forces generating this shape of the holding-level FPS to future research.

Consistent with the conjecture that a fund managing firm would punish its managers for bad performance and outflows, we document in Table 5 that managers are 0.29% to 0.52% more likely to exit if the earnings announcement return of the lowest performing stock is one-standard-deviation lower, which represents a 4.3% to 7.7% increase relative to the baseline probability of a manager leaving the fund in the next quarter. However, the shape of managers' exits as a function of the distribution of holdings' earnings announcement returns is less clear than that of fund flows.

In Appendix Section A.7, we show that the model with holding-level FPS of Section 6.1 can be extended to let the function $g(\varepsilon)$ give weight only to the return of the lowest performing stock. The main implications of the model for institutional trading behavior remain unchanged. Finally, Appendix Section A.8 provides additional evidence on and quantification of the holding-level FPS.

6.6 Monthly Flows and Changes in Institutional Behavior

Armed with the result that the return of the lowest performing stock has a first-order impact on fund flows, we provide more evidence on the specific timing of the reaction of flows to earnings announcement returns using monthly flows in this section and daily flows in Appendix Section A.5. We further provide evidence that institutions learn from these extreme realizations and trade more cautiously ahead of announcements in the next quarters.

The percentage monthly flows are estimated as in Eq. (17) using monthly returns and fund TNA instead. In particular, we study fund flows in the nine months after a strongly negative realization of the lowest earnings announcement return with this regression

$$\begin{aligned} Flow_{i,t} = &\sum_{s=1}^{9} b_s * D\_Lowest[0,1]_{i,t-s} + b_{10} * D\_Lowest[0,1]_{i,t} + b_{11} * Past\ Ranks_{i,t-1} \\ &+ b_{12} * Past\ Returns_{i,t-1} + b_{13} * Fund\ Characteristics_{i,t-1} + v_t + \varepsilon_{i,t}, \end{aligned}$$

where $D\_Lowest[0,1]_{i,t-s}$ is a dummy variable for a strongly negative realization of the lowest earnings announcement return in the fund's portfolio s months ago, which equals one for those in the lowest quintile (<-23.1%) and zero for others. Since 92.5% of earnings announcements in our sample are in the first two months of a quarter, we also report the results for fund flows in month 1, 2, and 3 of a quarter separately.

As reported in column (1) of Appendix Table A20, fund flows are 9 basis points (bps) lower already in the first month after a realization of earnings announcement return in the lowest quintile, suggesting that a significant part of investors react within a month. This number increases to 12 bps in the fourth month and stays statistically significant until the seventh month. These results indicate that the majority of fund investors react in about a quarter, and this effect on fund flows slowly dies out after about two quarters. It is worth noting that, fund flows are 6 bps lower in the same month of a strongly negative earnings announcement return according to the coefficient of $D\_Lowest[0,1]$, which is consistent with flow reactions in the same month. [33]

Appendix Section A.5 uses daily flows to study the flow-sensitivity to extreme holding-level realizations of earnings announcement returns and finds consistent results.

Next, we investigate whether institutions change their trading behavior before earnings announcements in the quarters after a strongly negative realization of earnings announcement return. If institutions learn from these extreme realizations and their implications in terms of outflows, we expect them to be more cautious before earnings announcement in the following quarters. To test this conjecture, we focus on the trades of the 331 mutual funds with daily holdings data and estimate the following specification

$$\begin{aligned} Signed\,Volume[-10,-1]_{i,t} =& a_i + \sum_{s=1}^{4} b_s * D\_Lowest[0,1]_{i,t-s} + \sum_{s=0}^{4} f_s * Flow_{i,t-s} \\ &+ b_5 * Past\ Ranks_{i,t-1} + b_6 * Past\ Returns_{i,t-1} \\ &+ b_7 * Fund\,Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t}, \end{aligned}$$

where $Signed\,Volume[-10,-1]_{i,t}$ is fund i's across-stocks average of the trades in the ten days before the earnings announcement in quarter t. The trade in each stock is measured as the signed number of shares traded divided by the average absolute number of shares traded in this stock by fund i in all trading days. Variable $D\_Lowest[0,1]_{i,t-s}$ is a dummy variable for a strongly negative realization of the lowest earnings announcement return in the fund's

[33] Consistent with the fact that 92.5% of earnings announcements are in the first two months of a quarter, we find that only strongly negative realizations of earnings announcement returns in the first two months of a quarter have a significant effect on fund flows, not those in the third month, as reported in column (2) to (4) of Appendix Table A20.

portfolio s quarters ago, which equals one for those in the lowest quintile (<-30.7%) and zero for others. Variable $Flow_{i,t-s}$ is quarterly fund flows s quarters ago. Both fund and quarter fixed effects are included.

As reported in Appendix Table A21, we do find that funds with strongly negative realizations during earnings announcements have larger abnormal sales in the ten days before earnings announcement in the second quarter after. These results confirm our conjecture that institutions learn from these extreme realizations and their consequences. The fact that they learn only starting from the second quarter after the event is consistent with our evidence on monthly and daily flows that flow reactions take about one quarter to realize. In column three of Appendix Table A21, we show that this finding is robust to controlling for past and concurrent fund flows, and this learning effect becomes smaller and insignificant in the third and fourth quarter.

7 Heterogeneity across Institutions

In what follows, we explore heterogeneity across institutions in the trading behavior that we have identified. Based on the notion that institutional investors avoid volatility to preempt outflows, we conjecture that the funds that are more subject to redemptions are more likely to reduce exposure to the announcing stocks. To test this conjecture, we focus on variables that measure financial constraints—intended as investors' likelihood to withdraw capital—and analyze how they affect institutional trading behavior during announcements.

For this analysis, we combine transaction data with fund-level characteristics. This is possible for a smaller sample of hedge funds and mutual funds, which we identify after matching the Ancerno database with other publicly available datasets, as described in Section 3. We measure the trades of institutions at the fund-stock-day level as described in Eq. (2). We regress the trades of funds on days [-3, 1] on selected measures of financial constraints and their interaction terms with the earning announcement dummies as follows

$$
\begin{aligned}
trades_{i,j,t} =& a + b_1 * Constrained_{i,t} \times EarningDay_{j,t} \\
& + b_2 * Constrained_{i,t} + b_3 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{i,j,t},
\end{aligned} \tag{20}
$$

where $trades_{i,j,t}$ is defined as in Eq. (2). $EarningDay_{j,t}$ is a dummy variable which equals one if it is the earning day under investigation (e.g, [-3]) and zero for all days outside our event window [-20, 20]. We run a separate regression for each day in the [-3, 1] window. $Constrained_{i,t}$ is a measure of financial constraint for fund i on day t. We include υ_j to control for the stock fixed effects.

7.1 Hedge Funds

For hedge funds, we are able to obtain the characteristics of hedge fund managing firms (identified by the variable *managercode* in Ancerno), rather than the characteristics of individual hedge funds (identified by the variable *clientmgrcode*). The characteristics of managing firms are from three commercial databases – the Lipper/TASS Hedge Fund Database, Morningstar CISDM, and Hedge Fund Research. Specifically, we compute the asset-weighted characteristic across the hedge funds in the same management firm.

Since the main constraint on an asset manager's ability to trade is redemptions from its investors, we start by using the past 2-year volatility of capital flows as a direct measure of a hedge fund's financial constraints. At the beginning of each month, we calculate the standard deviation of the fund's monthly flows in the past two years as the past 2-year flow volatility. We require at least eight monthly observations of fund flow for the calculation of the past 2-year flow volatility. We standardize the flow volatility to a mean of zero and a standard deviation of one and denote it as $FlowVol$.[34]

Panel A of Table 6 reports the estimates for the relationship between hedge funds' trades before and after earning announcements and the variable $FlowVol$, using the specification in

[34] We winsorize the fund flows at the 1% level. Panel A of Table A26 reports the summary statistics of the un-standardized flow-volatility variable for hedge funds.

Eq. (20). Based on the coefficients on the interaction terms, we find that hedge funds with a one-standard-deviation higher flow volatility decrease their order flow by as much as -22.8% of average daily trading volume on day -1, and they increase it by 13.4% of average daily trading volume on day 1. The finding corroborated the view that preempting redemptions seems to be a motive for reducing order flow in anticipation of announcements.[35]

Typically, hedge funds' trading strategies benefit from periods of intense volatility. In this light, it appears counterintuitive that all hedge funds reduce their exposure to assets experiencing spikes in volatility. To address this potential objection, we study the heterogeneity in our sample of hedge funds. In particular, we sort hedge funds into quintiles based on their past 2-year monthly flow volatility and investigate their abnormal trades in days [-3, 1] around earnings announcements by flow-volatility quintiles. As shown in Panel A of Figure 6, there is large heterogeneity in hedge funds' trading behavior around earnings announcements. While hedge funds with high flow volatility (quintile 5) display abnormal sales as large as -42.3% one day before earnings announcements, hedge funds with low flow volatility (quintile 1) display abnormal purchases of 12.2% on that day.[36] This pattern is largely monotonic across flow-volatility quintiles and holds for days -2 and -3 as well. Consistently, hedge funds with high flow volatility (quintile 5) have abnormal purchases one day after announcements, whereas hedge funds with low flow volatility (quintile 1) have abnormal sales on that day. This analysis, therefore, reveals substantial heterogeneity in the hedge fund sample, where the funds that reduce their exposure to anticipated volatility spikes are those with a more unstable funding base. Instead, the less constrained funds increase their exposure during these events.

Next, we use other fund characteristics to investigate the relevance of financial constraints in explaining trading behavior ahead of information releases. Hedge funds with shorter lockup periods, redemption notice period, higher redemption frequency (e.g., quar-

[35]This finding holds for past-year and past 5-year flow volatility as well. We choose 2 years because hedge funds usually have a redemption notice period of one to three months and a redemption frequency varying from a month to a year.

[36]Refer to Table A25 for detailed numbers and significance levels.

terly versus annually) face more redemption threats from their investors, and young funds and funds that just experienced bad performance are also more likely to be concerned about their financing conditions. Therefore, we use minus lockup period (LOCKUP), minus the redemption notice period (RED NOTICE), minus the redemption frequency (RED FREQ), minus the natural logarithm of the age of the fund (YOUNG), and minus the past year performance (BAD) to construct the fund-level measures of financial constraints. We first standardize each of these five variables to a mean of zero and a standard deviation of one to construct the individual measures of financial constraints. Then, we sum these five variables and re-standardize this combined measure to a mean of zero and a standard deviation of one to construct the Constrained Index.[37]

We use the Constrained Index for the regression analysis of Eq. (20). As reported in Table A22, hedge funds which are one standard deviation more financially constrained on average reduce order flow by 10.5% and 12.6% of average daily trading volume on day -2 and -1, and they increase it by 10.7% on day 1, suggesting that the decrease of hedge funds' order flow is related to their financial constraints.[38]

7.1.1 Mutual Funds

For the analysis of mutual funds, we use the 331 U.S. domestic equity mutual funds resulting from the match between Ancerno and the CRSP Mutual Fund database, for which we have data on both their transactions and fund-level characteristics.

Because open-ended mutual funds' redemption notice periods are much shorter than hedge funds' and their redemption frequencies are much higher, and the redemption terms are mostly uniform across funds, these variables are not relevant in this context. Thus,

[37] Cotelioglu et al. (2021) combine different measures of financial constraints in the same manner to study the relationship between the financial constraint and the liquidity provision of hedge funds.

[38] We run the same regression analysis (as described in Eq. (20)) for each individual measure of financial constraint and report the coefficients of the interaction terms in Appendix Table A23. We find that financially constrained hedge funds decrease significantly more their order flow on day -1 and day 0 for four out of five individual constraint measures at the 5% significance level, and they buy significantly more on day 1 for three out of five individual constraint measures, further confirming our result based on the combined measure.

we use past-year flow volatility as a direct measure of a mutual fund's financial constraint. Panel B of Table 6 reports the estimates for the relationship between mutual funds' trades before and after earnings announcements and the past-year flow volatility $FlowVol$, using the specification in Eq. (20). As shown by the coefficients on the interaction terms, we find that mutual funds with a flow volatility one-standard-deviation higher decrease their order flow by -1.8% and -2.1% of average daily trading volume on days -2 and -1.

Similar to the analysis for hedge funds, we also sort mutual funds into quintiles based on their past-year flow volatility and investigate their abnormal trades by flow-volatility quintiles. As shown in Panel B of Figure 6, the heterogeneity in mutual funds' trading behavior around earnings announcements is substantially smaller than that of hedge funds in Panel A. While mutual funds with high flow volatility (quintile 5) have abnormal sales of -9.5% one day before earnings announcements, mutual funds with low flow volatility (quintile 1) also have an abnormal sale of -4.3% on that day.[39] Thus, the decrease in order flow ahead of earnings announcements appears to be a more widespread behavior among mutual funds than hedge funds.

We further use the fund's age and the past performance as measures of financial constraints for mutual funds. Specifically, we use minus the natural logarithm of the age of the fund (YOUNG) and the reverse of the past-quarter performance rank (BAD). We use past-quarter instead of past-year performance because investors of open-ended mutual funds can react faster to bad performance due to a lack of redemption restriction, and we drop funds with less than a year in history to avoid confounding effects from the portfolio build-up phase. Panel A of Table A24 shows that both YOUNG funds and funds with BAD past-quarter performance decrease their order flow significantly more on the day of earnings announcements. We also find some evidence, although statistically weaker, that they decrease the order flow the day before the announcement.

Moreover, we use manager tenure in years (OLD MGR) collected from MorningStar

[39] Refer to Table A25 for detailed numbers and significance levels.

Direct to measure (low) risk-taking.[40] As reported in the Panel A of Table A24, managers with longer manager tenure (i.e., lower risk-taking) sell 2.7 to 2.8% more in the three days before earnings announcements. Since the age of a fund and the tenure of the fund manager are positively correlated, we also run a multivariate regression in Panel B of Table A24 including both YOUNG fund and OLD MGR and their interaction terms with $EarningDay_{j,t}$. As predicted, we find that YOUNG funds sell 2.2% to 2.6% more both before and on the day of earnings announcements arguably because they are more financially constrained, while OLD MGR sell 3.1% to 3.8% more both before and after the earnings announcements arguably because they take lower risks around earnings announcements.

Overall, the analysis in this section supports the conjecture that the trading behavior of institutional investors ahead of earnings announcement is related to the motive of preempting redemptions. Funds with a more fleeting capital base are more likely to reduce exposure to the announcing stocks.

8 Limits to Arbitrage and the Announcement Premium

To close the circle, we study whether the institutional trading behavior that constitutes the paper's main evidence has any relation to the return premium that is manifested around earnings announcements (Figure 1). Our conjecture is that the announcement premium can persist because of institutional limits to arbitrage. We study the relationship between institutional trades around earnings announcements and the magnitude of the abnormal returns on these days. If the conjecture is correct, we should find that the stocks with the largest institutional abnormal sales are those for which the premium is the greatest.

For this analysis, we measures institutional trades by expressing the signed volume of

[40] Brown, Harlow, and Starks (1996) and Chevalier and Ellison (1997) suggest that younger fund managers have a higher propensity to take risks. The correlation between fund age and the manager tenure is 0.347, indicating that these two variables are not measuring the same phenomenon since there is turnover in fund managers. As argued in Van Binsbergen, Han, Ruan, and Xing (2022a), new fund managers hired by both young and old funds have the incentive to trade aggressively on short-term investment opportunities which prove their skills faster.

Ancerno institutions as a fraction of total number of shares outstanding because the goal is to capture the potential price impact of institutional sales. Each quarter, we sort all stocks into quintiles based on the aggregate institutional trades in days [-10, -1] before their earnings announcements. Quintile 1 identifies the stocks with the largest institutional sales, while quintile 5 describes those with the largest institutional purchases (see Panel A of Table 7).

We find a significant correlation between the magnitude of the pre-announcement trading and the premium on the earnings announcement day. The stocks that are sold the most exhibit a return premium substantially larger than the other quintiles of stocks. As shown in Panel A of Table 7, stocks in quintile 1 (sold the most) have a significant DGTW abnormal return (AR) of 0.27% on day 0, which is substantially higher than the average AR of quintile 5 (i.e., 0.07%). As robustness check, we show in Panel B of Table 7 that this finding holds for ARs based on the Fama-Franch-Carhart four-factor model as well.[41]

While this evidence does not allow us to draw a causal link between institutional sales and the earnings announcement premium, the correlation that we identify contributes to shed light on the persistence of the premium. Specifically, the premium may materialize for reasons exogenous to the institutional sector—e.g., because of the buying activity of retail investors with limited attention, as suggested by Frazzini and Lamont (2007)—then, the aversion of institutions to trade aggressively on the premium allows the abnormal expected returns to persist.

[41]To study whether it is always the case that the magnitude of institutional trades lines up with returns, we conduct a placebo analysis. We sort trading days outside of the earnings announcement window by the amount of institutional sales in a prior-ten-day window and compute the average abnormal return on that day. The size of the trades in each quintile is of comparable magnitude to the trades in the main analysis (Panel C of Table 7). However, as evident from the placebo results in Panel A of Table 7, the relationship between institutional trades and abnormal returns is not nearly as strong as during earnings announcements. We conclude that the identified relationship between returns and institutional behavior is peculiar to earnings announcements.

9 Conclusion

In this paper, we show that institutions, on average, decrease their exposure to stocks before earnings announcements despite the large premium that is earned on these days and the improvement in the expected risk-return tradeoff. We also find that this behavior is significantly related to the idiosyncratic volatility of earnings announcement returns.

While the finding that well-diversified investors fear idiosyncratic volatility is apparently puzzling, we argue that this behavior is consistent with a novel dimension of the sensitivity of investor flows to performance. We show that extreme realizations of the earnings announcement return of individual holdings lead to substantially larger fund outflows, which are distinct from the normal reaction of flows to fund performance. Selling the stock before the announcement reduces the probability of these outflows. Thus, the evidence provides a motive for fund managers to decrease their exposure to the announcing stocks.

Confirming that the trading behavior ahead of earnings releases is motivated by the pre-emption of outflows, we show that institutions are more likely to decrease their exposure prior to earnings announcements when their investors are more prone to redemptions. This finding contributes with direct evidence on trading behavior to a long literature on limits of arbitrage that goes back at least to Shleifer and Vishny (1997).

Based on the evidence that institutional trades are able to anticipate the direction of news, a large literature concludes that institutions accelerate the incorporation of information into asset prices. The results in this paper bring a different perspective. On average, institutions reduce their exposures to stocks that are exposed to news releases. Therefore, the behavior that we describe mitigates the ability of institutions to impound information into asset prices.

Finally, substantial return premia are generated ahead of scheduled news releases. The new dimension of limits to arbitrage that we identify constrains institutions' ability to capture these premia and arbitrage them away. Thus, our evidence provides a rationale for the persistence of predictable premia before earnings announcements. At the same time, our findings contribute to the literature on delegated portfolio management by highlighting a new constraint on fund managers' ability to generate performance.

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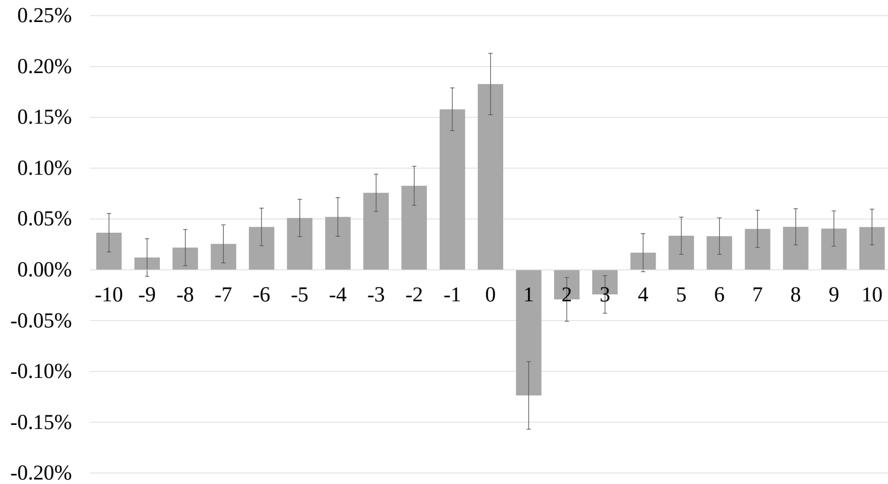
Panel A: DGTW Abnormal Returns per Day around Earnings Announcements



Panel B: DGTW Cumulative Abnormal Returns (CARs) around Earnings Announcements

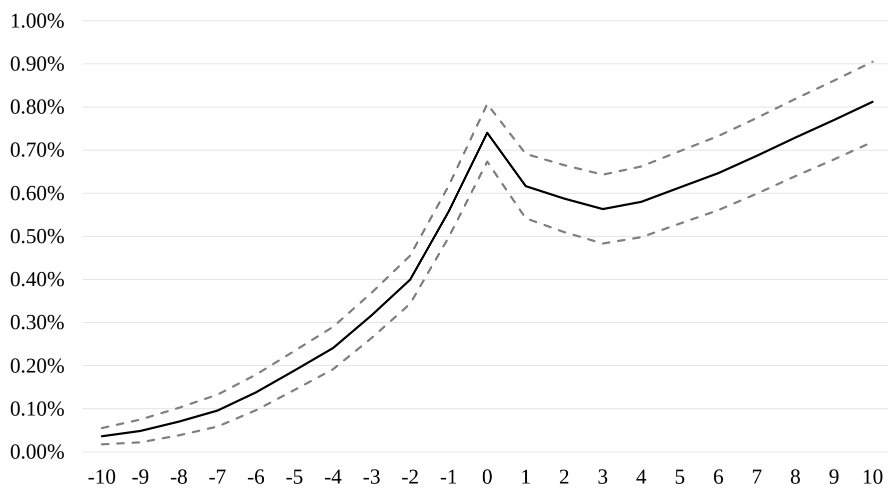


Figure 1: Abnormal Returns around Earnings Announcement Days

The figure plots abnormal stock returns around earnings announcement days in the [-10, 10] window. DGTW characteristic adjusted abnormal returns are calculated as in Daniel et al. (1997). Panel A reports the DGTW abnormal returns per day around earnings announcement days and Panel B reports the DGTW cumulative abnormal returns in the same window. The 95% confidence intervals are reported.

Panel A: Abnormal Net Institutional Trades (as a % of past 6-month daily volume)

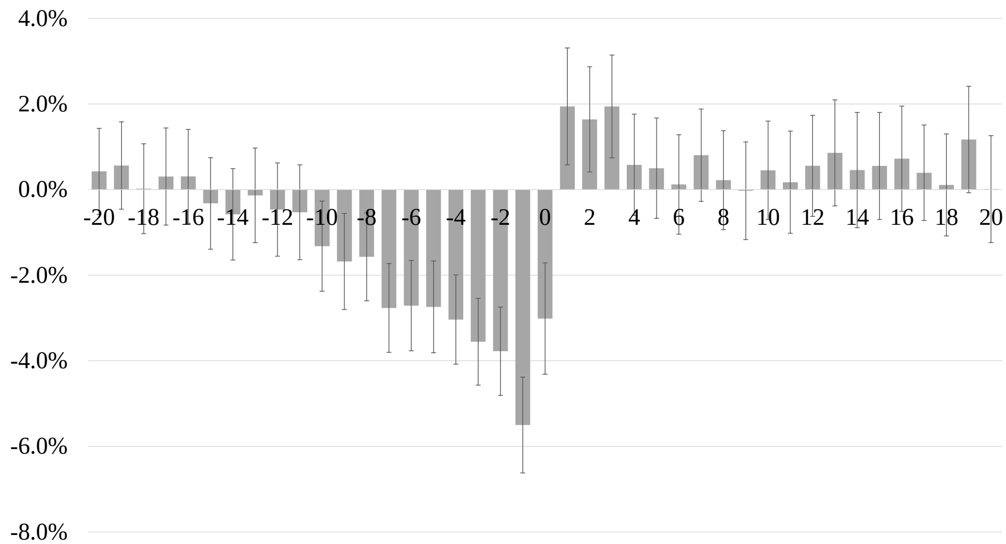
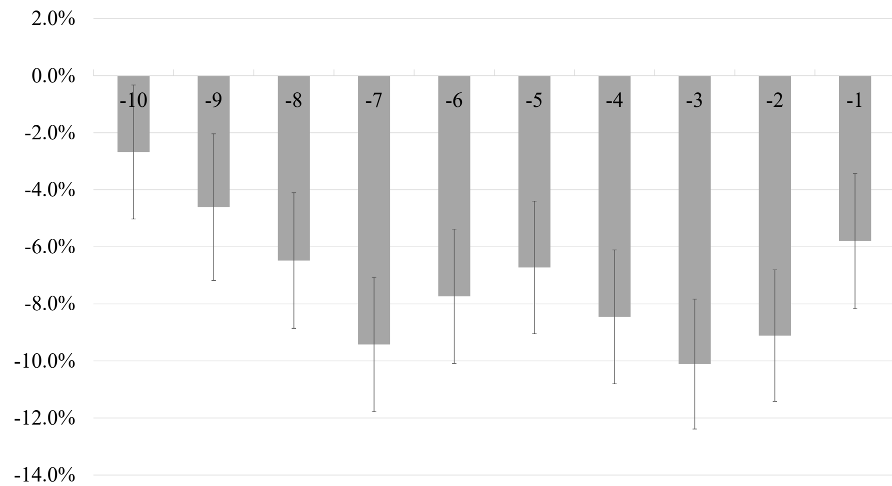


Figure 2: Abnormal Institutional Trades around Earnings Announcement Days

The figure plots institutions' abnormal signed trading volume as a percentage of past 6-month daily volume around earnings announcements. The event window is [-20, 20], that is from 20 days before to 20 days after the announcement (day 0). Panel A reports the net number of shares traded on each day for all institutions in the Ancerno database as a percentage of the average absolute number of shares traded per day on the same stock in the past six months before the event window as in Eq. (1). The abnormal trading amount is calculated as the differences between event days and non-event days outside the event window using the regression in Eq. (3). The 95% confidence intervals are based on standard errors clustered by day. Panel B reports the abnormal institutional volume of purchases in days [-10, -1]. We replace the net number of shares traded in Eq. (1) by the total number of shares bought and measure the volume of purchases as a percentage of past 6-month daily volume of institutional purchases in Ancerno. Panel C reports the abnormal institutional volume of sales. The abnormal volume of purchases and sales within the event window are calculated using the regression in Eq. (3).

Panel B: Abnormal Volume of Purchases (as a % of past 6-month daily volume of purchases)



Panel C: Abnormal Volume of Sales (as a % of past 6-month daily volume of sales)

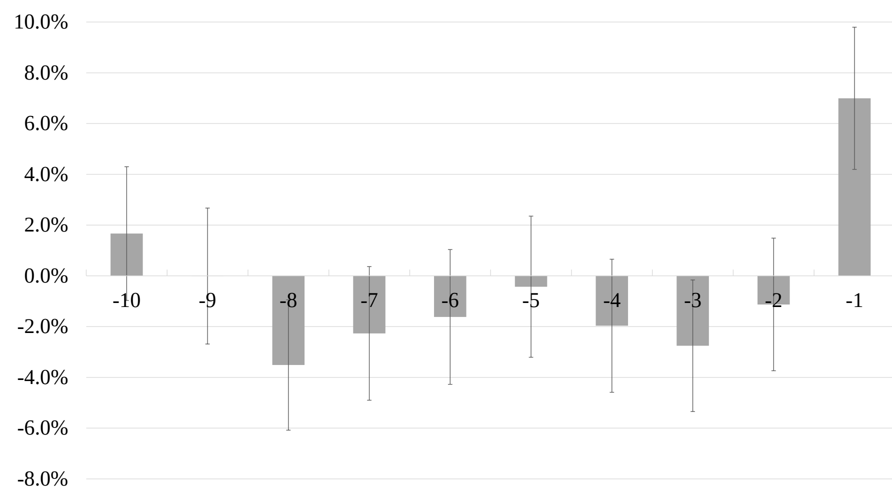
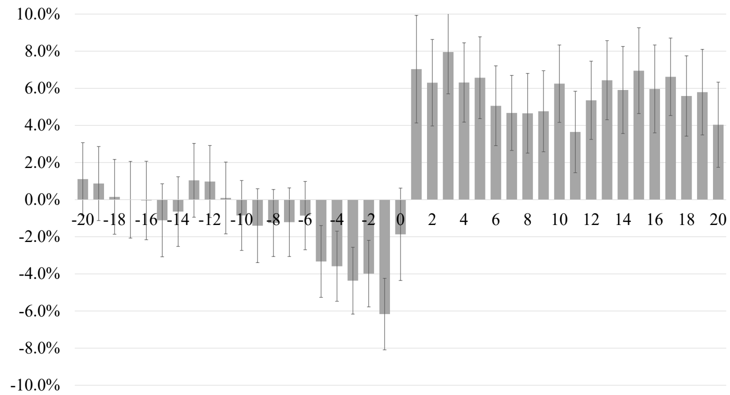
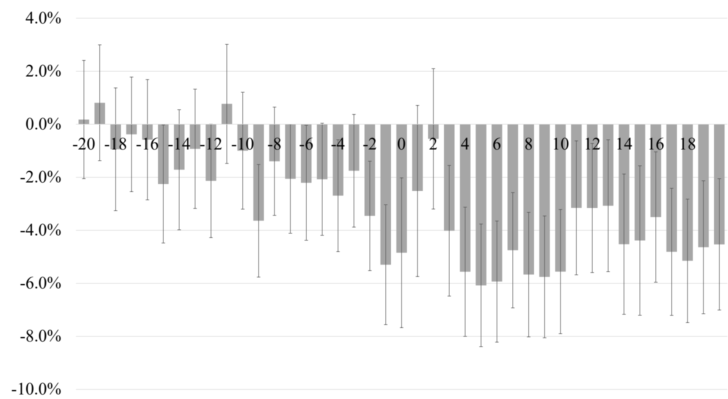


Figure 2: Abnormal Institutional Trades around Earnings Announcement Days (continued)

Panel A: Institutional Trades with Positive Earning Surprises (top 25%)



Panel B: Institutional Trades with Negative Earning Surprises (bottom 25%)



Panel C: Institutional Trades with No Earning Surprises (middle 50%)

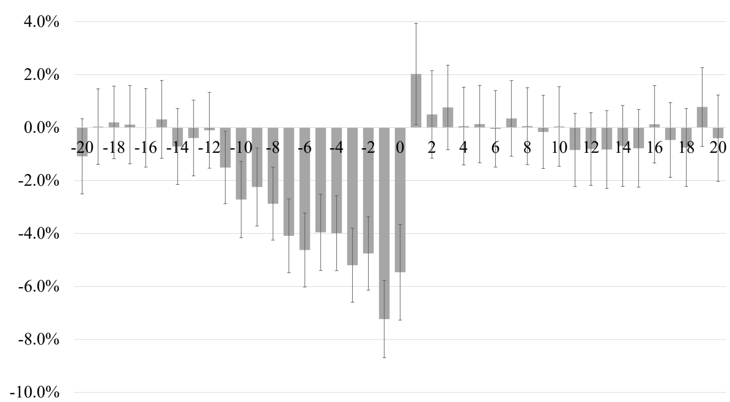


Figure 3: Trades around Positive, Negative, and No Earning Surprises

The figure plots institutions' abnormal signed trading volume around earnings announcements with positive surprises (Panel A), negative surprises (Panel B), and no surprises (Panel C). We calculate the earning surprises based on analysts' forecasts (IBES). The top (bottom) 25% earning surprises are defined as positive (negative) surprises, and the remaining 50% as no surprises. Abnormal institutional trades are calculated using the regression in Eq. (3). The 95% confidence intervals are reported.

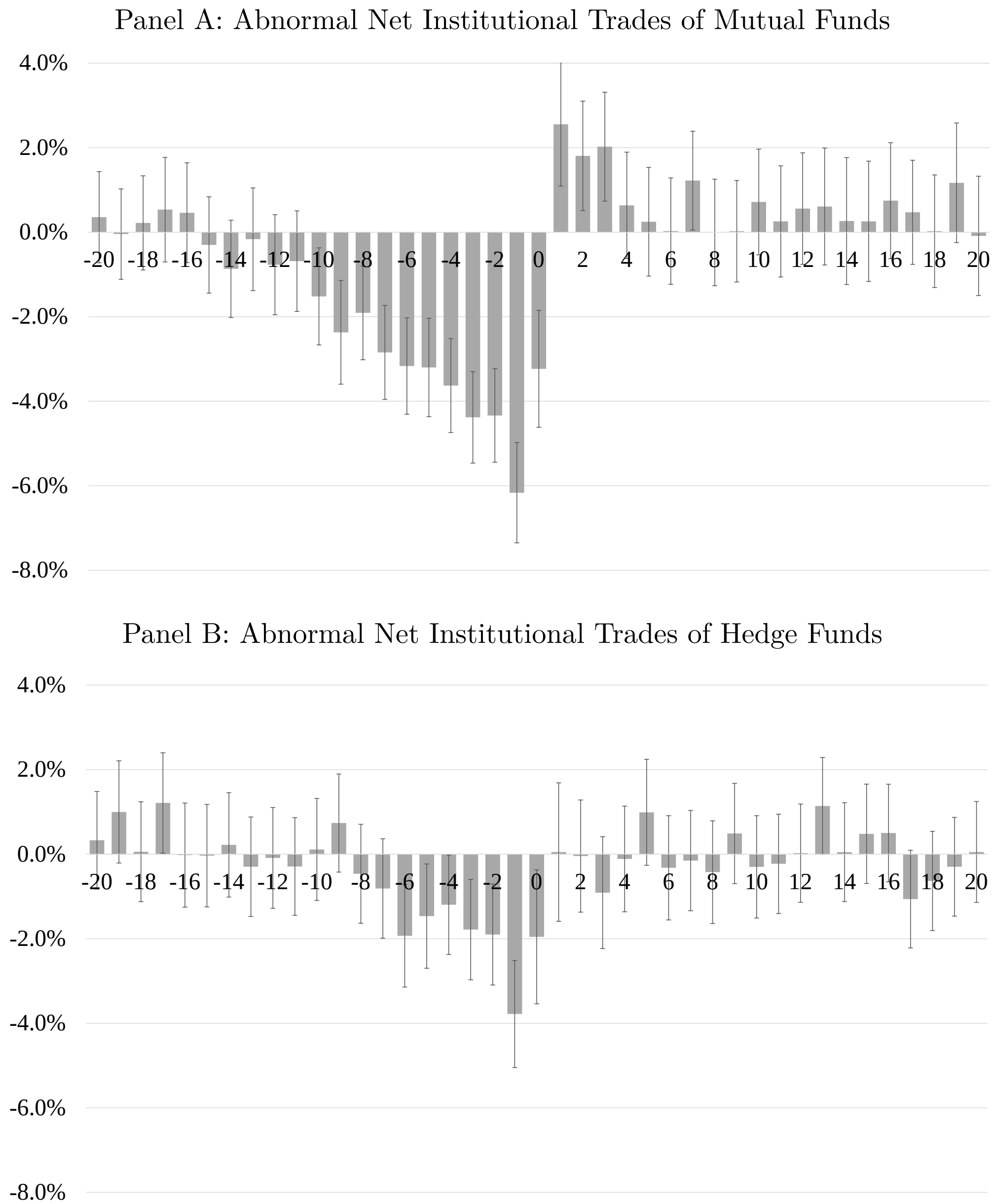
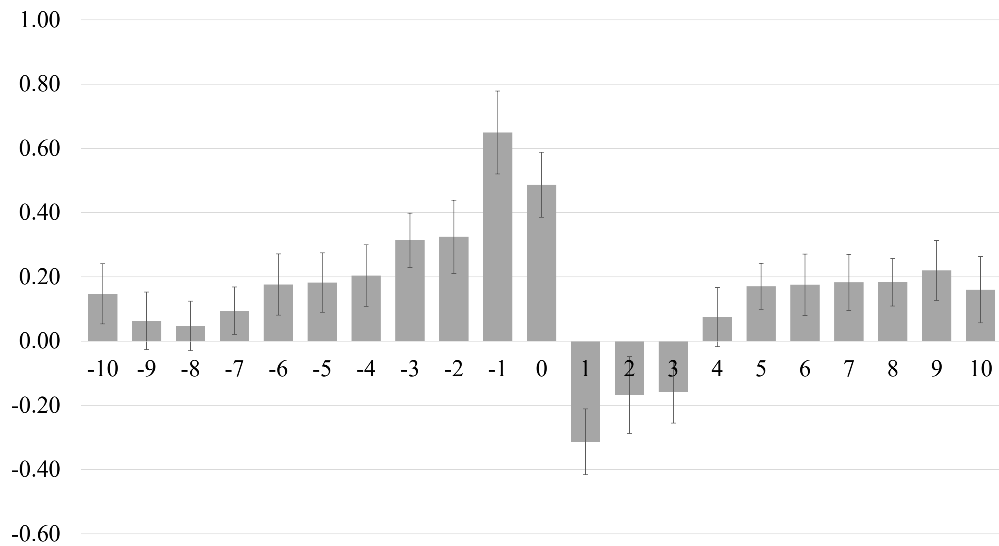


Figure 4: Institutional Trades of Mutual and Hedge Funds around Earnings Announcements

The figure plots mutual funds' and hedge funds' abnormal signed trading volume around earnings announcements . The event window is [-20, 20], that is from 20 days before to 20 days after. Panel A reports the net number of shares traded on each day for all mutual funds in the Ancerno database as a percentage of the average absolute number of shares traded per day on the same stock in the past six months before the event window as in Eq. (1). The abnormal trading amount is calculated as the differences between event days and non-event days outside the event window using the regression in Eq. (3). Panel B reports the results of hedge funds. The 95% confidence intervals are reported.

Panel A: Information Ratios of Daily Returns around Earnings Announcements



Panel B: Information Ratios of Cumulative Returns around Earnings Announcements

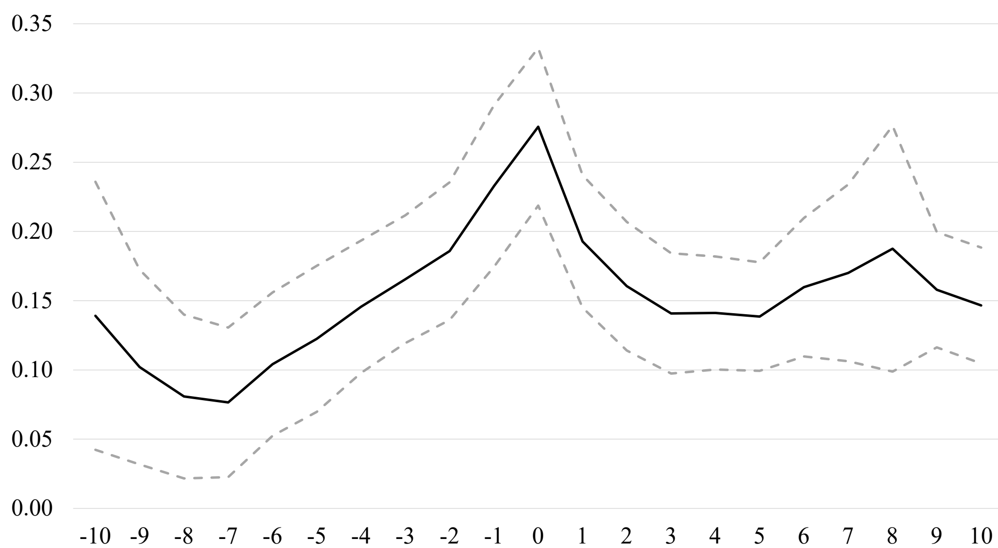
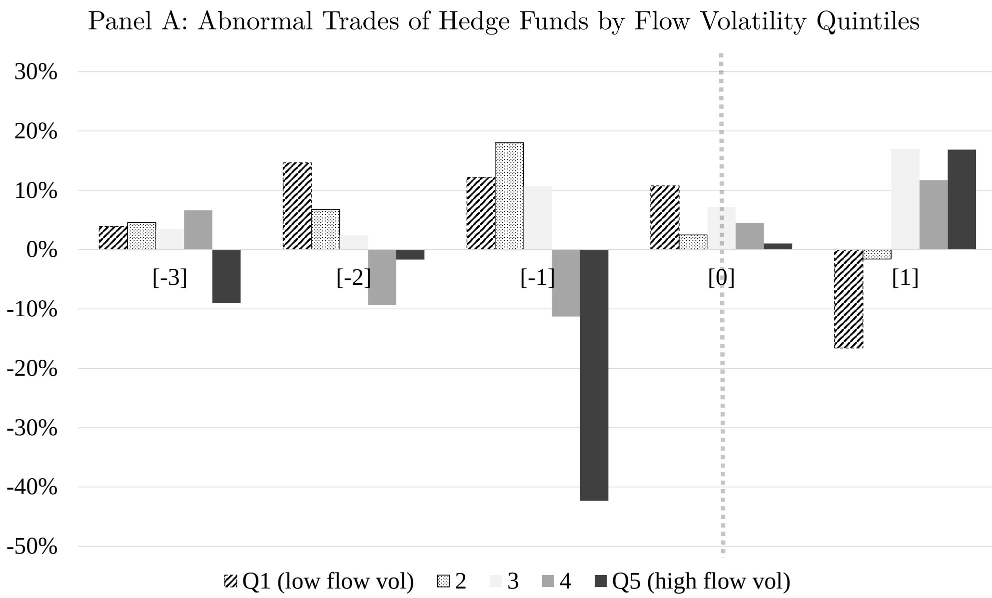


Figure 5: Information Ratios around Earnings Announcement Days

The figure plots information ratios of stock returns around earnings announcement days in [-10, 10] based on DGTW abnormal returns. DGTW characteristic adjusted abnormal returns are calculated as in Daniel et al. (1997). Panel A reports the information ratio of daily abnormal returns around earnings announcement days and Panel B reports the information ratio of cumulative abnormal returns (CARs) since day -10. The 95% confidence intervals are reported. All information ratios are annualized.



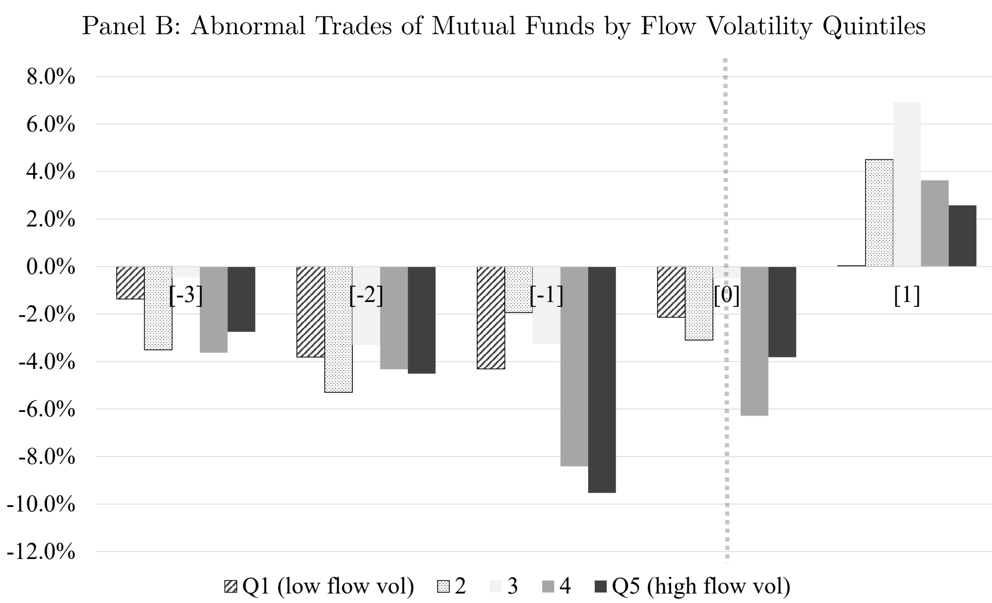


Figure 6: Abnormal Trades of Hedge Funds and Mutual Funds by Flow Volatility Quintiles

The figure plots the abnormal signed trading volume of hedge funds and mutual funds in days [-3, 1] around firms' earnings announcements by flow-volatility quintiles. At the beginning of every quarter, we sort hedge funds (mutual funds) into quintiles based on their past 2-year (1-year) monthly flow volatility. Panel A is for hedge funds and Panel B is for mutual funds. Abnormal institutional trades are calculated using Eq. (3) with stock fixed effects. We use the 331 mutual funds with fund-level as well as transaction-level data for the analysis in Panel B.

Table 1: Summary Statistics of Ancerno Transaction Data

The table reports the following statistics for several aspects of our data. Panel A is for the number of fund managing firms, the number of funds, the daily number of fund-stock-day observations of trades, the total daily dollar volume, and the number of distinct stocks traded by institutions in Ancerno at the daily frequency. Panel B is for the volume of fund-stock-day traded/with net purchases/with net sales in the Ancerno. Panel C is for the number of fund-stock-day observations per fund and per fund managing firm. Panel D reports the total number of fund managing firms for mutual funds (MF) and hedge funds (HF) separately, and the number of earnings announcement days (Earn.Ann.) from 1999 to 2014. Panel E reports the summary statistics of our measures of institutional trades in Equations (1) and (2), Panel F is for stock-level variables used in Equations (6) and (21). $SD\ Ret[0,1]$ ($Syst.$) and $SD\ Ret[0,1]$ ($Idio.$) are the systematic and idiosyncratic standard deviations of each stock's earnings announcement returns estimated from Eq. (5), and $Info\ Ratio[0,1]$ ($Idio.$) is the information ratio calculated as mean abnormal returns divided by $SD\ Ret[0,1]$ ($Idio.$).

Panel A: Daily data

	Mean	Std	Min	p25	p50	p75	Max
Number of managing firms	266	31	142	248	270	286	385
Number of funds	4,010	2,974	884	2,289	3,402	4,307	28,157
Number of fund-stock-day obs.	37,783	34,554	5,454	26,259	33,993	43,097	1,366,622
Daily Volume ($million)	13,443	4,846	-	10,288	12,669	15,878	60,971
No. distinct stocks traded per day	3,362	426	1,566	3,083	3,449	3,657	4,923

Panel B: Fund-stock-day level data

	Mean	Std	Min	p25	p50	p75	Max
Volume per fund-stock-day ($000)	358	3,914	0	3	18	104	31,723,752
Volume of net purchases ($000)	335	2,757	0	3	18	100	8,954,934
Volume of net sales ($000)	387	4,927	0	2	18	112	31,723,752

Panel C: Fund-level data

	Mean	Std	Min	p25	p50	p75	Max
No. fund-stock-day obs. (per fund)	688	11,162	1	22	106	328	2,995,980
No. fund-stock-day obs. (per firm)	151,170	1,105,703	1	728	5,579	30,657	24,473,950

Panel D: Number of hedge funds (HF), mutual funds (MF), and event days

	MF	HF	Earn.Ann.
Total number of managing firms:	417	99	
Number of event days:			339,901

Panel E: Measures of Institutional Trades

	Mean	Std	Min	p25	p50	p75	Max
Stock-day level	0.060	1.789	-8.377	-0.049	0.000	0.116	9.503
Fund-stock-day level	0.055	1.310	-4.681	-0.536	0.043	0.652	4.867

Panel F: Stock-level variables

	Mean	Std	Min	p25	p50	p75	Max
SD Ret[0,1] (Syst.)	0.018	0.004	0.006	0.016	0.018	0.020	0.040
SD Ret[0,1] (Idio.)	0.086	0.046	0.012	0.054	0.080	0.108	0.656
Info Ratio[0,1] (Idio.)	0.001	0.236	-1.485	-0.138	0.013	0.149	1.506
ln(Market-Cap)	12.5	2.1	5.1	11.0	12.4	13.9	20.3

Table 2: Institutional Trades before Earnings Announcements and Volatility

The table studies the relation between institutional trades before earnings announcements and stocks' idiosyncratic and systematic volatility during earnings announcements. For each quarter and each stock j, we regress its earnings announcement returns on day 0 and 1 on Fama-French-Carhart 4 factors using daily data in the past five years to separate the systematic component from the idiosyncratic as follows.

$$Ret[0,1]_{j,t} = \alpha_j + \underbrace{\beta_{1,j}MKT_t + \beta_{2,j}SMB_t + \beta_{3,j}HML_t + \beta_{4,j}MOM_t}_{\text{systematic}} + \underbrace{\varepsilon_{j,t}}_{\text{idiosyncratic}}.$$

Every quarter, we calculate the 5-year-rolling idiosyncratic standard deviation of stock j's returns during earnings announcements $SD\ Ret[0,1]\ (Idio.)_{j,t}$ using the idiosyncratic components ($\varepsilon_{j,t}$ of day 0 plus day 1) across all its earnings announcements in the past five years, and we calculate the systematic standard deviation $SD\ Ret[0,1]\ (Syst.)_{j,t}$ using the systematic components. Then we estimate the following specification:

$$\begin{aligned} trades_{j,t} =& a + b_1 * SD\ Ret[0,1]\ (Idio.)_{j,t} \times EarningDay_{j,t} \\ &+ b_2 * SD\ Ret[0,1]\ (Syst.)_{j,t} \times EarningDay_{j,t} \\ &+ b_3 * ln(MarketCap)_{j,t} \times EarningDay_{j,t} \\ &+ b_4 * SD\ Ret[0,1]\ (Idio.)_{j,t} + b_5 * SD\ Ret[0,1]\ (Syst.)_{j,t} \\ &+ b_6 * ln(MarketCap)_{j,t} + b_7 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{j,t}, \end{aligned}$$

where $trades_{j,t}$ is defined as in Eq. (1). $ln(MarketCap)_{j,t}$ is stock j's natural logarithm of market capitalization at the end of last quarter. $EarningDay_{j,t}$ is a dummy variable which equals one if it is the earning day under investigation (e.g, [-3] for the first column) and zero for all days outside our event window [-20, 20]. All other variables are standardized to a mean of zero and a standard deviation of one. Robust standard errors are clustered by day and t-statistics are reported in parentheses. The slopes on all control variables are reported in Appendix Table A8. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable:	Signed Trading Volume (Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
SD Ret[0,1] (Idio.) * Earnings Day	-0.016**	-0.027***	-0.021***	-0.019**	0.016
	(-2.36)	(-3.88)	(-2.90)	(-2.11)	(1.52)
SD Ret[0,1] (Syst.) * Earnings Day	0.010*	0.014**	0.008	0.009	-0.000
	(1.69)	(2.35)	(1.25)	(1.12)	(-0.00)
ln(Market-Cap) * Earnings Day	-0.007	-0.005	-0.015***	-0.014**	0.010
	(-1.27)	(-0.94)	(-2.62)	(-2.12)	(1.39)
Controls	Yes	Yes	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	3,160,050	3,160,241	3,160,809	3,161,546	3,161,643
Adjusted R^2	0.010	0.010	0.010	0.010	0.010

Table 3: Quarterly Flows, Volatility of Earnings Announcement Returns, and Institutional Trades – Using Transaction Data

The table reports the results from regressions of quarterly flows on the standard deviation of all stock holdings' earnings announcement returns in the portfolio and its interactions with funds' average trades before and after earnings announcements. We use the 331 mutual funds with daily holdings data in the following specification

$$\begin{aligned} Flow_{i,t} =& b_1 * SD\,Ret[0,1]_{i,t-1} + b_2 * SD\,Ret[0,1]_{i,t-1} \times Signed\,Volume[-10,-1]_{i,t-1} \\ &+ b_3 * Signed\,Volume[-10,-1]_{i,t-1} + b_4 * Past\,Ranks_{i,t-1} + b_5 * Past\,Returns_{i,t-1} \\ &+ b_6 * Fund\,Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t}, \end{aligned}$$

where $SD\,Ret[0,1]_{i,t-1}$ is the standard deviation of all holdings' returns on earnings announcement days [0, 1] in fund i's portfolio last quarter. $SignedVolume[-10,-1]_{i,t-1}$ is fund i's average trades of stocks in the ten days before the earnings announcement. The trade of each stock is measured as the signed number of shares traded divided by the average absolute number of shares of this stock traded by fund i in all trading days. Alternatively, we use $\Delta Weight[-10,-1]_{i,t-1}$ as a measure of a fund's trades before earnings announcements, which is the total dollar amounts of stocks shares traded ten days before the earnings announcement as a fraction of the fund's total net assets. $Past\,Ranks_{i,t-1}$ and $Past\,Returns_{i,t-1}$ control for fund performance ranks and returns in the past quarter, half year, year, and three years. $Fund\,Characteristics_{i,t-1}$ include controls for the fund's same-quarter return, age, turnover, expense ratio, ln(TNA), past-year flow volatility, return volatility, and number of stocks in the portfolio. The slopes on all control variables are reported in Appendix Table A9. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable	Quarterly Fund Flow					
	Raw return			FFC 4 factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)
SD Ret[0,1]	-0.178**	-0.148	-0.087	-0.252***	-0.183	-0.154
	(-2.60)	(-1.34)	(-0.82)	(-3.59)	(-1.45)	(-1.25)
SD Ret[0,1] × Signed Volume[-10, -1]		-0.114**			-0.125**	
		(-2.10)			(-2.29)	
SD Ret[0,1] × ΔWeight[-10, -1]			-1.541*			-1.996**
			(-1.69)			(-2.11)
Control variables:						
Signed Volume[-10, -1]		0.018***			0.018***	
		(4.31)			(4.26)	
ΔWeight[-10, -1]			0.235**			0.277***
			(2.54)			(3.23)
Controls for the past ranks	Yes	Yes	Yes	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,840	2,572	2,676	7,620	2,567	2,670
Adjusted R^2	0.135	0.183	0.181	0.135	0.162	0.169

Table 4: Quarterly Flows and the Distribution of Earnings Announcement Returns

The table reports results from a regressions of quarterly flows on the standard deviation of all stock holdings' earnings announcement returns in the portfolio and earnings announcement returns at different percentiles as described in Eq. (19). We use 2,989 U.S. active equity mutual funds with quarterly holdings data for this analysis. $SD\ Ret[0,1]$ is the standard deviation of all holdings' returns on earnings announcement days [0, 1] in a fund's portfolio last quarter. $Highest\ Ret[0,1]/Lowest\ Ret[0,1]$ is the return of the highest/lowest performing stocks during earnings announcement days [0, 1] in the fund's portfolio last quarter. "Pctile X" is the earnings announcement return on days [0, 1] at the X^{th} percentile of all holdings. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. We use as dependent variable quarterly flows in bps and standardize all independent variables to a mean of zero and a standard deviation of one. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable	Quarterly Fund Flow (in bps)										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SD Ret[0,1] (std)	-46.6***										
	(-3.70)										
Lowest Ret[0,1] (std)		39.7***									26.7***
		(4.96)									(3.22)
Pctile 5 (std)			39.2***								5.3
			(3.81)								(0.58)
Pctile 10 (std)				39.7***							14.3
				(3.20)							(0.91)
Pctile 25 (std)					24.5**						2.5
					(2.29)						(0.19)
Pctile 50 (std)						-4.2					-6.5
						(-0.51)					(-0.60)
Pctile 75 (std)							-24.7**				-0.9
							(-2.42)				(-0.08)
Pctile 90 (std)								-35.7***			-6.1
								(-3.40)			(-0.43)
Pctile 95 (std)									-35.2***		-11.7
									(-3.47)		(-1.00)
Highest Ret[0,1] (std)										-14.2**	-7.5
										(-2.32)	(-0.81)
Controls for the past ranks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	61,881	61,881	61,881	61,881	61,881	61,881	61,881	61,881	61,881	61,881	61,881
Adjusted R-squared	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151	0.151

Table 5: Manager Exit and the Distribution of Earnings Announcement Returns

The table reports results from regressions of a manager exit dummy on the standard deviation of all stock holdings' earnings announcement returns in the portfolio and earnings announcement returns at different percentiles as described in Eq.(19), replacing the dependent variable by a dummy variable for manager exit, which equals one if a manager leaves the fund in that quarter and zero otherwise. We use 2,989 U.S. active equity mutual funds with quarterly holdings data for this analysis. $SD\ Ret[0,1]$ is the standard deviation of all holdings' returns on earnings announcement days [0, 1] in a fund's portfolio last quarter. $Highest\ Ret[0,1]/Lowest\ Ret[0,1]$ is the return of the highest/lowest performing stocks during earnings announcement days [0, 1] in the fund's portfolio last quarter. "Pctile X" is the earnings announcement return on days [0, 1] at the X^{th} percentile of all holdings. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. We standardize all independent variables to a mean of zero and a standard deviation of one. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable	Dummy Manager Exit										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SD Ret[0,1] (std)	-0.0010										
	(-0.64)										
Lowest Ret[0,1] (std)		-0.0029*									-0.0052**
		(-1.78)									(-2.41)
Pctile 5 (std)			0.0030*								0.0032
			(1.84)								(1.27)
Pctile 10 (std)				0.0037**							0.0032
				(2.21)							(1.21)
Pctile 25 (std)					0.0027						0.0007
					(1.66)						(0.27)
Pctile 50 (std)						0.0005					0.0007
						(0.34)					(0.37)
Pctile 75 (std)							-0.0020				-0.0029
							(-1.48)				(-1.12)
Pctile 90 (std)								-0.0014			-0.0007
								(-0.89)			(-0.21)
Pctile 95 (std)									-0.0005		0.0016
									(-0.31)		(0.53)
Highest Ret[0,1] (std)										0.0011	0.0009
										(1.04)	(0.43)
Controls for the past ranks	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	58,184	58,184	58,184	58,184	58,184	58,184	58,184	58,184	58,184	58,184	58,184
Adjusted R-squared	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015

Table 6: Trades and Flow Volatility for Hedge Funds and Mutual Funds

The table studies the relationship between flow volatility and trades before and after earnings announcements for hedge funds and mutual funds separately. We estimate Eq. (20), where we use the hedge fund's past 2-year (mutual fund's past year) monthly flow volatility $FlowVol_{i,t}$ as the measure of financial constraint. We standardize $FlowVol_{i,t}$ to a mean of zero and a standard deviation of one. Panel A reports the regression results for hedge funds, and Panel B is for mutual funds. Summary statistics of the quarterly measures of funds' flow volatility both before and after the standardization are reported in the Appendix Table A26. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Panel A: Hedge funds' flow volatility and pre-announcement sales

Dependent Variable:	Signed Trading Volume (Fund-Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
FlowVol × Earning Day	-0.040	-0.064*	-0.228***	-0.038	0.134***
	(-1.17)	(-1.87)	(-6.38)	(-1.27)	(4.15)
FlowVol	-0.008	-0.007	-0.005	-0.006	-0.012
	(-0.58)	(-0.51)	(-0.39)	(-0.46)	(-0.87)
Earning Day	0.003	-0.006	-0.054	0.042	0.013
	(0.10)	(-0.14)	(-1.38)	(1.22)	(0.38)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	80,237	80,366	80,679	82,234	82,750
Adjusted R-squared	0.064	0.064	0.062	0.057	0.056

Panel B: Mutual funds' flow volatility and pre-announcement sales

Dependent Variable:	Signed Trading Volume (Fund-Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
FlowVol × Earning Day	-0.003	-0.018**	-0.021**	-0.000	-0.004
	(-0.38)	(-2.02)	(-2.25)	(-0.00)	(-0.37)
FlowVol	0.016***	0.017***	0.017***	0.017***	0.017***
	(4.19)	(4.19)	(4.20)	(4.23)	(4.21)
Earning Day	-0.027***	-0.047***	-0.053***	-0.036***	0.027***
	(-2.66)	(-4.80)	(-5.41)	(-3.54)	(2.66)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1,107,006	1,106,910	1,108,413	1,123,169	1,128,079
Adjusted R^2	0.01	0.01	0.01	0.01	0.01

Table 7: Earnings Announcement Premium and Institutional Order Flow

The table reports the DGTW abnormal returns (AR) on earnings announcement day 0 by institutional trades' quintiles in the [-10, -1] window. Each quarter, all stocks are sorted into institutional trades quintiles based on the aggregate institutional trades in days [-10, -1] before their earnings announcements. Quintile 1 holds the stocks with the largest institutional sales and quintile 5 those with the largest institutional purchases. Institutional trades are measured as a percentage of total shares outstanding. Panel A reports DGTW abnormal returns. "1-5" is for the difference between quintile 1 and 5. The placebo is based on institutional trades' quintiles formed using normal days outside the $[-20, 20]$ event window. Panel B reports the results based on Fama-French-Carhart 4 factor alphas. All averages are equally weighted. Summary statistics are reported in Panel C. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

	Quintiles of Institutional Trades [-10, -1]					
	1 (sell)	2	3	4	5 (buy)	1 − 5
Panel A: DGTW cumulative abnormal returns on day 0 (in %)						
AR[0]	0.27***	0.23***	0.18***	0.11***	0.07**	0.21***
	(6.74)	(5.16)	(3.27)	(3.55)	(2.03)	(3.94)
Placebo	0.03***	0.01**	0.01*	0.01***	0.02***	0.01**
	(5.85)	(2.09)	(1.86)	(5.45)	(5.38)	(2.02)
Panel B: Fama-French-Carhart 4 factor CARs on day 0 (in %)						
AR[0]	0.22***	0.20***	0.21***	0.11***	0.04	0.18***
	(5.77)	(5.16)	(3.50)	(3.29)	(1.31)	(3.81)
Panel C: Institutional trades in [-10, -1] (% of shares outstanding)						
trades [-10, -1]	-0.75	-0.06	0.00	0.08	0.70	
Placebo	-0.76	-0.05	0.00	0.10	0.79	

A Appendix

A.1 Identification of Hedge Funds and Mutual Funds in the Ancerno Data

Although Ancerno's clients, mainly pension funds and money managers, are always anonymous, we follow the procedure in Cotelioglu et al. (2021) to identify asset management companies, which operate primarily mutual funds and hedge funds, whose names we observe. An identifier (the variable *managercode*) denotes the trades originating from the same management company. Corresponding to the company identifier, we are given the name of the management company to which the trade pertains (the variable *manager*). This variable is crucial for our identification of hedge funds. In particular, we identify hedge funds by matching the names of the management companies to two sources. The first source is a list of hedge funds that is based on quarterly 13F mandatory filings. This source is also used in Ben-David et al. (2012) and is based on the combination of a Thomson Reuters proprietary list of hedge funds, ADV filings, and industry listings. The second source is the combined data from three commercial databases – the Lipper/TASS Hedge Fund Database, Morningstar CISDM, and Hedge Fund Research – which contain hedge-fund-level information at the monthly frequency. In the identification process, we make sure to select exclusively "pure-play" hedge fund management companies, that is, institutions whose core business is managing hedge funds. This is done by applying the same criteria as in K. Brunnermeier and Nagel (2004) and by manual verification. In the end, the matching procedure allows us to identify 99 distinct hedge fund management companies that are present in Ancerno at various times throughout the sample.

We single out mutual funds residually as the managers that are not hedge funds or pension funds. To identify pension funds, we use the *clienttype* variable, as done in e.g. Puckett and Yan (2011). In some instances, this classification might be incorrect – for example, when the client is a pension fund, but the trades are executed by a mutual fund on its behalf. Therefore, we also perform a manual match of the Ancerno manager name with S12 mandatory filings data. Based on this procedure, we identify 417 distinct mutual fund managing companies for our analysis. In part of our analysis, we use the variable *clientmgrcode* in Ancerno to identify an individual fund within a management company, and we aggregate the trades of each stock by each fund per day (at the fund-stock-day level) for that analysis.

A.2 Mutual Fund Holdings Communications

As written in the main text, U.S. mutual funds report their second and fourth fiscal quarter ends' holdings in the N-CSR form, no later than 10 days after quarter end. The first- and third quarter-end holdings are reported in the N-PORT form no later than 60 days after quarter end. They mention specifically whether they were holding some worse and best performing stocks in the corresponding period and whether they keep holding it at the end of this period. The majority of mutual fund families, e.g. Fidelity, report their holdings monthly in Morningstar. More importantly, funds also communicate with their clients about their portfolio holdings through informal channels upon their requests.

Below we report extracts from the Statements of Additional Information (SAI) as well as the Annual Report (Form N-CSR) detailing how the funds communicate their holdings information to third parties. The main upshot of this information is that investors can learn about the fund's holdings more frequently and more timely than the mandatory quarterly reports with their associated delays.

As a first case study, we focus on the Fidelity Magellan Fund (ticker: FMGKX), which in its SAI dating of May 29, 2021, reports:

The fund will provide a full list of holdings, including its top ten holdings, monthly on www.fidelity.com 30 days after the month-end (excluding high income security holdings, which generally will be presented collectively monthly and included in a list of full holdings 60 days after its fiscal quarter-end) [...]

The fund may also from time to time provide or make available to the Board or third parties upon request specific fund level performance attribution information and statistics [which] may include (i) the allocation of the fund's portfolio holdings...

(and italics below): We also report "Management's Discussion of Fund Performance" in the Annual Report (Form N-CSR) of Fidelity Magellan Fund, dating of August 31, 2021:

Comments from Portfolio Manager Sammy Simnegar:

For the fiscal year ending March 31, 2022, the fund gained 12.29%, trailing the 15.65% advance of the benchmark S&P 500 index. Versus the benchmark, security selection was the primary detractor, although a complete lack of exposure to the market-leading energy sector was the single biggest headwind for relative performance. Picks among information technology and consumer discretionary stocks also hindered the fund's relative result. Not owning Tesla, a benchmark component that gained about 61%, was the biggest individual relative detractor. ***The fund's non-benchmark stake in DocuSign, a position not held at period end, returned approximately -47%. Also hampering performance was our overweighting in Visa, which returned about -11% and was one of our largest holdings at period end.*** *In contrast, the largest contributor to performance versus the benchmark was an overweighting in information technology. Investment choices in consumer staples also helped, as did an overweighting in the communication services sector, where both avoiding the lagging telecommunication services segment and overweighting the media & entertainment industry helped.* ***The fund's top individual relative contributor was an outsized stake in Nvidia, which gained roughly 105% the past year. The company was among our biggest holdings. Also boosting value was our overweighting in Fortinet, which gained about 85%. Another notable relative contributor was an outsized stake in Costco Wholesale (+65%), which was one of our largest holdings as of March 31.*** *Notable changes in positioning include reduced exposure to the communication services sector and a higher allocation to health care stocks.*

As a second case study, we report extracts of the SAI of Applied Finance's Core, Explorer, Select Funds (tickers: AFALX, AFDVX, AFVLX, respectively), dating of August 31, 2021:

...From time to time, employees of the Adviser may express their views orally or in writing on the Funds' portfolio securities or may state that the Funds have recently purchased or sold, or continues to own, one or more securities. The securities subject to these views and statements may be ones that were purchased or sold since the Funds' most recent quarter-end and therefore may not be reflected on the list of the Funds' most recent quarter-end portfolio holdings. These views and statements may be made to various persons, including members of the press, brokers and other financial intermediaries that sell shares of the Funds, shareholders in the Funds, persons considering investing in the Funds or representatives of such shareholders or potential shareholders, such as fiduciaries of a 401(k) plan or a trust and their advisers, and other entities for which the Adviser may determine. The nature and content of the views and statements provided to each of these persons may differ. From time to time, employees of the Adviser also may provide oral or written information ("portfolio commentary") about the Funds, including, but not limited to, how the Funds' investments are divided among various sectors, industries, countries, investment styles and capitalization sizes, and among stocks, bonds, currencies and cash, security types, bond maturities, bond coupons and bond credit quality ratings. This portfolio commentary may also include information on how these various weightings and factors contributed to Fund performance. The Adviser may also provide oral or written information ("statistical information") about various financial characteristics of the Funds or their underlying portfolio securities including, but not limited to, alpha, beta, R-squared, coefficient of determination, duration, maturity, information ratio, Sharpe ratio, earnings growth, payout ratio, price/book value, projected earnings growth, return on equity, standard deviation, tracking error, weighted average quality, market capitalization, percent of debt to equity, price to cash flow, dividend yield or growth, default rate, portfolio turnover, and risk and style characteristics. This portfolio commentary and statistical information about the

Funds may be based on the Funds' portfolios as of the most recent quarter-end or the end of some other interim period, such as month-end. The portfolio commentary and statistical information may be provided to various persons, including those described in the preceding paragraph. The nature and content of the information provided to each of these persons may differ...

A.3 Institutional Market Participation around Earnings Announcements

Another relevant dimension of institutional behavior is market participation around these events. In Figure A5, we study unsigned trading volume at the stock level as a fraction of the volume in the prior six months. The analysis replicates the specification in Eq. (3), replacing the dependent variable with the fraction of overall daily volume—i.e., $Buys+Sells$—divided by the average of the numerator in the prior six months. We find a significant reduction in trading volume of up to 5% two days before the announcement. Then, volume rises on the day of the announcement and it spikes on day 1 with an increase of 90% relative to the days outside of the window. It remains at abnormal levels in the following two weeks. The conclusion is that institutions withdraw from the market (i,e., they trade less) ahead of announcements, which is consistent with the previous result that they reduce exposure to the announcing stocks.

The evidence in Figure A5 is consistent with the findings in Frazzini and Lamont (2007), who show that abnormal volume across all investors decreases ahead of earnings announcements and rises from the day of the announcement. This evidence is also consistent with the finding in Zhu (2020) that the stock market volume decreases in anticipation of FOMC announcements and increases afterward. Finally, the finding of a decrease in trading volume is consistent with theories positing that, around the release of earnings, information asymmetry goes up (Kim and Verrecchia, 1994) and *uninformed* traders withdraw from the market. Thus, uninformed investors abstain from trading during these periods to avoid being adversely selected.

A.4 Cross-sectional Risk-Return Tradeoff

From the time-series evidence, it appears that institutional trading behavior neglects the better risk-return tradeoff that stocks provide before earnings announcement. We ask, therefore, whether this attitude is present when looking at the cross section of stocks. In particular, we estimate the following specification:

$$\begin{aligned} trades_{j,t} =& a + b_1 * Info\,Ratio[0,1]_{j,t} \times EarningDay_{j,t} \\ &+ b_2 * ln(MarketCap)_{j,t} \times EarningDay_{j,t} \\ &+ b_3 * Info\,Ratio[0,1]_{j,t} + b_4 * ln(MarketCap)_{j,t} + b_5 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{j,t}, \end{aligned} \tag{21}$$

where $trades_{j,t}$ is defined as in Eq. (1). $Info\,Ratio[0,1]_{j,t}$ is the information ratio of stock j's returns during earnings announcements days [0,1] calculated as the average cumulative abnormal returns of stock j on these two days based on Fama-French-Carhart 4 factor model divided by the standard deviation $SD\ Ret[0,1]\ (Idio.)_{j,t}$ using the data in the past five years. The summary statistics of the variables in this regression are reported in Table 1.

As shown in Table A5, there is no evidence that institutions increase their order flow on stocks with high information ratios during earnings announcements in the three days before the earnings announcements. The evidence strengthens the puzzle suggesting that institutional trades do not pursue the best risk-return tradeoff ahead of earnings announcements. We obtain similar results using Sharpe ratios instead of information ratios.

A.5 Daily Flows after A Strongly Negative Realization of Earnings Announcement Returns

To obtain a closer description of investor reaction to the realization of holding returns, we study daily fund flows. Morningstar Direct reports daily fund TNAs from 2008 July the 11th to 2013 November the 1st for a subset of mutual funds in our sample. We merge this data with the CRSP Mutual Fund Database for daily returns and portfolio holdings from Thomson Reuters. We end up with 1,497 mutual funds for which we can calculate daily fund flows. The percentage daily flows are estimated as in Eq.(17) using daily returns and TNAs.

Then, we measure abnormal fund flows using the following regression, which is run separately for each day within the event window [-20, 100] around the earnings announcement:

$$\begin{aligned} Flow_{i,t} =& a_i + b_1 * EventDay_{i,t} + b_2 * Past\ Ranks_{i,t-1} + b_3 * Past\ Returns_{i,t-1} \\ &+ b_4 * Fund\ Characteristics_{i,t-1} + b_6 * QtoD\ Ret_{i,t} + b_5 * Ret_{i,t} + \eta_t + \varepsilon_{i,t}, \end{aligned} \tag{22}$$

where $Flow_{i,t}$ is the daily flow of fund i on day t. Variable $EventDay_{i,t}$ equals one for the event days under investigation (e.g., day [-1]) and zero for days outside the event window [-20, 100]. That is, we use the daily fund flows on days outside the event window [-20, 100] as the baseline. We control for both fund fixed effect a_i and day fixed effect η_t in this regression, as well as all the control variables about funds' past return, return ranks, and other characteristics in the last quarter. In addition, we add funds' quarter-to-date returns $QtoD\ Ret_{i,t}$ and returns on the same day $Ret_{i,t}$ into the control variables. We only include mutual funds holding at least 30 stocks at the end of previous quarter into our analysis. We denote the fund flows that are lower than the baseline as abnormal fund outflows, and those higher than the baseline as abnormal fund inflows. When calculating the weekly abnormal fund flows, we do the regression of daily fund flows in Eq. (22) once for every five consecutive event days together to calculate the average daily abnormal fund flows in these five days (coefficient $\hat{b}_1$) and multiply this number by five for weekly abnormal fund flows.

For the analysis of abnormal daily fund flows around a strongly negative earnings announcement return, all days within the event window [-20, 100] of this earnings announcement day are set as event days (i.e., $EventDay_{i,t}$ equals one for each of these event days in a separate regression and zero for days outside this event window). For each fund, we find the lowest earnings announcement return in that fund's portfolio, and we sort the lowest earnings announcement returns of all the funds into quintiles in each quarter. We define a strongly negative earnings announcement return as the lowest earnings announcement return in the lowest quintile.

As shown in Figure A8, there are already significant abnormal fund outflows in the first week (on day 0 as well) after a strongly negative earnings announcement return, suggesting that a small group of investors react instantly after this event. The majority of investors react within three to 17 weeks after this event, and the effect becomes smaller thereafter. These results are consistent with our conjecture that a small group of investors pay close attention to funds' holding performance (or have constant communicate with fund managers through informal channels), whereas the majority of investors get this information with a delay from either the social media or regular reports of mutual funds. The total abnormal outflow within 20 weeks amounts to 0.54% of fund total net assets, which is similar to the estimates based on monthly flows in Table A20 and quarterly flows in Table A14. The abnormal fund outflows peaks in week 15 in Figure A8, which is also consistent with the peak in four month in Table A20.

A.6 Implied Volatility Spikes

Scheduled announcements correspond to anticipated spikes in volatility. To understand the extent to which predictably higher volatility plays a role in explaining our findings, we extend the main analysis of the paper to all situations in which expected volatility increases.

To this purpose, we use the OptionMetrics database to construct a measure of anticipated spikes in short term volatility. Specifically, we create the variable "Dummy dif 10-30", which equals one if the 10-day implied volatility is more than 15% (95^{th} percentile) higher than the 30-day implied volatility. This measure captures the short-term implied volatility spikes relative to the long-term implied volatility. Regressing our stock-day level measure of institutional trades (as described in Eq. (A2)) on the one-day lag of this dummy variable for spikes in short-term implied volatility, and controlling for stock fixed effects, we find that institutions decrease their order flow, on average, by 5.5% of their average daily trading volume one day after a spike in 10-day implied volatility relative to the 30-day implied volatility. This result, reported in column (1) of Table A6, is robust to controlling for lagged institutional trades and the levels of 30- and 10-day implied volatility (as in column (2)).

We also generate the variable "Dummy IV shock 30", which equals one if the 30-day implied volatility today is more than 43% higher than its past six-month trailing average (95^{th} percentile), and zero otherwise. As reported in column (3) of Table A6, institutions decrease order flow, on average, by 5.8% of their average daily trading volume one day after a $95^t h$ percentile spike in 30-day implied volatility.

Table A7 shows the results based on levels of implied volatility to be consistent with, but less significant than, the results based on the dummy variables for volatility spikes.

A.7 Flow-Performance Sensitivity to the Lowest Performing Holding: Model

The empirical evidence in Table 4 suggests that the holding-level FPS loads mainly on the return of the lowest performing stock during earnings announcements. To accommodate this evidence, we introduce the flow-performance sensitivity to the lowest performing stock (FPS to the lowest) into our benchmark setting. In particular, we modify Eq. (8) and assume that the fund flow in dollar also depends on the earnings announcement return of the lowest performing stock in the portfolio, which is denoted as stock l

$$flow = \rho \left(h'r + \Delta x' r^e \right) + \eta \left(h_l \varepsilon_l^e + \Delta x_l \varepsilon_l^e \right), \tag{23}$$

where parameter $\eta > 0$ captures the flow-performance sensitivity to the earnings announcement return shock of the lowest performing stock in the portfolio ε_l^e. Eq. (23) shows that $flow$ is an increasing function of the product of trading amount Δx_l and ε_l^e after controlling for the fund-level FPS. Therefore, Eq. (23) gives a direct hypothesis for the empirical test of our new assumption (FPS to the lowest) as follows:

Hypothesis 3 *The earnings announcement return of the lowest performing stock in a fund's portfolio positively correlates with its next-quarter fund flows.*

The parameter Δx_l in the second parenthesis further indicates that

Hypothesis 4 *Purchases of the lowest performing stock before its earnings announcement strengthen its effect on fund flows.*

Then the change in fund size q becomes

$$\Delta q = (1+\rho)\left(h'r + \Delta x' r^e\right) + \eta\left(h_l \varepsilon_l^e + \Delta x_l \varepsilon_l^e\right) - \frac{1}{2}\lambda \Delta x' \Delta x, \tag{24}$$

and the maximization problem becomes

$$\max_{\Delta x_j} E(\Delta q) = (1+\rho)\left(h'\alpha_0 + \Delta x'\alpha^e\right) + \sum_j Pr(j=l)\eta(h_j + \Delta x_j)E(\varepsilon_j^e | j=l) - \frac{1}{2}\lambda\Delta x'\Delta x. \tag{25}$$

Under the assumption that ε_j^e is normally distributed and that the volatility of ε_j^e is σ^2 for all stocks, $Pr(j=l) = \frac{1}{n}$, and $E(\varepsilon_j^e | j=l) = \sigma E_n$.[42] Chen and Tyler (1999) show that E_n is well approximated by $\Phi^{-1}(0.5264^{1/n})$, where Φ^{-1} is the inverse of the standard normal cumulative distribution function.[43] Taking the F.O.C with respect to each Δx_j gives

$$\Delta x_j^* = \frac{\alpha^e(1+\rho) - \frac{1}{n}\eta\sigma E_n}{\lambda}. \tag{26}$$

Therefore, *a fund chooses to reduce, rather than increase, its exposure before earnings announcement if and only if its concern of potential outflows associated with strongly negative earnings announcement returns dominates the benefit of the announcement premium.*

Since the average announcement premium α^e is as large as 70 bps in ten days, the opportunity costs of not increasing the exposure before earnings announcement is substantial. Similar to the model in Section 6.1, Eq. (26) shows that the optimal trading amount Δx_j^* is a decreasing function of the volatility of individual stocks σ. Thus, the model delivers the result that motivated its construction. In particular, institutional order flow before

[42]For simplicity, we assume the volatility of ε_j^e has the same value σ^2 for all the stocks. We later release this assumption for analyses across stock holdings.

[43]For $n \geq 10$ the approximation error falls below 1% as documented in Chen and Tyler (1999). Another approximation is $E_n \approx \sqrt{2log(n)}$ which is simpler but less accurate than the previous one.

earnings announcements decreases with the stock's idiosyncratic volatility during earnings announcements (see Table 2).

A.8 Flow-Performance Sensitivity to the Lowest Performing Stock Holding

Next, we test Hypotheses 3 and 4 using the sample of 2,989 U.S. active equity mutual funds with quarterly holdings data. In particular, we regress quarterly flows on the returns of the lowest performing stocks during earnings announcement days [0, 1] in the fund's portfolio last quarter (variable $Lowest\,Ret[0,1]$) and its interaction term with the change of portfolio weight of the lowest performing stock (variable $\Delta Weight_{i,t-1}$).

$$\begin{aligned} Flow_{i,t} =& b_1 * Lowest\ Ret[0,1]_{i,t-1} \\ &+ b_2 * Lowest\ Ret[0,1]_{i,t-1} \times \Delta Weight_{i,t-1} \\ &+ b_3 * Lowest\ Ret[0,1]_{i,t-1} \times Weight_{i,t-1} \\ &+ b_4 * \Delta Weight + b_5 * Weight \\ &+ b_6 * Past\ Ranks_{i,t-1} + b_7 * Past\ Returns_{i,t-1} \\ &+ b_8 * Fund\,Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t}, \end{aligned} \tag{27}$$

We calculate $\Delta Weight_{i,t-1}$ as the number of shares traded last quarter multiplied by the price of that stock at the beginning of last quarter divided by the assets under management of fund i at the beginning of last quarter to capture the quarterly net trade in the stock. $Weight_{i,t-1}$ is the portfolio weight of the lowest performing stock at the beginning of last quarter.

As shown in column (1) of Table A15, the return of the lowest performing stock during earnings announcement days has a significant effect on the fund flows in the following quarter. In terms of magnitude, a one-standard-deviation decrease (-11.4% from Panel B of Table A1) in the earnings announcement return of the lowest performing stock leads to an additional fund outflow of -0.40% per quarter. This effect on fund flows is substantial considering that it reflects the performance of just one stock in the fund's portfolio during the earnings announcement. For comparison, if we regress the quarterly fund flows on the fund's last quarter return, we get a flow-performance sensitivity of 0.20, that is, a one-standard-deviation decrease (-11.4%) in the fund's quarterly return leads to a fund outflow of -2.21% in the next quarter. This evidence validates Hypothesis 3.

As shown in column (2) of Table A15, we find that a one-standard-deviation decrease in $\Delta Weight_{i,t-1}$ (0.8% as reported in Panel B of Table A1) decreases the coefficient of *Lowest Ret*$[0,1]$ by 0.015, which is about 43% the unconditional effect of *Lowest Ret*$[0,1]$ on fund flow (0.035 as reported in column (1)). That is, less purchases (or more sales) of the lowest performing stock in the same quarter substantially reduce the effect of lowest performing stock on fund outflows. In contrast, the portfolio weight of the lowest performing stock $Weight_{i,t-1}$ at the beginning of the quarter does not have a significant effect, suggesting that the FPS to the lowest is more sensitive to the amounts traded than held at the beginning. These findings hold as well using the Fama-French-Carhart 4 factor alpha (column (4) to (6)). This evidence supports Hypothesis 4.

In Table A16, we provide a more precise quantification of the effect of *Lowest Ret*$[0,1]$ on fund flows by double sorting. In brief, we find that funds in the bottom quintile of *Lowest Ret*$[0,1]$ have lower flows by 1.08% per quarter. This effect is substantial as it reduces management fee revenues, which is the product of fund assets under management and percentage fee, by 4.32% (=1.08%*4) in a year. The double sorting results in Table A16 also support Hypothesis 3. The effect of *Lowest Ret*$[0,1]$ on fund flows is statistically significant for the funds that *increase* their exposure to the lowest performing stocks in the last quarter (as reported in Panel C of Table A16). In contrast, it is insignificant for the funds that *reduce* their exposure to the lowest performing stocks in the last quarter (as reported in Panel B of Table A16). The comparison between Panels B and C provides support for Hypothesis 4

To investigate this channel more closely, we focus on the 331 U.S. active equity mutual funds for which we have both daily transactions and fund flows. We adjust regression (27) as follows to distinguish trades before and after earnings announcements:

$$
\begin{aligned}
Flow_{i,t} = \quad & b_1 * Lowest\ Ret[0,1]_{i,t-1} \\
& + b_2 * Lowest\ Ret[0,1]_{i,t-1} \times Trades\ Lowest[-10,-1]_{i,t-1} \\
& + b_3 * Lowest\ Ret[0,1]_{i,t-1} \times Trades\ Lowest[0,10]_{i,t-1} \\
& + b_4 * Trades\ Lowest[-10,-1]_{i,t-1} + b_5 * Trades\ Lowest[0,10]_{i,t-1} \\
& + b_6 * Past\ Ranks_{i,t-1} + b_7 * Past\ Returns_{i,t-1} \\
& + b_8 * Fund\ Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t},
\end{aligned} \tag{28}
$$

where $Trades\ Lowest[-10,-1]_{i,t-1}$ is fund i's trades of the lowest performing stock in the ten days before the earnings announcement, measured as the signed number of shares traded divided by the average absolute number of shares of the stock traded by fund i in all trading days, and $Trades\ Lowest[0,10]_{i,t-1}$ is fund i's trades of the lowest performing stock on the earnings announcement day and the following ten days. The sample size for this analysis being small, we keep only the most significant control variables from the previous setting. For $Past\ Ranks_{i,t-1}$ and $Past\ Returns_{i,t-1}$, we keep fund performance ranks and returns in the past quarter and three years; for $Fund\ Characteristics_{i,t-1}$, we keep the fund's same-quarter return, age, and past-year flow volatility.

The main finding in Table A17 is that reducing the exposure to the lowest performing stock in the ten-day window before the announcement is successful in stemming the fund outflows that are triggered by the negative returns. In contrast, trades occurring in the ten days after the announcement do not have an effect on these outflows. In column (2), we find that a one-standard-deviation decrease in $Trades\ Lowest[-10,-1]_{i,t-1}$ (-3.0 as reported in Panel B of Table A1) decreases the coefficient of $Lowest\ Ret[0,1]$ by -0.048, which is about half the unconditional effect of $Lowest\ Ret[0,1]$ on fund flow (0.087 as reported in column (1)). That is, sales in the ten days before earnings announcements substantially reduce fund outflows caused by the lowest performing stocks, whereas sales on the same day of earnings announcements and the following ten days do not have such an effect (as shown in column (3)).

A.9 The Model Based On Portfolio Weights

In this section, we write our model as a function of the change in portfolio weight. Dividing both sides of Eq. (8) by fund size q gives the fund flow as a percentage of fund size q as:

$$flow = \rho\left(w'r + \Delta w' r^e\right) + \eta \sum_j [(w_j + \Delta w_j) g(\varepsilon_j^e)], \tag{29}$$

The change in fund size q in Eq. (11) becomes

$$\Delta q = (1+\rho) q \left(w'r + \Delta w' r^e\right) - \eta \sum_j [(w_j + \Delta w_j) q (\varepsilon_j^e)^2] - \frac{1}{2}\lambda \Delta w' \Delta w q^2, \tag{30}$$

where Δw is a vector for changes in stocks' portfolio weights before their earnings announcements. A fund chooses Δw that maximize the expected increase in revenue. So Eq. (13) becomes

$$\max_{\Delta x} E(\Delta q) = (1+\rho) q \left(w'\alpha_0 + \Delta w' \alpha^e\right) - \eta \sum_j [(w_j + \Delta w_j) q \sigma_j^2] - \frac{1}{2}\lambda \Delta w' \Delta w q^2. \tag{31}$$

Taking the derivative with respect to each Δw_j gives the F.O.C.

$$\Delta w_j^* = \frac{\alpha_j^e (1+\rho) - \sigma_j^2 \eta}{\lambda q}. \tag{32}$$

As before, this result indicates that a fund chooses to reduce, rather than increase, its exposure before earnings announcement if and only if its concern of potential outflows associated with extreme earnings announcement realizations dominates the benefit of unconditional premium.

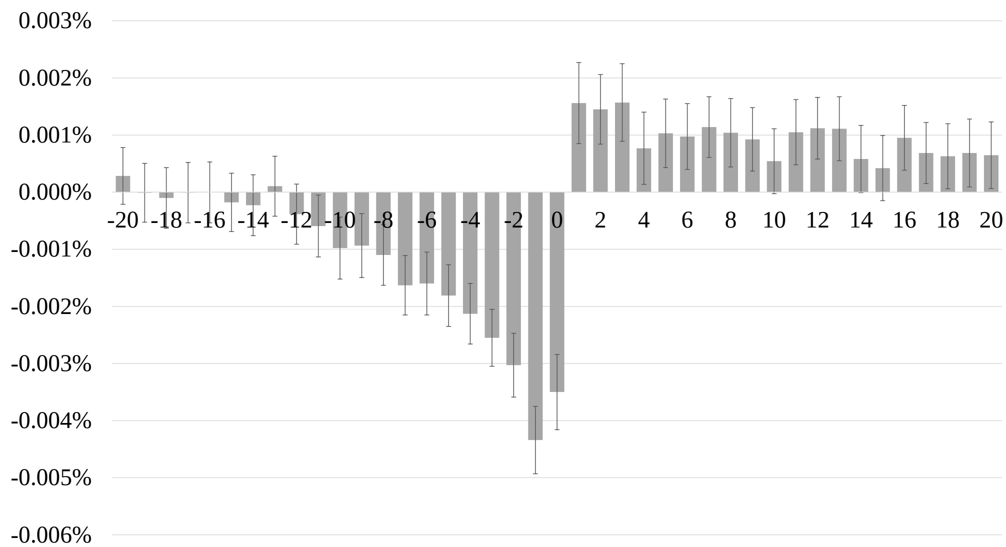


Figure A1: Abnormal Institutional Trades around Earnings Announcement Days (% of total of shares outstanding)

The figure plots institutions' abnormal trading amounts around firms' earnings announcements. The event window is [-20, 20], that is from 20 days before to 20 days after. The trading amount is measured as the net number of shares traded as a percentage of the total number of shares outstanding. The abnormal trading amount is calculated as the differences between event days and non-event days outside the event window using regression (3). The 95% confidence intervals are reported.

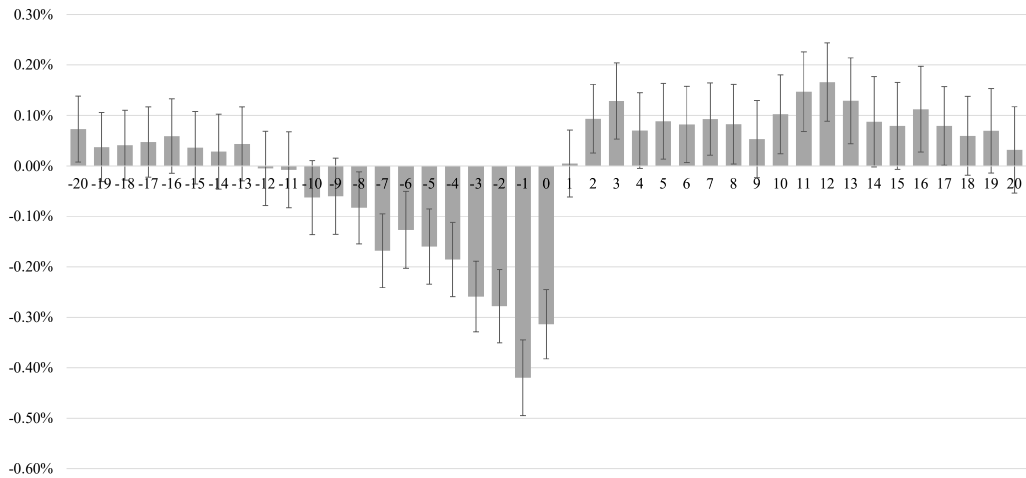


Figure A2: Abnormal Institutional Trades around Earnings Announcement Days (% of total trading volume in CRSP)

The figure plots institutions' abnormal trading amounts around firms' earnings announcements. The event window is [-20, 20], that is from 20 days before to 20 days after. The trading amount is measured as the net number of shares traded as a percentage of the total trading volume in CRSP. The abnormal trading amount is calculated as the differences between event days and non-event days outside the event window using regression (3). The 95% confidence intervals are reported.

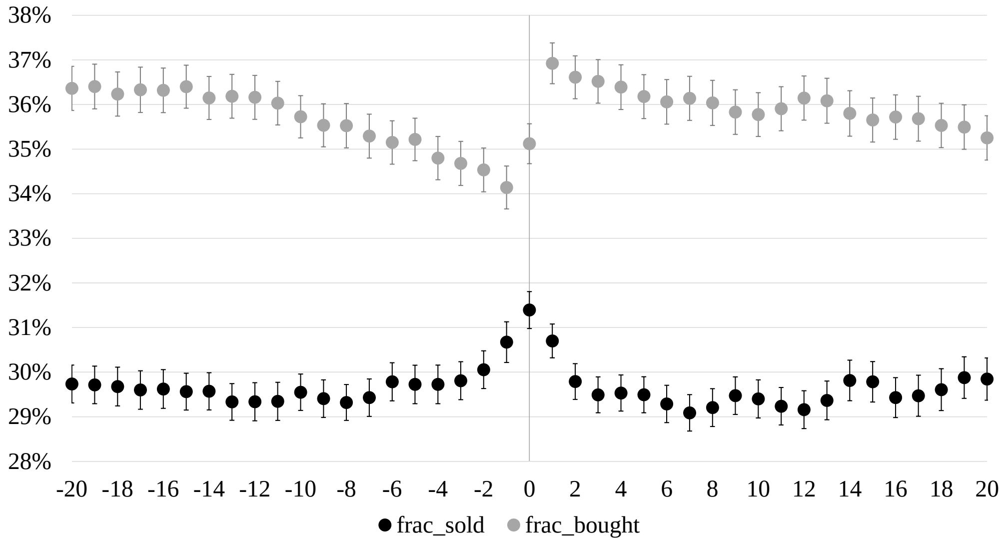


Figure A3: Fractions of Net Purchases and Sales around Earnings Announcement Days

The figure plots the average fractions of stocks with net institutional purchases and sales around earnings announcement days as a percentage of the total number of stocks every quarter. The 95% confidence intervals are based on standard errors clustered by day.

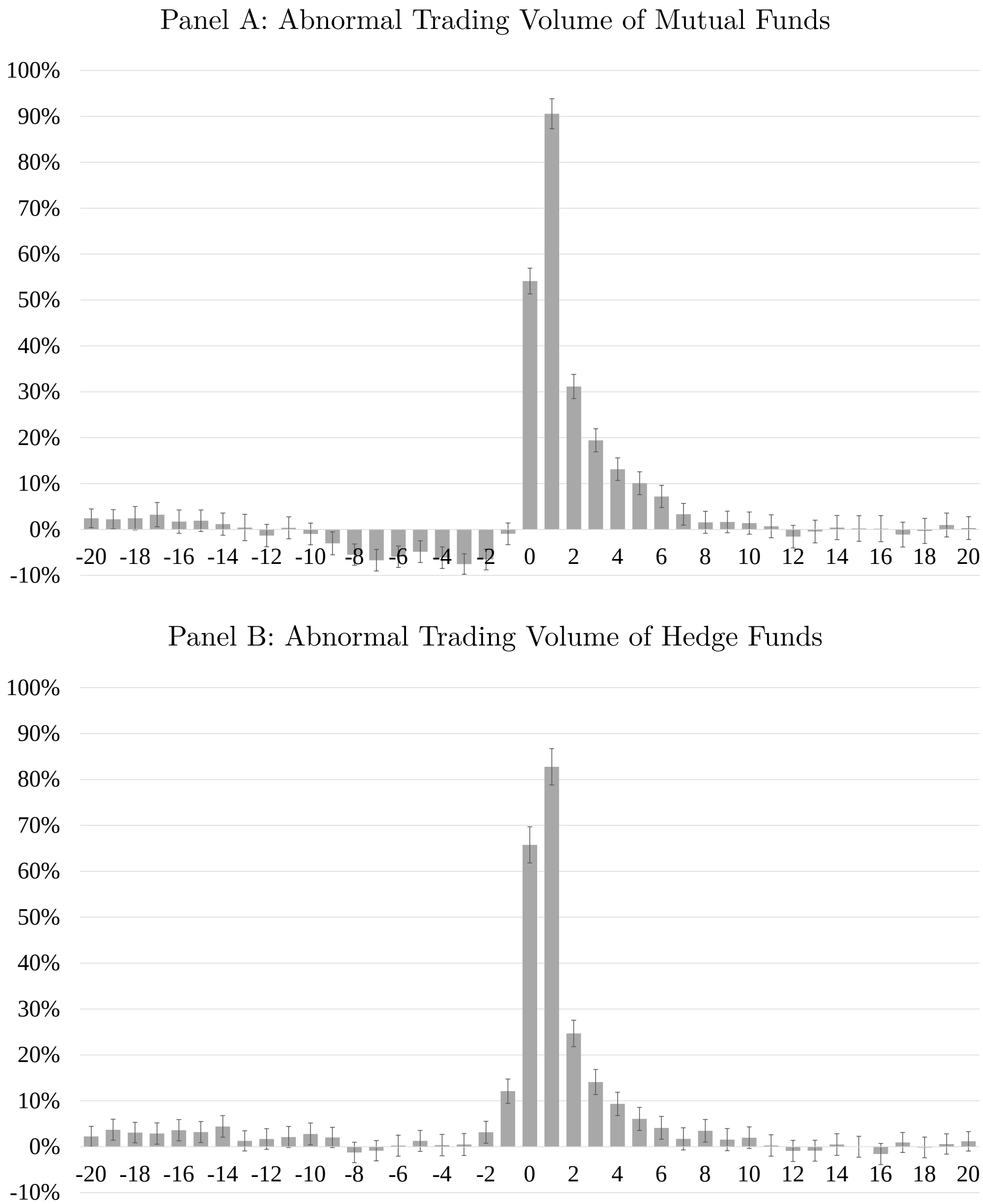


Figure A4: Trading Volume of Mutual and Hedge Funds around Earnings Announcements

The figure plots mutual and hedge funds' total abnormal trading volume (including both purchases and sales) around firms' earnings announcements. The event window is [-20, 20], that is from 20 days before to 20 days after. Panel A reports the total number of shares traded on each day for all mutual funds in the Ancerno database in the aggregate as a percentage of the average total number of shares traded per day on the same stock in the past six months before the event window as in Eq. (1). The abnormal trading amount is calculated as the differences between event days and non-event days outside the event window using regression (3). Panel B reports the results of hedge funds. The 95% confidence intervals are reported.

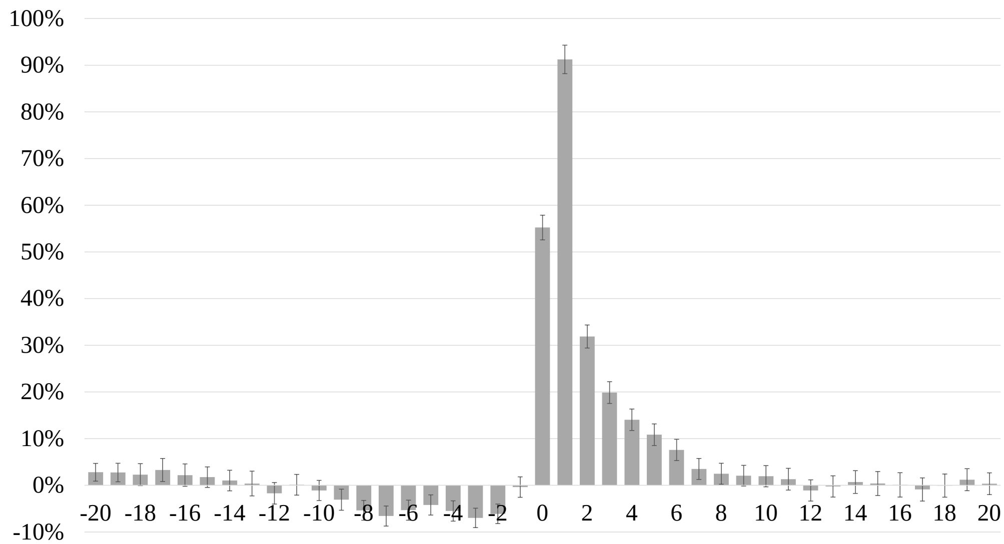


Figure A5: Abnormal Institutional Trading Volume around Earnings Announcement Days

The figure reports the total abnormal trading volume including both purchases and sales. The 95% confidence intervals are reported.

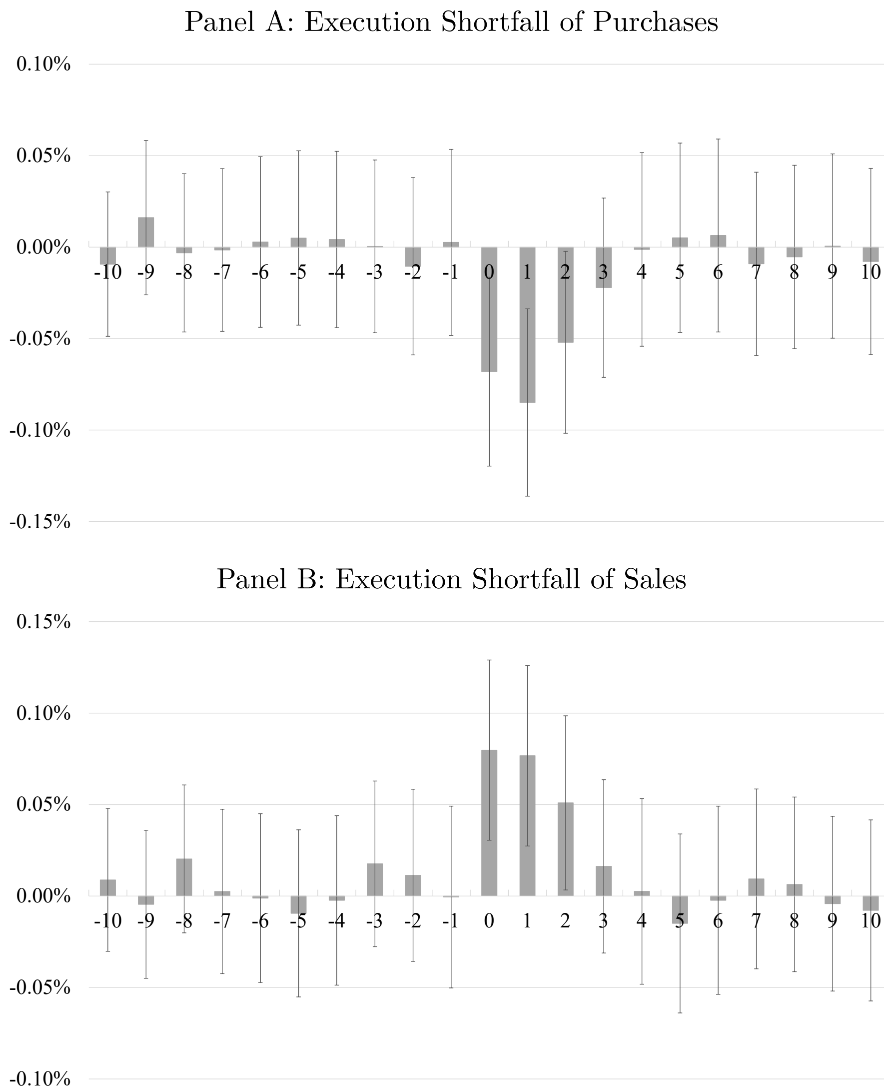


Figure A6: Execution Shortfall around Earnings Announcement Days

The figure reports the abnormal execution shortfall, which is a measure of price impact, of institutional purchases and sales separately. The execution shortfall of trades is calculated as $ES_{i,t} = D_{i,t}\frac{P^e_{i,t}-P^0_{i,t}}{P^0_{i,t}}$, where $D_{i,t}$ is 1 for buys and -1 for sells. $P^0_{i,t}$ is the stock price at order placement, and $P^e_{i,t}$ is the order's actual execution price. If you buy (sell) at a price $P^e_{i,t}$ higher (lower) than $P^0_{i,t}$, the price impact costs of this trade measured by $ES_{i,t}$ is positive. Following Anand et al. (2013), we drop the execution shortfalls with an absolute value larger than 10% from our analysis. The abnormal execution shortfall each day is calculated in the same way as Eq.(3), using $ES_{i,t}$ as the dependent variable instead. The 95% confidence intervals are reported.

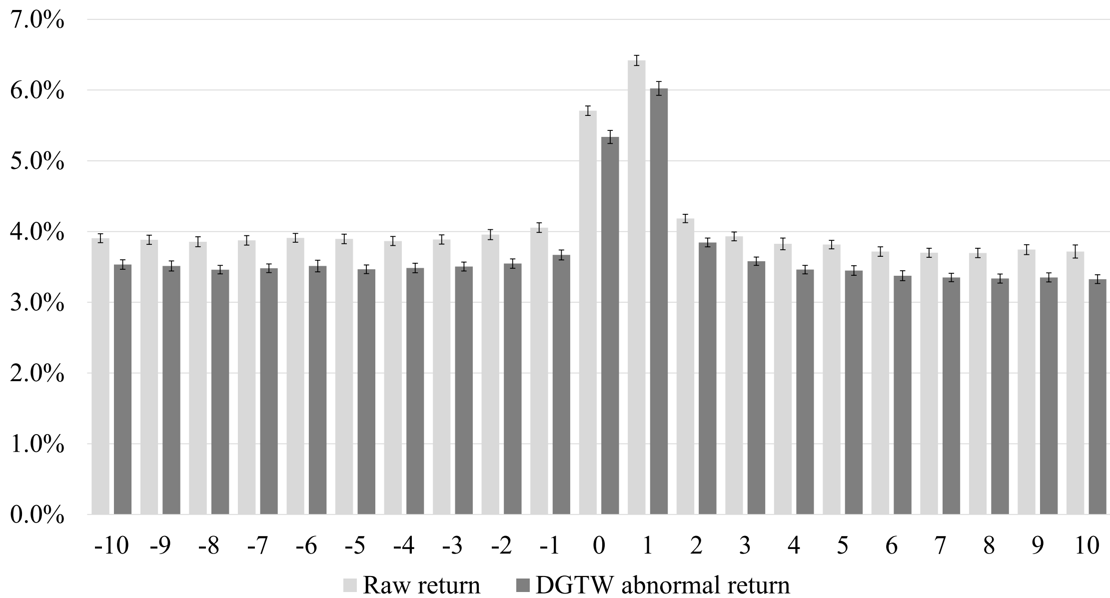


Figure A7: Standard Deviation of Daily Returns around Earnings Announcements

The figure plots the standard deviation of daily returns in the 20 days around earnings announcements. We first calculate the standard deviation of daily returns across all the earnings announcements for each quarter. We report the mean of these standard deviations across quarters. The 95% confidence intervals are calculated across quarters.

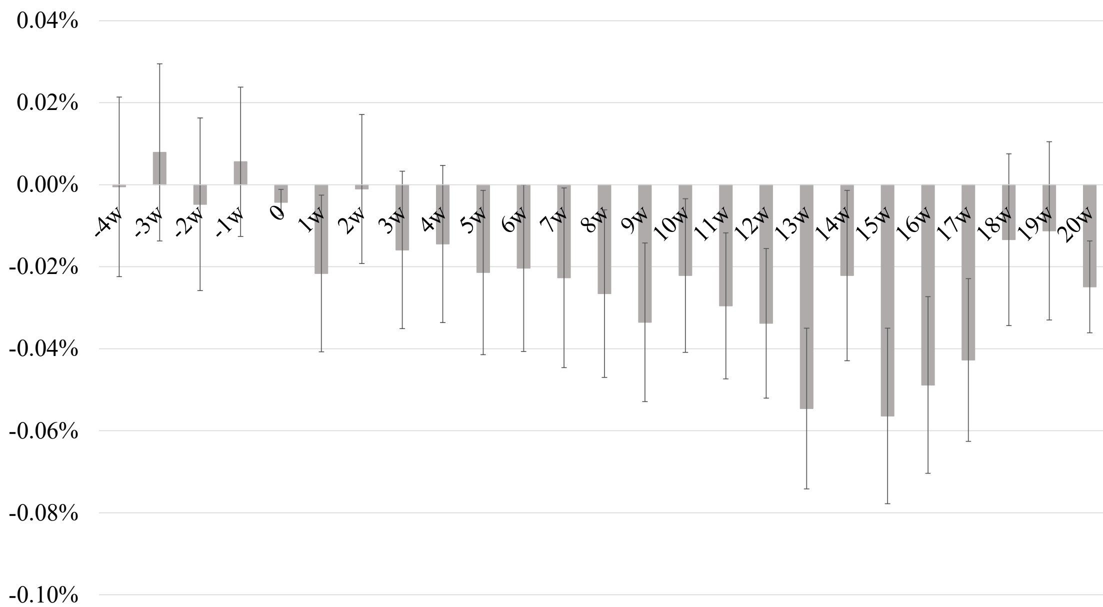


Figure A8: Weekly Abnormal Fund Flows around A Strongly Negative Realization of Earnings Announcement Return

The figure plots weekly abnormal fund flows around a strongly negative realization of earnings announcement return from four weeks before to 20 weeks after. We denote day 0 as "0". For each fund, we find the lowest earnings announcement return in that fund's portfolio, and we sort the lowest earnings announcement returns of all the funds into quintiles in each quarter. We define a strongly negative earnings announcement return as the lowest earnings announcement return in the lowest quintile. Abnormal fund flows within the event window are calculated based on Eq.(22), where we control for both fund and time fixed effects as well as other fund-level variables including fund returns and return ranks. The 95% confidence intervals are reported.

Table A1: Summary Statistics for the Mutual Fund Samples

The table reports the summary statistics for the mutual fund samples and the variables used in the regressions of quarterly fund flows on the lowest earnings announcement returns. Panel A reports the summary statistics of the 2989 U.S. equity funds with quarterly holdings (A1) and the 331 funds with daily holdings and transactions (A2). The column "Year" represents the year of the records. "Num. of Funds" represents the number of funds in the sample. "Fund TNA ($mn)" represents the average fund TNAs in million dollars. "Stock Holding" ("Cash Holding") represents equity (cash) holdings as a percentage of fund TNAs as reported in CRSP, which are available only after 2001. "Turnover (%)" represents the annual turnover reported in CRSP, which is the minimum of the aggregate purchases and the aggregate sales during the calendar year divided by the average TNA of the fund. "Expense Ratio (%)" represents the annual expense ratio and "Management Fee (%)" represents the management fee. "Fund Age" represents the average age of the funds. Panel B reports the summary statistics for the key variables in regressions of quarterly fund flows on the lowest earnings announcement returns on day [0, 1] of all stock in the fund's portfolio last quarter. Panel B1 is for Equations (19) and (27) where the quarterly holdings data of 2989 U.S. active equity mutual funds from 1999 to 2014 is used, and Panel B2 is for Equations (18) and (28) where the daily holdings and transaction data of 331 U.S. mutual funds from 1999 to 2010 is used. We report the variables for the analyses using raw returns and Fama-French-Carharts 4 factor alphas separately.

Panel A: Summary Statistics of Mutual Fund Samples

Year	Num. of Funds	Fund TNA ($mn)	Stock Holding (%)	Cash Holding (%)	Turnover (%)	Expense Ratio (%)	Manage -ment Fee (%)	Fund Age
A1. 2989 U.S. equity funds with quarterly holdings								
1999-2014	2,989	1,136	95.0	3.4	92.0	1.49	0.73	7.5
2001	2,033	1,042	-	-	108.8	1.57	0.75	6.1
2005	2,202	1,192	95.7	3.1	84.4	1.51	0.74	7.3
2010	1,985	1,196	93.1	2.7	77.5	1.38	0.71	9.8
A2. 331 funds with daily holdings								
1999-2010	331	1,541	93.2	4.0	95.6	1.51	0.71	7.5
2001	94	1,570	-	-	127.3	1.62	0.71	6.1
2005	208	2,108	93.4	4.1	96.6	1.52	0.70	7.5
2010	79	611	89.7	3.2	80.4	1.41	0.73	8.4

Table A1 (continued): Summary Statistics of Mutual Fund Samples

Panel B: Summary Statistics for Regressions of Fund Flows

	# of Obs.	Mean	Std	Min	Max	# of Obs.	Mean	Std	Min	Max
Panel B1: 2989 mutual funds with quarterly holdings										
Quarterly Fund Flow	101,565	0.011	0.124	-0.180	0.647					
Raw return:						*FFC 4 factor alpha:*				
SD Ret[0,1]	77,229	0.073	0.028	0.030	0.165	74,429	0.068	0.025	0.028	0.152
Lowest Ret[0,1]	77,229	-0.218	0.114	-0.599	-0.049	74,429	-0.211	0.111	-0.601	-0.046
Pctile 5	77,229	-0.112	0.049	-0.280	-0.037	74,429	-0.106	0.045	-0.260	-0.035
Pctile 10	77,229	-0.077	0.033	-0.195	-0.025	74,429	-0.072	0.029	-0.175	-0.025
Pctile 25	77,229	-0.035	0.017	-0.098	-0.005	74,429	-0.031	0.014	-0.080	-0.004
Pctile 50	77,229	0.002	0.010	-0.028	0.033	74,429	0.002	0.008	-0.021	0.028
Pctile 75	77,229	0.041	0.018	0.007	0.100	74,429	0.037	0.016	0.007	0.087
Pctile 90	77,229	0.084	0.032	0.028	0.186	74,429	0.077	0.028	0.026	0.164
Pctile 95	77,229	0.116	0.045	0.040	0.270	74,429	0.106	0.040	0.037	0.235
Highest Ret[0,1]	77,229	0.198	0.141	-0.101	0.715	74,429	0.184	0.129	-0.093	0.678
Δ Weight	76,427	-0.002	0.008	-0.039	0.035	73,593	-0.002	0.009	-0.039	0.033
Weight	77,229	0.013	0.011	0.000	0.075	74,429	0.013	0.012	0.000	0.074
Panel B2: 331 mutual funds with daily holdings										
Quarterly Fund Flow	9,475	0.009	0.115	-0.180	0.647					
Signed Volume[-10, -1]	3,220	-0.121	1.033	-8.792	10.000					
ΔWeight[-10, -1]	4,169	-0.012	0.107	-0.953	0.288					
Signed Volume[0, 10]	3,234	-0.036	1.066	-9.876	10.415					
ΔWeight[0, 10]	4,169	0.001	0.088	-0.514	0.563					
Raw return:						*FFC 4 factor alpha:*				
SD Ret[0,1]	9,566	0.073	0.026	0.030	0.165	9,226	0.069	0.024	0.028	0.152
Lowest Ret[0,1]	2,260	-0.223	0.111	-0.631	-0.057	1,988	-0.214	0.107	-0.601	-0.046
Trades Lowest[-10, -1]	938	-0.396	2.963	-21.239	16.346	806	-0.787	2.985	-21.558	9.874
Trades Lowest[0, 10]	1,306	-1.094	4.972	-27.597	25.037	933	-0.963	4.469	-31.339	19.516

Table A2: Institutional Trades around Earnings Announcements (Stock-Day Level)

The table studies institutional trades around earnings announcements at the stock-day level with and without fixed effects. We estimate the following specification:

$$trades_{j,t} = a + b_1 * EarningDay_{j,t} + \varepsilon_{j,t},$$

where $trades_{j,t}$ is the standardized net number of shares of stock j traded by all the institutions in Ancerno on day t as defined in Eq. (1), which is positive for purchases and negative for sales. $EarningDay_{j,t}$ is a dummy variable which equals one if it is the earning day under investigation (e.g, [-3] for the first column) and zero for all days outside our event window [-20, 20]. Panel A reports the results without fixed effects, and Panel B reports the results with stock and day fixed effects separately. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Panel A: Stock-day level regressions

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Signed Trading Volume (Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
Earning Dummy	-0.036***	-0.038***	-0.055***	-0.030***	0.019***
	(-6.87)	(-7.17)	(-9.62)	(-4.54)	(2.79)
Constant	0.068***	0.068***	0.068***	0.068***	0.068***
	(23.51)	(23.51)	(23.51)	(23.51)	(23.51)
Observations	4,559,425	4,559,608	4,560,283	4,561,150	4,561,423
Adjusted R^2	0.000	0.000	0.000	0.000	0.000

Panel B: Regressions with fixed effects

	Stock Fixed Effects				
Earning Dummy	-0.038***	-0.040***	-0.057***	-0.033***	0.017**
	(-7.26)	(-7.51)	(-9.94)	(-4.83)	(2.43)
Adjusted R^2	0.010	0.010	0.010	0.010	0.010

	Day Fixed Effects				
Earning Dummy	-0.019***	-0.019***	-0.033***	-0.006	0.043***
	(-4.04)	(-3.91)	(-6.45)	(-0.98)	(6.57)
Adjusted R^2	0.005	0.005	0.005	0.005	0.005

Table A3: Institutional Trades around Earnings Announcements (Fund-Stock-Day Level)

The table studies institutional trades around earnings announcements at the fund-stock-day level with and without fixed effects. We estimate the following specification:

$$trades_{i,j,t} = a + b_1 * EarningDay_{j,t} + \varepsilon_{i,j,t},$$

where $trades_{i,j,t}$ is the standardized net number of shares of stock j traded by fund i on day t as defined in Eq. (2), which is positive for purchases and negative for sales. $EarningDay_{j,t}$ is a dummy variable which equals one if it is the earning day under investigation (e.g, [-3] for the first column) and zero for all days outside our event window [-20, 20]. Panel A reports the results without fixed effects, and Panel B reports the results with fund-day and fund-stock fixed effects separately. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Panel A: Fund-stock-day level regressions

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Signed Trading Volume (Fund-Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
Earning Dummy	-0.019	-0.032*	-0.046***	-0.018	-0.021
	(-1.38)	(-1.65)	(-2.68)	(-1.17)	(-1.04)
Constant	0.051***	0.051***	0.051***	0.051***	0.051***
	(6.19)	(6.19)	(6.19)	(6.19)	(6.19)
Observations	47,994,409	48,036,426	48,056,393	48,413,947	48,644,266
Adjusted R^2	0.000	0.000	0.000	0.000	0.000

Panel B: Regressions with fixed effects

	Fund-Day Fixed Effects				
Earning Dummy	-0.012	-0.022	-0.021***	-0.004	-0.005
	(-1.22)	(-1.04)	(-4.16)	(-0.39)	(-0.21)
Adjusted R^2	0.220	0.220	0.221	0.220	0.218

	Fund-Stock Fixed Effects				
Earning Dummy	-0.006	-0.013	-0.022**	0.015*	0.017
	(-0.70)	(-1.11)	(-2.32)	(1.88)	(1.38)
Adjusted R^2	0.052	0.052	0.052	0.049	0.047

Table A4: Trades of Other Stocks with No Earnings Announcements Around

The table studies the trades of stocks with no earnings announcements in close proximity conditional on the fraction of stocks with earnings announcements in the coming 10 days. Specifically, we sort all trading days into deciles based on the fraction of stocks with earnings announcements in the coming 10 days. "Decile n" is the dummy variable, which equals one for trading days in decile n from 2 and 10. We investigate the signed trading volume of stocks with no earnings announcements in the surrounding 20 days using Decile 1 (with the smallest fraction of stocks with earnings announcements in 10 days) as the benchmark. The fraction and number of stocks with earnings announcement in the coming 10 days are reported as well. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Variable	Signed Trading Volume of Stocks with No Earnings Announcements around (Stock-Day Level)		Stocks with Earnings Announcements in 10 days		Total Number of Stocks
	(1)	(2)	Fraction	Number	
Decile 1	-	-	0.013	82	5507
Decile 2	0.035***	0.052***	0.021	133	5666
	(3.74)	(5.48)			
Decile 3	0.034***	0.057***	0.027	168	5634
	(3.17)	(5.21)			
Decile 4	0.043***	0.061***	0.033	209	5586
	(3.71)	(5.08)			
Decile 5	0.023**	0.042***	0.049	316	5641
	(2.03)	(3.68)			
Decile 6	0.033***	0.048***	0.083	535	5659
	(3.04)	(4.30)			
Decile 7	0.039***	0.060***	0.136	861	5662
	(3.50)	(5.30)			
Decile 8	0.050***	0.066***	0.178	1118	5632
	(4.09)	(5.43)			
Decile 9	0.003	0.033***	0.247	1539	5635
	(0.31)	(3.16)			
Decile 10	-0.018*	0.014	0.340	2092	5612
	(-1.76)	(1.31)			
Constant	0.044***				
	(6.49)				
Stock Fixed Effects	No	Yes			
Observations	4,378,989	4,378,989			
Adjusted R^2	0.000	0.011			

Table A5: Institutional Trades before Earnings Announcements and Stocks' Information Ratios

The table studies the relation between institutional trades before earnings announcements and stocks' information ratios during earnings announcements. We estimate the following specification:

$$\begin{aligned} trades_{j,t} =& a + b_1 * Info\,Ratio[0,1]_{j,t} \times EarningDay_{j,t} \\ &+ b_2 * ln(MarketCap)_{j,t} \times EarningDay_{j,t} \\ &+ b_3 * Info\,Ratio[0,1]_{j,t} + b_4 * ln(MarketCap)_{j,t} + b_5 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{j,t}, \end{aligned}$$

where $trades_{j,t}$ is defined as in Eq. (1). $InfoRatio[0,1]_{j,t}$ is the information ratio of stock j's returns during earnings announcements days [0,1] calculated as the average cumulative abnormal returns of stock j on these two days based on Fama-French-Carhart 4 factor model divided by the standard deviation $SD\ Ret[0,1]\ (Idio.)_{j,t}$ using the data in the past five years. $EarningDay_{j,t}$ is a dummy variable which equals one if it is the earning day under investigation (e.g, [-3] for the first column) and zero for all days outside our event window [-20, 20]. All other variables are standardized to a mean of zero and a standard deviation of one. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable:	Signed Trading Volume (Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
Info Ratio[0,1] (Idio.) * Earnings Day	0.000	-0.003	-0.007	-0.001	0.011*
	(0.08)	(-0.60)	(-1.50)	(-0.21)	(1.65)
ln(Market-Cap) * Earnings Day	-0.004	0.001	-0.009*	-0.010	0.004
	(-0.73)	(0.14)	(-1.71)	(-1.53)	(0.59)
Info Ratio[0,1] (Idio.)	0.009***	0.009***	0.009***	0.008***	0.007***
	(5.40)	(5.56)	(5.36)	(5.02)	(4.58)
ln(Market-Cap)	-0.023***	-0.022***	-0.023***	-0.024***	-0.024***
	(-3.95)	(-3.88)	(-3.96)	(-4.16)	(-4.05)
Earnings Day	-0.039***	-0.045***	-0.060***	-0.037***	0.017**
	(-6.34)	(-7.22)	(-8.79)	(-4.67)	(2.04)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	3,160,050	3,160,241	3,160,809	3,161,546	3,161,643
Adjusted R^2	0.010	0.010	0.010	0.010	0.010

Table A6: Institutional Trades and Shocks in Implied Volatilty

The table reports results from the regression of institutional trades on the one-day lagged shocks in stocks' 10-day and 30-day implied volatility. Panel A reports the regression results and Panel B reports the summary statistics of shocks in implied volatility. "dif 10-30" reported in Panel B is the percentage difference between the 10-day implied volatility and 30-day implied volatility. "Dummy dif 10-30" equals one if the 10-day implied volatility is more than 15% (95^{th} percentile of "dif 10-30") higher than the 30-day implied volatility. "IV shock 30" reported in Panel B is the percentage increase of 30-day implied volatility relative to its past 6 months trailing average. "Dummy IV shock 30" equals one if the 30-day implied volatility today is more than 43% higher (95^{th} percentile of "IV shock 30") than its past 6 months trailing average, and it equals zero otherwise. We use the one-day lagged shock dummies "L. Dummy dif 10-30" and "L. Dummy IV shock 30" for this analysis. We control for the one-day lagged institutional trades, "L. Signed trading volume", and two-day lagged 30/10-day implied volatility "L2. IV 30/10" in columns (2) and (4). Stock and day fixed effects are included in all specifications. Robust standard errors are clustered by day and *t*-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Panel A: Institutional Trades and Implied-Volatility Shocks

Dependent Variable	Signed Trading Volume (Stock-Day Level)			
	(1)	(2)	(3)	(4)
L. Dummy dif 10-30	-0.065***	-0.067***		
	(-3.50)	(-3.04)		
L. Dummy_IV shock 30			-0.042***	-0.022***
			(-7.68)	(-4.21)
L. Signed trading volume		0.219***		0.328***
		(25.26)		(184.42)
L2. IV 30		-0.072		0.014**
		(-0.57)		(2.14)
L2. IV 10		0.097		
		(0.82)		
Stock Fixed Effects	Yes	Yes	Yes	Yes
Day Fixed Effects	Yes	Yes	Yes	Yes
Observations	111,610	101,204	4,578,489	4,559,558
Adjusted R-squared	0.013	0.061	0.011	0.117

Panel B: Summary Statistics of Implied-Volatility Shocks

Variable	# of obs	Mean	Std.	Min	Max
dif 10-30	124,486	-0.01	0.10	-0.66	6.20
IV shock 30	6,191,385	0.01	0.33	-0.99	125.66

Variable	5%	25%	50%	75%	95%
dif 10-30	-0.16	-0.04	0.00	0.02	0.15
IV shock 30	-0.29	-0.14	-0.04	0.09	0.43

Table A7: Institutional Trades and Implied Volatility Level

The table reports results from the regression of institutional trades on the stocks' 30-day implied volatility and the difference between the 10-day and 30-day implied volatility. Panel A reports the regression results and Panel B reports the summary statistics of implied volatility. "L. dif 10-30 IV" is the one-day lagged difference between the 10-day and 30-day implied volatility (annualized standard deviation of returns). "L. IV 30" is the one-day lagged 30-day implied volatility. We control for the one-day lagged institutional trades, "L. Signed trading volume", and two-day lagged 30/10-day implied volatility, "L2. IV 30/10", in columns (2) and (4). Robust standard errors are clustered by day and *t*-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Panel A: Institutional Trades and Levels of Implied Volatility

Dependent Variable	Signed Trading Volume (Stock-Day Level)			
	(1)	(2)	(3)	(4)
L. dif 10-30 IV	-0.173	-0.197		
	(-1.52)	(-1.13)		
L. IV 30			-0.016**	-0.084***
			(-2.02)	(-6.45)
L. Signed trading volume		0.218***		0.328***
		(25.23)		(177.47)
L2. IV 30		0.086		0.088***
		(0.56)		(7.12)
L2. IV 10		-0.052		
		(-0.32)		
Stock Fixed Effects	Yes	Yes	Yes	Yes
Observations	111,641	101,226	4,857,934	4,830,047
Adjusted R-squared	0.008	0.056	0.006	0.113

Panel B: Summary Statistics of Implied-Volatility Level

Variable	Obs	Mean	Std.	Min	Max
IV 10	125,703	0.32	0.20	0.04	2.90
IV 30	6,903,106	0.42	0.24	0.01	3.00
dif 10-30 IV	124,486	0.00	0.04	-1.41	1.22

Variable	5%	25%	50%	75%	95%
IV 10	0.12	0.18	0.26	0.39	0.70
IV 30	0.16	0.26	0.37	0.52	0.89
dif 10-30 IV	-0.053	-0.009	0.000	0.005	0.053

Table A8: Institutional Trades before Earnings Announcements and Stocks' Idiosyncratic and Systematic Volatility

The table reports the complete regressions results of Table 2 in Panel A and univariate results for idiosyncratic volatility "SD Ret[0,1] (Idio.)" and systematic volatility "SD Ret[0,1] (Syst.)" during earnings announcements separately in Panels B and C.

Dependent Variable:	Signed Trading Volume (Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
Panel A: Regression for SD Ret[0,1] (Idio.) and SD Ret[0,1] (Syst.)					
SD Ret[0,1] (Idio.) * Earnings Day	-0.016**	-0.027***	-0.021***	-0.019**	0.016
	(-2.36)	(-3.88)	(-2.90)	(-2.11)	(1.52)
SD Ret[0,1] (Syst.) * Earnings Day	0.010*	0.014**	0.008	0.009	-0.000
	(1.69)	(2.35)	(1.25)	(1.12)	(-0.00)
ln(Market-Cap) * Earnings Day	-0.007	-0.005	-0.015***	-0.014**	0.010
	(-1.27)	(-0.94)	(-2.62)	(-2.12)	(1.39)
SD Ret[0,1] (Idio.)	0.007***	0.007***	0.007***	0.008***	0.007***
	(2.74)	(2.95)	(3.02)	(3.13)	(2.72)
SD Ret[0,1] (Syst.)	-0.010***	-0.010***	-0.010***	-0.010***	-0.011***
	(-4.63)	(-4.68)	(-4.81)	(-4.66)	(-5.00)
ln(Market-Cap)	-0.020***	-0.019***	-0.020***	-0.021***	-0.021***
	(-3.55)	(-3.44)	(-3.57)	(-3.78)	(-3.76)
Earnings Day	-0.039***	-0.045***	-0.059***	-0.036***	0.016*
	(-6.28)	(-7.10)	(-8.63)	(-4.62)	(1.92)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	3,160,050	3,160,241	3,160,809	3,161,546	3,161,643
Adjusted R^2	0.010	0.010	0.010	0.010	0.010

Table A8 (continued): Institutional Trades before Earnings Announcements and Stocks' Idiosyncratic and Systematic Volatility

Dependent Variable:	Signed Trading Volume (Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
Panel B: Regression for SD Ret[0,1] (Idio.) alone					
SD Ret[0,1] (Idio.) * Earnings Day	-0.009*	-0.017***	-0.015***	-0.013*	0.016*
	(-1.70)	(-3.11)	(-2.66)	(-1.86)	(1.93)
ln(Market-Cap) * Earnings Day	-0.006	-0.004	-0.014**	-0.014**	0.010
	(-1.15)	(-0.77)	(-2.53)	(-2.04)	(1.40)
SD Ret[0,1] (Idio.)	0.001	0.001	0.001	0.002	0.000
	(0.27)	(0.44)	(0.46)	(0.64)	(0.09)
ln(Market-Cap)	-0.020***	-0.019***	-0.020***	-0.021***	-0.021***
	(-3.47)	(-3.36)	(-3.48)	(-3.69)	(-3.66)
Earnings Day	-0.039***	-0.045***	-0.059***	-0.036***	0.016*
	(-6.24)	(-7.05)	(-8.61)	(-4.60)	(1.93)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	3,160,050	3,160,241	3,160,809	3,161,546	3,161,643
Adjusted R^2	0.010	0.010	0.010	0.010	0.010
Panel C: Regression for SD Ret[0,1] (Syst.) alone					
SD Ret[0,1] (Syst.) * Earnings Day	0.001	-0.001	-0.004	-0.002	0.009
	(0.19)	(-0.14)	(-0.72)	(-0.31)	(1.22)
ln(Market-Cap) * Earnings Day	-0.004	0.000	-0.011*	-0.010	0.007
	(-0.69)	(0.05)	(-1.95)	(-1.61)	(0.97)
SD Ret[0,1] (Syst.)	-0.007***	-0.007***	-0.007***	-0.007***	-0.008***
	(-3.46)	(-3.38)	(-3.50)	(-3.31)	(-3.96)
ln(Market-Cap)	-0.021***	-0.020***	-0.021***	-0.022***	-0.022***
	(-3.69)	(-3.60)	(-3.73)	(-3.94)	(-3.88)
Earnings Day	-0.040***	-0.045***	-0.059***	-0.037***	0.016*
	(-6.33)	(-7.17)	(-8.69)	(-4.66)	(1.96)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	3,160,050	3,160,241	3,160,809	3,161,546	3,161,643
Adjusted R^2	0.010	0.010	0.010	0.010	0.010

Table A9: Quarterly Flows, Volatility of Holdings' Earnings Announcement Returns, and Institutional Trades – Using Transaction Data (Detailed)

The table reports the regression results in Table 3 with the coefficients on all the control variables fully displayed.

Dependent Variable	Quarterly Fund Flow					
		Raw return			FFC 4 factor alpha	
	(1)	(2)	(3)	(4)	(5)	(6)
SD Ret[0,1]	-0.178**	-0.148	-0.087	-0.252***	-0.183	-0.154
	(-2.60)	(-1.34)	(-0.82)	(-3.59)	(-1.45)	(-1.25)
SD Ret[0,1] * Signed Volume[-10, -1]		-0.114**			-0.125**	
		(-2.10)			(-2.29)	
SD Ret[0,1] * ΔWeight[-10, -1]			-1.541*			-1.996**
			(-1.69)			(-2.11)
Control variables:						
Signed Volume[-10, -1]		0.018***			0.018***	
		(4.31)			(4.26)	
ΔWeight[-10, -1]			0.235**			0.277***
			(2.54)			(3.23)
Past Quarter Rank	0.004	-0.011	-0.012	-0.006	0.007	0.004
	(0.53)	(-0.57)	(-0.63)	(-0.69)	(0.37)	(0.24)
Past Halfyear Rank	0.015*	-0.019	-0.023	0.004	-0.030	-0.032
	(1.90)	(-0.77)	(-0.95)	(0.44)	(-1.27)	(-1.43)
Past Year Rank	0.051***	0.039	0.041*	0.038***	0.032	0.032
	(6.06)	(1.59)	(1.70)	(4.85)	(1.24)	(1.31)
Past 3years Rank	0.050***	0.062***	0.062***	0.071***	0.061***	0.069***
	(6.91)	(3.24)	(3.37)	(11.26)	(3.04)	(3.50)
Past Quarter Ret	0.026	0.195	0.198	0.155*	0.101	0.115
	(0.71)	(1.08)	(1.09)	(1.79)	(0.39)	(0.45)
Past Halfyear Ret	0.008	0.279*	0.269*	0.018	0.308	0.300
	(0.29)	(1.92)	(1.88)	(0.35)	(1.49)	(1.53)
Past Year Ret	-0.034**	-0.046	-0.043	-0.029*	0.003	0.017
	(-2.41)	(-0.45)	(-0.43)	(-1.89)	(0.02)	(0.11)
Past 3years Ret	0.016*	-0.015	-0.010	-0.001	-0.015	-0.029
	(1.97)	(-0.48)	(-0.33)	(-0.24)	(-0.37)	(-0.73)
Same Quarter Ret	0.043	0.229***	0.236***	-0.031	0.106*	0.124*
	(0.82)	(3.31)	(3.23)	(-0.26)	(1.68)	(1.95)
ln(Age)	-0.016***	-0.020***	-0.021***	-0.017***	-0.020***	-0.021***
	(-8.96)	(-7.96)	(-8.55)	(-9.62)	(-7.18)	(-7.41)
Turnover	-0.002	0.001	-0.001	-0.003	-0.001	-0.002
	(-0.88)	(0.33)	(-0.15)	(-1.22)	(-0.26)	(-0.50)
Exp Ratio	-0.519	-1.540***	-1.878***	-0.597	-0.683	-1.097*
	(-1.24)	(-2.72)	(-3.32)	(-1.47)	(-1.14)	(-1.84)
ln(TNA)	-0.000	-0.002	-0.003*	-0.001	-0.001	-0.002
	(-0.47)	(-1.41)	(-1.94)	(-0.91)	(-0.92)	(-1.58)
Flow Vol Past1y	0.282***	0.371***	0.354***	0.246***	0.328***	0.331***
	(5.88)	(3.63)	(3.38)	(4.69)	(3.08)	(3.05)
Ret Vol Past1y	-0.246	-0.180	-0.176	0.740***	0.335	0.426
	(-1.50)	(-0.67)	(-0.68)	(3.68)	(0.81)	(1.11)
Num. Stocks	-0.000*	-0.000**	-0.000***	0.000	-0.000	-0.000
	(-1.92)	(-2.61)	(-3.01)	(0.40)	(-0.63)	(-0.68)
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Std. Err. Clustered per	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
Observations	7,840	2,572	2,676	7,620	2,567	2,670
Adjusted R-squared	0.135	0.183	0.181	0.135	0.162	0.169

Table A10: Quarterly Flows, Volatility of Holdings' Earnings Announcement Returns, and Institutional Trades after Announcements

The table reports results from the regression of Eq. (18) using measures of trades after announcements. $Signed\,Volume[0,10]_{i,t-1}$ and $\Delta Weight[0,10]_{i,t-1}$ are defined as in Table 3 but for average trades of stocks on the earnings announcement day and in the ten days after the earnings announcement.

Dependent Variable	Quarterly Fund Flow			
	Raw return		FFC 4 factor alpha	
	(1)	(2)	(3)	(4)
SD Ret[0,1]	-0.114	-0.058	-0.159	-0.131
	(-1.07)	(-0.55)	(-1.29)	(-1.06)
SD Ret[0,1] * Signed Volume[0, 10]	-0.102		-0.108	
	(-1.37)		(-1.51)	
SD Ret[0,1] * ΔWeight[0, 10]		-0.598		-0.169
		(-0.35)		(-0.10)
Control variables:				
Signed Volume[0, 10]	0.017***		0.017***	
	(3.19)		(3.27)	
ΔWeight[0, 10]		0.239		0.148
		(1.58)		(0.97)
Past Quarter Rank	-0.014	-0.015	0.005	0.003
	(-0.71)	(-0.80)	(0.26)	(0.15)
Past Halfyear Rank	-0.019	-0.019	-0.028	-0.027
	(-0.80)	(-0.80)	(-1.23)	(-1.18)
Past Year Rank	0.041	0.040	0.031	0.029
	(1.63)	(1.63)	(1.23)	(1.20)
Past 3years Rank	0.060***	0.063***	0.061***	0.068***
	(3.15)	(3.26)	(3.03)	(3.43)
Past Quarter Ret	0.227	0.233	0.125	0.154
	(1.27)	(1.29)	(0.49)	(0.62)
Past Halfyear Ret	0.265*	0.256*	0.290	0.260
	(1.83)	(1.74)	(1.43)	(1.29)
Past Year Ret	-0.051	-0.044	-0.001	0.023
	(-0.49)	(-0.44)	(-0.00)	(0.15)
Past 3years Ret	-0.014	-0.013	-0.016	-0.029
	(-0.45)	(-0.40)	(-0.38)	(-0.73)
Same Quarter Ret	0.226***	0.230***	0.102	0.108
	(3.32)	(3.28)	(1.61)	(1.64)
ln(Age)	-0.021***	-0.022***	-0.021***	-0.021***
	(-8.20)	(-8.33)	(-7.48)	(-7.46)
Turnover	0.002	0.000	-0.001	-0.002
	(0.38)	(0.06)	(-0.20)	(-0.57)
Exp Ratio	-1.669***	-2.005***	-0.802	-1.041*
	(-2.90)	(-3.86)	(-1.33)	(-1.84)
ln(TNA)	-0.002	-0.003**	-0.001	-0.002
	(-1.27)	(-2.33)	(-0.84)	(-1.47)
Flow Vol Past1y	0.357***	0.343***	0.312***	0.309***
	(3.51)	(3.75)	(2.91)	(3.11)
Ret Vol Past1y	-0.194	-0.203	0.303	0.425
	(-0.74)	(-0.76)	(0.74)	(1.08)
Num. Stocks	-0.000**	-0.000***	-0.000	-0.000
	(-2.65)	(-3.17)	(-0.67)	(-0.79)
Quarterly Fixed Effects	Yes	Yes	Yes	Yes
Std. Err. Clustered per	Quarter	Quarter	Quarter	Quarter
Observations	2,590	2,676	2,585	2,670
Adjusted R^2	0.184	0.191	0.163	0.166

Table A11: Quarterly Flows and Volatility of Holdings' Earnings Announcement Returns Controlling for Daily Fund Returns

The table reports results from the regression of Eq. (18) adding the standard deviation and minimum value of daily fund returns in the past year (*"Ret Vol Past1y (Daily)"* and *"Min Ret Past1y (Daily)"*), and the concurrent and lagged skewness of daily fund returns every quarter (*"Ret Skewness (Daily)"*) as control variables.

Dependent Variable	Quarterly Fund Flow					
		331 Funds			2989 Funds	
	(1)	(2)	(3)	(4)	(5)	(6)
SD Ret[0,1]	-0.213**	-0.245***	-0.256***	-0.135**	-0.131**	-0.134**
	(-2.50)	(-2.86)	(-3.04)	(-2.49)	(-2.39)	(-2.54)
Control variables:						
Past Quarter Rank	-0.006	-0.004	-0.005	0.008	0.007	0.008
	(-0.56)	(-0.38)	(-0.44)	(1.29)	(1.28)	(1.36)
Past Halfyear Rank	0.019**	0.017**	0.016*	0.021***	0.021***	0.019***
	(2.12)	(2.08)	(1.84)	(3.21)	(3.22)	(3.04)
Past Year Rank	0.055***	0.054***	0.054***	0.041***	0.042***	0.043***
	(4.66)	(4.50)	(4.43)	(6.46)	(6.88)	(6.99)
Past 3years Rank	0.048***	0.049***	0.049***	0.073***	0.073***	0.073***
	(4.89)	(4.98)	(5.10)	(15.49)	(15.51)	(15.32)
Past Quarter Ret	0.121	0.117	0.126	0.001	-0.000	-0.004
	(1.54)	(1.50)	(1.54)	(0.16)	(-0.05)	(-0.45)
Past Halfyear Ret	0.002	-0.003	0.001	-0.002	-0.001	0.003
	(0.11)	(-0.16)	(0.04)	(-0.20)	(-0.14)	(0.35)
Past Year Ret	-0.041***	-0.038***	-0.042***	-0.004	-0.005	-0.008
	(-3.31)	(-3.20)	(-3.30)	(-0.52)	(-0.58)	(-0.94)
Past 3years Ret	0.019*	0.017*	0.017*	0.002	0.002	0.003
	(2.01)	(1.94)	(1.93)	(0.82)	(0.84)	(0.91)
Same Quarter Ret	0.148	0.242***	0.244***	0.026	0.024	0.032
	(1.63)	(3.94)	(4.68)	(1.06)	(1.00)	(1.48)
ln(Age)	-0.016***	-0.015***	-0.015***	-0.018***	-0.018***	-0.018***
	(-6.34)	(-6.45)	(-6.39)	(-12.92)	(-13.03)	(-13.10)
Turnover	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001
	(-0.53)	(-0.56)	(-0.66)	(-1.29)	(-1.18)	(-1.43)
Exp Ratio	-0.448	-0.478	-0.462	-0.974***	-0.966***	-0.970***
	(-0.89)	(-0.96)	(-0.93)	(-4.05)	(-3.98)	(-4.01)
ln(TNA)	-0.001	-0.001	-0.001	-0.002***	-0.002***	-0.002***
	(-1.30)	(-1.32)	(-1.30)	(-5.19)	(-5.17)	(-5.11)
Flow Vol Past1y	0.289***	0.285***	0.284***	0.362***	0.362***	0.362***
	(4.46)	(4.47)	(4.45)	(10.25)	(10.27)	(10.29)
Ret Vol Past1y (Daily)	-0.395	-1.248	-0.788	-1.079**	-0.728	-0.453
	(-0.50)	(-1.60)	(-0.98)	(-2.52)	(-1.03)	(-0.60)
Num. Stocks	-0.000	-0.000	-0.000	-0.000*	-0.000*	-0.000*
	(-1.12)	(-1.15)	(-1.16)	(-1.81)	(-1.80)	(-1.81)
Min Ret Past1y (Daily)		-0.803***	-0.663***		0.224	0.313
		(-3.95)	(-2.74)		(0.66)	(0.90)
Ret Skewness (Daily)			-0.016			-0.013***
			(-1.35)			(-3.36)
L.Ret Skewness (Daily)			-0.002			0.001
			(-0.34)			(0.28)
L2.Ret Skewness (Daily)			0.000			-0.002
			(0.08)			(-0.45)
L3.Ret Skewness (Daily)			0.006			0.001
			(1.31)			(0.35)
L4.Ret Skewness (Daily)			-0.002			0.004
			(-0.37)			(1.07)
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Std. Err. Clustered per	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
Observations	5,389	5,389	5,389	49,545	49,545	49,544
Adjusted R-squared	0.141	0.150	0.150	0.159	0.159	0.160

Table A12: Quarterly Flows and Volatility of Holdings' Earnings Announcement Returns Controlling for Non-Linear Past Returns and Morningstar Ratings

The table reports results from the regression of Eq. (18) adding the dummy variables for past quarter, year, and 3 year return quintiles, the squares of past returns, as well as the dummy variable for Morningstar ratings as control variables. Funds in return quitile 1 or with Morningstar rating 1 are used as the benchmark case.

	Quarterly Fund Flow					
		331 Funds			2989 Funds	
	(1)	(2)	(3)	(4)	(5)	(6)
SD Ret[0,1]	-0.185***	-0.182**	-0.189***	-0.186***	-0.187***	-0.196***
	(-2.67)	(-2.65)	(-2.81)	(-4.19)	(-4.21)	(-5.07)
Control variables:						
Past Quarter Q2	0.004	0.004	0.007**	0.004**	0.004**	0.004***
	(1.41)	(1.33)	(2.07)	(2.40)	(2.41)	(2.78)
Past Quarter Q3	0.004	0.004	0.004	0.004**	0.004**	0.006***
	(1.11)	(1.03)	(1.22)	(2.30)	(2.30)	(3.13)
Past Quarter Q4	0.006	0.006	0.007	0.006**	0.006**	0.007***
	(1.43)	(1.37)	(1.52)	(2.33)	(2.33)	(3.00)
Past Quarter Q5	0.015***	0.015***	0.013**	0.014***	0.014***	0.015***
	(2.73)	(2.69)	(2.42)	(4.02)	(4.02)	(5.13)
Past Year Q2	0.011***	0.011***	0.010***	0.011***	0.011***	0.010***
	(3.59)	(3.52)	(3.24)	(7.53)	(7.53)	(7.32)
Past Year Q3	0.018***	0.018***	0.014***	0.017***	0.017***	0.016***
	(5.75)	(5.76)	(4.26)	(8.30)	(8.30)	(7.88)
Past Year Q4	0.024***	0.025***	0.024***	0.023***	0.023***	0.021***
	(5.78)	(5.82)	(5.11)	(8.61)	(8.61)	(8.68)
Past Year Q5	0.043***	0.044***	0.035***	0.044***	0.044***	0.038***
	(7.78)	(7.89)	(6.79)	(10.74)	(10.77)	(11.89)
Past 3year Q2	0.005	0.005	0.001	0.013***	0.013***	0.007***
	(1.50)	(1.52)	(0.33)	(10.56)	(10.56)	(6.19)
Past 3year Q3	0.017***	0.017***	0.004	0.022***	0.022***	0.009***
	(5.15)	(5.13)	(1.07)	(16.05)	(16.06)	(6.43)
Past 3year Q4	0.024***	0.024***	0.002	0.033***	0.033***	0.012***
	(5.51)	(5.41)	(0.40)	(16.07)	(16.08)	(6.13)
Past 3year Q5	0.046***	0.045***	0.015***	0.064***	0.064***	0.025***
	(9.98)	(9.82)	(3.06)	(20.50)	(20.61)	(9.52)
Past Quarter Ret ˆ 2		-0.002*	0.295*		0.000	0.000
		(-1.71)	(1.80)		(0.62)	(0.04)
Past Year Retˆ 2		-0.009***	-0.007***		-0.001	-0.000
		(-3.39)	(-3.16)		(-1.58)	(-0.34)
Past 3years Retˆ 2		0.004*	0.003*		-0.000	-0.000***
		(1.90)	(1.85)		(-1.28)	(-3.41)
Morningstar Rating 2			-0.007			0.003
			(-0.82)			(1.42)
Morningstar Rating 3			0.006			0.017***
			(0.82)			(8.28)
Morningstar Rating 4			0.031***			0.046***
			(4.07)			(17.49)
Morningstar Rating 5			0.054***			0.100***
			(6.53)			(24.20)
Controls for Fund Char.	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Std. Err. Clustered per	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
	7,840	7,840	6,012	71,817	71,817	55,850
	0.132	0.133	0.148	0.153	0.151	0.196

Table A13: Estimation of Fund-Level Flow-Performance Sensitivity

The table reports estimates of the fund-level FPS using the quarterly returns.

Dependent Variable	Quarterly Fund Flow	
	Raw return	FFC 4 factor alpha
	(1)	(2)
Past Quarter Ret	0.116**	0.155***
	(2.18)	(3.21)
Control variables:		
Same Quarter Ret	0.061	0.185***
	(1.59)	(4.36)
ln(Age)	-0.027***	-0.028***
	(-16.98)	(-16.78)
Turnover	-0.005***	-0.006***
	(-3.54)	(-3.95)
Exp Ratio	-1.083***	-1.337***
	(-4.82)	(-5.96)
ln(TNA)	-0.000	-0.000
	(-0.09)	(-0.21)
Flow Vol Past1y	0.411***	0.392***
	(12.56)	(12.57)
Ret Vol Past1y	-0.168	0.547***
	(-1.47)	(3.57)
Num. Stocks	-0.000***	-0.000***
	(-3.72)	(-2.78)
Quarterly Fixed Effects	Yes	Yes
Std. Err. Clustered per	Quarter	Quarter
Observations	78,426	78,475
Adjusted R-squared	0.097	0.099

Table A14: Quarterly Flows, Strongly Negative Holdings' Earnings Announcement Returns, and Institutional Trades

The table reports results from the regression of quarterly flows on a dummy variable for strongly negative earnings announcement return in each quarter and its interaction terms with funds' average trades before earnings announcements. We use the 331 mutual funds with daily holdings data for this regression below.

$$\begin{aligned} Flow_{i,t} =& b_1 * D\_Lowest[0,1]_{i,t-1} + b_2 * D\_Lowest[0,1] \times \Delta Weight[-10,-1]_{i,t-1} \\ &+ b_3 * \Delta Weight[-10,-1]_{i,t-1} + b_4 * Past\ Ranks_{i,t-1} + b_5 * Past\ Returns_{i,t-1} \\ &+ b_6 * Fund\,Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t}, \end{aligned}$$

where $D\_Lowest[0,1]_{i,t-1}$ is a dummy variable for funds with strongly negative earnings announcement return in quarter $t-1$ (i.e., funds with the lowest earnings announcement returns in the lowest quintile of all the funds in that quarter). We use $\Delta Weight[-10,-1]_{i,t-1}$ as a measure of a fund's trades before earnings announcements, which is the total dollar amounts of stocks shares traded ten days before the earnings announcement as a fraction of the fund's total net assets. $Past\ Ranks_{i,t-1}$ and $Past\ Returns_{i,t-1}$ control for fund performance ranks and returns in the past quarter, half year, year, and three years. $Fund\,Characteristics_{i,t-1}$ include controls for the fund's same-quarter return, age, turnover, expense ratio, ln(TNA), past-year flow volatility, return volatility, and number of stocks in the portfolio. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. Column (1) and (3) are estimated using the 2,989 funds with quarterly holdings for higher accuracy. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable	Quarterly Fund Flow			
	Raw return		FFC 4 factor alpha	
	(1)	(2)	(3)	(4)
D_Lowest[0,1]	-0.006***	0.003	-0.004***	-0.001
	(-3.66)	(0.54)	(-3.54)	(-0.21)
D_Lowest[0,1] × Δ Weight [-10, -1]		-0.117*		-0.138***
		(-1.94)		(-2.68)
Control variables:				
Δ Weight [-10, -1]		0.149***		0.173***
		(3.42)		(4.35)
Controls for the past ranks	Yes	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes	Yes
Quarterly Fixed Effects	Yes	Yes	Yes	Yes
Observations	71,817	2,676	69,778	2,670
Adjusted R-squared	0.153	0.183	0.156	0.171

Table A15: Quarterly Flows, Lowest Earnings Announcement Returns, and Institutional Trades

The table reports results from the regression of quarterly flows on the lowest earnings announcement returns in the portfolio. We use 2,989 U.S. active equity mutual funds with quarterly holdings data for this analysis. In particular, we regress quarterly fund flows on the return of the lowest performing stocks during earnings announcement days [0, 1] in the fund's portfolio last quarter (variable $Lowest\ Ret[0,1]$) and its interaction terms with the change and level of portfolio weights.

$$\begin{aligned} Flow_{i,t} =& b_1 * Lowest\ Ret[0,1]_{i,t-1} + b_2 * Lowest\ Ret[0,1]_{i,t-1} \times \Delta Weight_{i,t-1} \\ &+ b_3 * Lowest\ Ret[0,1]_{i,t-1} \times Weight_{i,t-1} \\ &+ b_4 * \Delta Weight + b_5 * Weight + b_6 * Past\ Ranks_{i,t-1} \\ &+ b_7 * Past\ Returns_{i,t-1} + b_8 * Fund\,Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t}, \end{aligned}$$

where $\Delta Weight_{i,t-1}$ is the change of the portfolio weight of the lowest performing stock caused by trades in last quarter. $Weight_{i,t-1}$ is the portfolio weight of the lowest performing stock at the beginning of last quarter. $Past\ Ranks_{i,t-1}$ and $Past\ Returns_{i,t-1}$ control for fund performance ranks and returns in the past quarter, half year, year, and three years. $Fund\,Characteristics_{i,t-1}$ include controls for the fund's same-quarter return, age, turnover, expense ratio, ln(TNA), past-year flow volatility, return volatility, and number of stocks in the portfolio. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. Complete regression results including all control variables are reported in Table A18. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable	Quarterly Fund Flow					
		Raw Return			FFC 4 factor alpha	
	(1)	(2)	(3)	(4)	(5)	(6)
Lowest Ret[0,1]	0.035***	0.039***	0.024***	0.025***	0.028***	0.015**
	(4.96)	(5.38)	(3.03)	(4.83)	(5.54)	(2.04)
Lowest Ret[0,1] × Δ Weight		1.785***			1.465**	
		(3.10)			(2.33)	
Lowest Ret[0,1] × Weight			0.302			0.582
			(0.58)			(1.30)
Control variables:						
Δ Weight		1.024***			1.011***	
		(6.60)			(6.57)	
Weight			0.319***			0.232**
			(2.87)			(2.27)
Controls for the past ranks	Yes	Yes	Yes	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71,817	71,746	71,817	69,778	69,708	69,778
Adjusted R-squared	0.153	0.156	0.153	0.157	0.160	0.157

Table A16: Double Sorting on Fund Return and Lowest Ret[0,1]

The table reports the quarterly fund flows doubled sorted by funds' past-quarter returns and the returns of the lowest performing stocks during earnings announcements, Lowest Ret[0, 1], in funds' portfolios last quarter. Every quarter, we first sort funds into quintiles based on their past-quarter returns. Within each past-quarter-return quintile, we further sort funds into Lowest Ret[0, 1] quintiles based on their Lowest Ret[0, 1] last quarter. Panel A includes all fund-quarter observations of the 2,989 US equity mutual funds with quarterly holdings. Panel B only includes fund-quarter observations where funds *reduced* their holdings of the lowest performing stocks in the last quarter for this analysis, and Panel C only includes fund-quarter observations where funds *increased* their holdings of the lowest performing stocks in the last quarter. Robust standard errors are clustered per quarter and t-statistics are reported in parentheses. Sig. lvl: *** 0.01, ** 0.05, and * 0.1.

(in fraction)	Lowest Ret[0, 1] Quintiles					
	Q1 (low)	2	3	4	Q5 (high)	(5-1)
Panel A: All fund-quarter observations						
Lowest Ret[0, 1]	-0.3480	-0.2392	-0.1877	-0.1468	-0.0988	0.2492
Past-Quarter-Ret Quintiles						
Q1 (low)	-0.0138***	-0.0093***	-0.0114***	-0.0090**	-0.0100***	0.0038
	(-4.19)	(-2.62)	(-2.78)	(-2.43)	(-2.62)	(1.39)
2	-0.0028	-0.0013	-0.0071***	-0.0003	0.0034	0.0062**
	(-1.13)	(-0.45)	(-2.62)	(-0.13)	(1.33)	(2.41)
3	0.0046*	0.0037	0.0054*	0.0061**	0.0114***	0.0068**
	(1.65)	(1.15)	(1.87)	(2.21)	(3.58)	(2.26)
4	0.0103***	0.0171***	0.0173***	0.0196***	0.0251***	0.0148***
	(2.71)	(5.08)	(5.61)	(5.84)	(6.73)	(3.64)
Q5 (high)	0.0387***	0.0360***	0.0431***	0.0473***	0.0594***	0.0206***
	(6.86)	(7.17)	(7.80)	(8.24)	(10.20)	(3.84)
Average	0.0075***	0.0093***	0.0095***	0.0131***	0.0183***	0.0108***
	(2.63)	(3.33)	(3.37)	(4.89)	(6.54)	(5.16)

Table A16 (continued): Double Sorting on Fund Return and Lowest Ret[0,1]

(in fraction)	Lowest Ret[0, 1] Quintiles					
	Q1	2	3	4	Q5	(5-1)
Past-Quarter-Ret Quintiles						
Panel B: Conditional on funds *reduced* their holdings of the lowest performing stocks in the last quarter						
Q1 (low)	-0.0201***	-0.0192***	-0.0238***	-0.0176***	-0.0245***	-0.0043
	(-5.58)	(-5.90)	(-5.87)	(-4.31)	(-5.96)	(-1.31)
2	-0.0090***	-0.0078***	-0.0146***	-0.0129***	-0.0117***	-0.0027
	(-3.30)	(-2.78)	(-5.13)	(-4.43)	(-4.43)	(-0.80)
3	-0.0032	-0.0028	-0.0044*	-0.0047	-0.0028	0.0004
	(-1.04)	(-0.87)	(-1.70)	(-1.45)	(-0.84)	(0.12)
4	0.0056	0.0101**	0.0118***	0.0016	0.0123***	0.0067
	(1.32)	(2.34)	(3.05)	(0.43)	(3.05)	(1.44)
Q5 (high)	0.0367***	0.0265***	0.0337***	0.0364***	0.0411***	0.0045
	(6.15)	(5.51)	(5.63)	(4.89)	(5.75)	(0.69)
Average	0.0018	0.0013	0.0004	0.0006	0.0034	0.0016
	(0.62)	(0.50)	(0.17)	(0.21)	(1.18)	(0.71)
Panel C: Conditional on funds *increased* their holdings of the lowest performing stocks in the last quarter						
Q1 (low)	0.0110*	0.0169***	0.0151***	0.0296***	0.0299***	0.0189***
	(1.93)	(2.86)	(2.65)	(4.37)	(4.08)	(2.66)
2	0.0230***	0.0196***	0.0208***	0.0356***	0.0378***	0.0148***
	(4.88)	(4.71)	(4.22)	(6.30)	(7.41)	(2.43)
3	0.0296***	0.0277***	0.0363***	0.0342***	0.0563***	0.0267***
	(6.17)	(5.55)	(6.69)	(6.06)	(9.36)	(3.61)
4	0.0369***	0.0523***	0.0490***	0.0490***	0.0692***	0.0323***
	(6.18)	(8.63)	(8.80)	(8.63)	(11.24)	(4.37)
Q5 (high)	0.0713***	0.0720***	0.0841***	0.0892***	0.1059***	0.0346***
	(9.41)	(9.24)	(11.42)	(11.57)	(12.63)	(4.65)
Average	0.0355***	0.0397***	0.0428***	0.0489***	0.0624***	0.0269***
	(8.71)	(9.55)	(11.53)	(11.24)	(14.06)	(7.02)

Table A17: Quarterly Flows, Lowest Earnings Announcement Returns, and Institutional Trades – Using Transaction Data

The table reports results from the regression of quarterly flows on the lowest earnings announcement returns in the portfolio and its interaction terms with funds' trades before and after earnings announcements. We use the 331 mutual funds with daily holdings data for this regression below.

$$\begin{aligned}Flow_{i,t} =& b_1 * Lowest\ Ret[0,1]_{i,t-1} + b_2 * Lowest\ Ret[0,1]_{i,t-1} \times Trades\ Lowest[-10,-1]_{i,t-1} \\ &+ b_3 * Lowest\ Ret[0,1]_{i,t-1} \times Trades\ Lowest[0,10]_{i,t-1} \\ &+ b_4 * Trades\ Lowest[-10,-1]_{i,t-1} + b_5 * Trades\ Lowest[0,10]_{i,t-1} \\ &+ b_6 * Past\ Ranks_{i,t-1} + b_7 * Past\ Returns_{i,t-1} \\ &+ b_8 * Fund\ Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t},\end{aligned}$$

where $Lowest\ Ret[0,1]_{i,t-1}$ is the return of the lowest performing stocks during earnings announcement days [0, 1] in fund i's portfolio last quarter. $Trades\ Lowest[-10,-1]_{i,t-1}$ is fund i's trades of the lowest performing stock in the ten days before the earnings announcement, which is measured as the signed number of shares traded divided by the average absolute number of shares of this stock traded by fund i in all trading days. $Trades\ Lowest[0,10]_{i,t-1}$ is fund i's trades of the lowest performing stock on the earnings announcement day and the following ten days. $Past\ Ranks_{i,t-1}$ and $Past\ Returns_{i,t-1}$ control for fund performance ranks and returns in the past quarter and three years. $Fund\ Characteristics_{i,t-1}$ include controls for the fund's same-quarter return, age, and past-year flow volatility. Complete regression results including all control variables are reported in Table A19. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable	Quarterly Fund Flow					
	Raw return			FFC 4 factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)
Lowest Ret[0,1]	0.087***	0.069	0.096**	0.067**	0.133***	0.081*
	(3.50)	(1.34)	(2.32)	(2.53)	(2.76)	(1.86)
Lowest Ret[0,1] × Trades Lowest[-10, -1]		0.016**			0.021**	
		(2.23)			(2.24)	
Lowest Ret[0,1] × Trades Lowest[0, 10]			0.004			0.012
			(0.68)			(1.61)
Control variables:						
Trades Lowest[-10, -1]		0.006**			0.006**	
		(2.64)			(2.31)	
Trades Lowest[0, 10]			0.001			0.003
			(0.48)			(1.54)
Controls for the past ranks	Yes	Yes	Yes	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,926	768	1,103	1,704	672	781
Adjusted R-squared	0.151	0.177	0.157	0.177	0.234	0.174

Table A18: Quarterly Flows, Lowest Earnings Announcement Returns, and Institutional Trades – Using Transaction Data (Detailed)

The table reports the regression results in Table A15 with the coefficients on all the control variables fully displayed.

Dependent Variable	Quarterly Fund Flow					
		Raw Return			FFC 4 factor alpha	
	(1)	(2)	(3)	(4)	(5)	(6)
Lowest Ret[0,1]	0.035***	0.039***	0.024***	0.025***	0.028***	0.015**
	(4.96)	(5.38)	(3.03)	(4.83)	(5.54)	(2.04)
Lowest Ret[0,1] × Δ Weight		1.785***			1.465**	
		(3.10)			(2.33)	
Lowest Ret[0,1] × Weight			0.302			0.582
			(0.58)			(1.30)
Δ Weight		1.024***			1.011***	
		(6.60)			(6.57)	
Weight			0.319***			0.232**
			(2.87)			(2.27)
Past Quarter Rank	0.007	0.007	0.007	0.004	0.004	0.004
	(1.32)	(1.38)	(1.43)	(0.98)	(1.07)	(1.03)
Past Halfyear Rank	0.017***	0.017***	0.018***	0.012**	0.011**	0.012**
	(3.38)	(3.36)	(3.43)	(2.41)	(2.39)	(2.43)
Past Year Rank	0.042***	0.041***	0.042***	0.038***	0.037***	0.038***
	(7.44)	(7.35)	(7.46)	(7.59)	(7.52)	(7.57)
Past 3years Rank	0.074***	0.073***	0.074***	0.082***	0.081***	0.082***
	(20.51)	(20.15)	(20.63)	(24.49)	(23.71)	(24.47)
Past Quarter Ret	0.009	0.009	0.009	-0.000	-0.000	-0.000
	(0.56)	(0.58)	(0.57)	(-0.02)	(-0.01)	(-0.02)
Past Halfyear Ret	-0.002	-0.002	-0.003	-0.001	-0.001	-0.001
	(-0.18)	(-0.18)	(-0.20)	(-0.10)	(-0.07)	(-0.11)
Past Year Ret	0.002	0.002	0.002	-0.000	-0.001	-0.000
	(0.18)	(0.18)	(0.17)	(-0.05)	(-0.06)	(-0.05)
Past 3years Ret	0.002	0.002	0.002	0.001	0.001	0.001
	(0.85)	(0.81)	(0.88)	(0.21)	(0.18)	(0.22)
Same Quarter Ret	0.042	0.042	0.042	0.119**	0.118**	0.119**
	(1.44)	(1.44)	(1.44)	(2.57)	(2.56)	(2.58)
ln(Age)	-0.017***	-0.017***	-0.017***	-0.019***	-0.018***	-0.019***
	(-15.37)	(-15.25)	(-15.36)	(-14.85)	(-14.80)	(-14.82)
Turnover	-0.001	0.000	-0.001	-0.001	0.001	-0.001
	(-1.11)	(0.12)	(-0.92)	(-0.77)	(0.70)	(-0.64)
Exp Ratio	-0.922***	-0.902***	-0.969***	-0.883***	-0.876***	-0.899***
	(-4.64)	(-4.58)	(-4.85)	(-4.99)	(-4.98)	(-5.06)
ln(TNA)	-0.002***	-0.002***	-0.002***	-0.003***	-0.003***	-0.003***
	(-5.49)	(-6.00)	(-4.88)	(-8.32)	(-9.01)	(-8.06)
Flow Vol Past1y	0.303***	0.296***	0.301***	0.270***	0.263***	0.269***
	(10.98)	(10.76)	(10.94)	(9.86)	(9.73)	(9.86)
Ret Vol Past1y	-0.200*	-0.189*	-0.213**	0.254**	0.280***	0.229**
	(-1.96)	(-1.86)	(-2.06)	(2.47)	(2.72)	(2.12)
Num. Stocks	-0.000	-0.000*	-0.000	0.000**	0.000*	0.000**
	(-1.34)	(-1.69)	(-0.42)	(2.22)	(1.78)	(2.19)
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	71,817	71,746	71,817	69,778	69,708	69,778
Adjusted R-squared	0.153	0.156	0.153	0.157	0.160	0.157

Table A19: Quarterly Flows, Lowest Earnings Announcement Returns, and Institutional Trades – Using Transaction Data (Detailed)

The table reports the regression results in Table A17 with the coefficients on all the control variables fully displayed.

Dependent Variable	Quarterly Fund Flow					
	Raw return			FFC 4 factor alpha		
	(1)	(2)	(3)	(4)	(5)	(6)
Lowest Ret[0,1]	0.087***	0.069	0.096**	0.067**	0.133***	0.081*
	(3.50)	(1.34)	(2.32)	(2.53)	(2.76)	(1.86)
Lowest Ret[0,1] * Signed Volume[-10, -1]		0.016**			0.021**	
		(2.23)			(2.24)	
Lowest Ret[0,1] * Signed Volume[0, 10]			0.004			0.012
			(0.68)			(1.61)
Control variables:						
Signed Volume[-10, -1]		0.006**			0.006**	
		(2.64)			(2.31)	
Signed Volume[0, 10]			0.001			0.003
			(0.48)			(1.54)
Past Quarter Rank	0.001	0.033	-0.004	-0.039	0.001	0.010
	(0.04)	(0.78)	(-0.11)	(-1.41)	(0.03)	(0.29)
Past 3years Rank	0.071***	0.013	0.037*	0.085***	0.102**	0.056**
	(4.24)	(0.43)	(1.71)	(4.07)	(2.08)	(2.11)
Past Quarter Ret	0.359*	0.095	0.425	0.928***	0.479	0.388
	(1.85)	(0.22)	(1.50)	(2.73)	(0.75)	(1.01)
Past 3years Ret	0.006	0.120*	0.067	0.005	0.030	0.074
	(0.19)	(1.86)	(1.50)	(0.10)	(0.22)	(1.03)
Same Quarter Ret	0.246***	0.174	0.202*	0.127	0.261	0.050
	(3.00)	(1.25)	(1.73)	(1.32)	(1.57)	(0.30)
ln(Age)	-0.019***	-0.026***	-0.021***	-0.018***	-0.024***	-0.022***
	(-7.90)	(-5.11)	(-5.40)	(-6.43)	(-4.50)	(-4.34)
Flow Vol Past1y	0.397***	0.431***	0.356***	0.394***	0.582***	0.382**
	(4.38)	(3.02)	(3.09)	(3.62)	(2.97)	(2.30)
Quarterly Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,926	768	1,103	1,704	672	781
Adjusted R-squared	0.151	0.177	0.157	0.177	0.234	0.174

Table A20: Monthly Flows after A Strongly Negative Realization of Earnings Announcement Return

The table studies the abnormal monthly fund flows within nine months after a negative realization of earnings announcement return in the lowest quintile (<-23.1%) per month. We estimate the abnormal monthly flows using this regression below.

$$Flow_{i,t} = \sum_{s=1}^{9} b_s * D\_Lowest[0,1]_{i,t-s} + b_{10} * D\_Lowest[0,1]_{i,t} + b_{11} * Past\ Ranks_{i,t-1} + b_{12} * Past\ Returns_{i,t-1} + b_{13} * Fund\ Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t},$$

where $D\_Lowest[0,1]_{i,t-s}$ is a dummy variable for a strongly negative realization of the lowest earnings announcement return in the fund's portfolio s months ago, which equals one for those in the lowest quintile (<-23.1%) and zero for others. Since 92.5% of earnings announcements in our sample are in the first two months of a quarter, we also report the results for fund flows in month 1, 2, and 3 of a quarter separately. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent variable:	Monthly Flows			
	(1) All Months	(2) Month1	(3) Month2	(4) Month3
L.D_Lowest[0,1]	-0.0009***	0.0009	-0.0010**	-0.0015***
	(-2.63)	(1.12)	(-2.38)	(-2.74)
L2.D_Lowest[0,1]	-0.0009***	-0.0011**	-0.0003	-0.0011**
	(-2.92)	(-2.28)	(-0.53)	(-2.06)
L3.D_Lowest[0,1]	-0.0006**	-0.0009*	-0.0012***	0.0012*
	(-2.03)	(-1.96)	(-2.79)	(1.86)
L4.D_Lowest[0,1]	-0.0012***	0.0001	-0.0010*	-0.0020***
	(-3.58)	(0.08)	(-1.87)	(-3.90)
L5.D_Lowest[0,1]	-0.0007**	-0.0010**	0.0003	-0.0009*
	(-2.17)	(-2.03)	(0.46)	(-1.72)
L6.D_Lowest[0,1]	-0.0007**	-0.0011**	-0.0014***	0.0011**
	(-2.26)	(-2.28)	(-2.79)	(2.01)
L7.D_Lowest[0,1]	-0.0005*	0.0005	-0.0007	-0.0008*
	(-1.77)	(0.74)	(-1.40)	(-1.80)
L8.D_Lowest[0,1]	-0.0003	-0.0006	0.0006	-0.0004
	(-0.69)	(-1.01)	(0.80)	(-0.66)
L9.D_Lowest[0,1]	-0.0004	-0.0006	-0.0007*	0.0006
	(-1.18)	(-1.04)	(-1.74)	(0.81)
D_Lowest[0,1]	-0.0006**	-0.0009*	-0.0011**	0.0010
	(-2.01)	(-1.74)	(-2.36)	(1.39)
Controls for the past ranks	Yes	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes	Yes
Monthly Fixed Effects	Yes	Yes	Yes	Yes
Observations	151,691	50,735	50,842	50,114
Adjusted R-squared	0.121	0.129	0.120	0.115

Table A21: Institutional Trades before Announcements after A Strongly Negative Earnings Announcement Realization

The table studies the changes of institutional trades before earnings announcements after a negative realization of earnings announcement return in the lowest quintile (<-30.7%) per quarter. We estimate the changes of institutional trades using the 331 mutual funds with daily holdings data.

$$Signed\,Volume[-10,-1]_{i,t} = a_i + \sum_{s=1}^{4} b_s * D\_Lowest[0,1]_{i,t-s} + \sum_{s=0}^{4} f_s * Flow_{i,t-s}$$
$$+ b_5 * Past\,Ranks_{i,t-1} + b_6 * Past\,Returns_{i,t-1} + b_7 * Fund\,Characteristics_{i,t-1} + \upsilon_t + \varepsilon_{i,t},$$

where $SignedVolume[-10,-1]_{i,t}$ is fund i's across-stocks average of the trades in the ten days before the earnings announcement in quarter t. The trade in each stock is measured as the signed number of shares traded divided by the average absolute number of shares traded in this stock by fund i in all trading days. Variable $D\_Lowest[0,1]_{i,t-s}$ is a dummy variable for a strongly negative realization of the lowest earnings announcement return in the fund's portfolio s quarters ago, which equals one for those in the lowest quintile (<-30.7%) and zero for the others. Variable $Flow_{i,t-s}$ is quarterly fund flows s quarters ago. Both fund and quarter fixed effects are included. Robust standard errors are clustered by quarter and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent variable: Signed Volume[-10, -1]			
	(1)	(2)	(3)
L.D_Lowest[0,1]	0.000	-0.018	-0.013
	(0.01)	(-0.54)	(-0.40)
L2.D_Lowest[0,1]	-0.050***	-0.058**	-0.052**
	(-2.71)	(-2.53)	(-2.14)
L3.D_Lowest[0,1]		-0.042	-0.045
		(-1.30)	(-1.50)
L4.D_Lowest[0,1]		-0.029	-0.027
		(-1.13)	(-1.00)
Flow			1.090***
			(4.47)
L.Flow			0.148
			(0.66)
L2.Flow			0.188
			(1.25)
L3.Flow			0.320**
			(2.04)
L4.Flow			0.219**
			(2.16)
Controls for the past ranks	Yes	Yes	Yes
Controls for the past returns	Yes	Yes	Yes
Controls for fund characteristics	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes
Fund Fixed Effects	Yes	Yes	Yes
Observations	2,006	1,634	1,634
Adjusted R-squared	0.206	0.224	0.270

Table A22: Hedge Funds' Trades and Financial Constraints

The table studies the effect of financial constraints on hedge funds' trades before and after earnings announcements. We estimate Eq. (20):

$$
\begin{aligned}
trades_{i,j,t} =& a + b_1 * Constrained_{i,t} \times EarningDay_{j,t} \\
&+ b_2 * Constrained_{i,t} + b_3 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{i,j,t},
\end{aligned}
$$

where $trades_{i,j,t}$ is defined as in Eq. (2). $EarningDay_{j,t}$ is a dummy variable which equals one if it is the earning day under investigation (e.g, [-3] for the first column) and zero for all days outside our event window [-20, 20]. For the variable $Constrained_{i,t}$, we use an index of hedge fund financial constraints, constructed as explained in Section 7, with a mean of zero and a standard deviation of one. We use lockup period, redemption notice period, redemption frequency, fund age, and past year performance to construct this fund-level measure of financial constraint. Stock fixed effects are included into our analysis. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable:	Signed Trading Volume (Fund-Stock-Day Level)				
	[-3]	[-2]	[-1]	[0]	[1]
Constrained Index × Earning Day	-0.018	-0.105***	-0.126***	-0.047	0.107***
	(-0.52)	(-3.23)	(-3.84)	(-1.54)	(3.39)
Constrained Index	0.007	0.009	0.006	0.006	0.007
	(0.64)	(0.79)	(0.55)	(0.50)	(0.59)
Earning Day	-0.012	-0.036	-0.012	0.059**	0.017
	(-0.35)	(-0.94)	(-0.36)	(1.97)	(0.61)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	100,879	101,018	101,520	103,331	103,749
Adjusted R^2	0.05	0.05	0.05	0.05	0.05

Table A23: Hedge Funds and Financial Constraints (Individual Constraint)

The table reports the estimates of Eq. (20):

$$
\begin{aligned}
trades_{i,j,t} = & a + b_1 * Constrained_{i,t} \times EarningDay_{j,t} \\
& + b_2 * Constrained_{i,t} + b_3 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{i,j,t},
\end{aligned}
$$

using each individual measure of financial constraint for hedge funds. We only report the coefficients of the interaction terms. We use minus lockup period (LOCKUP), minus the redemption notice period (RED NOTICE), minus the redemption frequency (RED FREQ), minus the age of the fund (YOUNG), and minus the past year performance (BAD) for this regressions analysis. For each variable, we standardize it to a mean of zero and a standard deviation of one. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable: Signed Trading Volume (Fund-Stock-Day Level)					
	Coefficients of "Constrained × Earning Day"				
	[-3]	[-2]	[-1]	[0]	[1]
LOCKUP	0.003	-0.007	-0.026*	-0.047***	-0.035***
	(0.24)	(-0.47)	(-1.79)	(-3.55)	(-2.64)
RED NOTICE	-0.027**	-0.006	-0.087***	-0.047***	0.005
	(-2.26)	(-0.48)	(-6.79)	(-4.08)	(0.43)
RED FREQ	-0.027	-0.049***	-0.079***	-0.045***	0.053***
	(-1.48)	(-2.94)	(-4.37)	(-2.72)	(3.24)
YOUNG	-0.02	-0.055**	-0.121***	-0.045**	0.099***
	(-0.95)	(-2.36)	(-5.07)	(-2.20)	(4.71)
BAD	-0.008	-0.038	-0.092***	0.003	0.069***
	(-0.30)	(-1.46)	(-3.43)	(0.10)	(2.74)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes

Table A24: Mutual Funds and Other Financial Constraints

The table studies the effect of two other measures of financial constraints on mutual funds' trades before and after earnings announcements. We estimate Eq. (20)

$$\begin{aligned} trades_{i,j,t} = & a + b_1 * Constrained_{i,t} \times EarningDay_{j,t} \\ & + b_2 * Constrained_{i,t} + b_3 * EarningDay_{j,t} + \upsilon_j + \varepsilon_{i,j,t}, \end{aligned}$$

using each individual measure of financial constraint for mutual funds. We use minus the ln age of the fund (YOUNG) and the reverse of the past quarter performance rank (BAD) for this regressions analysis, and we use ln manager tenure in years (OLD MGR) to measure (low) risk-taking. Panel A reports the regressions results. Since the age of a fund and the tenure of the fund manager are positively correlated (with a correlation of 0.347) and young funds and new fund managers have different trading incentives, we do a multivariate regression (Eq. (20)) in Panel B including both "YOUNG" fund and "OLD MGR" and their interaction terms with $EarningDay_{j,t}$. We standardize each variable (YOUNG, BAD, and OLD MGR) to a mean of zero and a standard deviation of one, and we only report the coefficients of their interaction terms. Robust standard errors are clustered by day and t-statistics are reported in parentheses. Asterisks denote significance levels: *** 0.01, ** 0.05, and * 0.1.

Dependent Variable:	Signed Trading Volume (Fund-Stock-Day Level)				
	Coefficients of "Constrained × Earning Day"				
	[-3]	[-2]	[-1]	[0]	[1]
Panel A: Regressions of individual measures					
YOUNG	-0.002	-0.011	-0.012	-0.017**	-0.013
	(-0.21)	(-1.18)	(-1.36)	(-2.00)	(-1.50)
BAD	-0.005	-0.011	-0.018*	-0.020**	0.000
	(-0.56)	(-1.14)	(-1.94)	(-2.18)	(0.01)
OLD MGR (low risk-taking)	-0.028***	-0.027***	-0.027***	-0.010	-0.021**
	(-2.95)	(-2.76)	(-2.75)	(-1.00)	(-1.99)
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Panel B: Multivariate reg. for "YOUNG" fund and "OLD" manager (Corr = - 0.347)					
YOUNG × EarningDay	-0.015	-0.022**	-0.026***	-0.022**	-0.024**
	(-1.50)	(-2.11)	(-2.59)	(-2.23)	(-2.38)
OLD MGR × EarningDay	-0.035***	-0.036***	-0.038***	-0.017	-0.031***
	(-3.39)	(-3.39)	(-3.53)	(-1.47)	(-2.60)
Other Controls	Yes	Yes	Yes	Yes	Yes
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	869,578	869,649	870,957	884,350	888,679
Adjusted R^2	0.01	0.01	0.01	0.01	0.01

Table A25: Abnormal Trades of Hedge Funds and Mutual Funds by Flow Volatility Quintiles

The table studies the abnormal signed trading volume of hedge funds and mutual funds in days [-3, 1] around firms' earnings announcements by flow-volatility quintiles. At the beginning of every quarter, we sort hedge funds (mutual funds) into quintiles based on their past 2-year (year) monthly flow volatility. Panel A is for hedge funds, and Panel B is for mutual funds. Abnormal institutional trades are calculated using Eq. (3) with stock fixed effects. We use the 331 mutual funds with fund-level as well as transaction-level data for the analysis in panel B. Robust standard errors are clustered by day and *t*-statistics are reported in parentheses. Sig. lvl: *** 0.01, ** 0.05, and * 0.1.

Panel A: Abnormal Trades of Hedge Funds by Flow Volatility Quintiles

Dependent Variable:	Signed Trading Volume (Fund-Stock-Day Level)					
	[-3]	[-2]	[-1]	[0]	[1]	Flow Volatility
Q1 (low flow vol)	0.039	0.146*	0.122	0.108	-0.166**	0.016
	(0.51)	(1.81)	(1.52)	(1.34)	(-2.20)	
2	0.046	0.067	0.180*	0.025	-0.016	0.040
	(0.51)	(0.74)	(1.75)	(0.29)	(-0.17)	
3	0.035	0.024	0.107	0.072	0.170**	0.059
	(0.41)	(0.24)	(1.21)	(0.88)	(2.14)	
4	0.066	-0.093	-0.113	0.045	0.117	0.098
	(0.91)	(-1.10)	(-1.12)	(0.58)	(1.53)	
Q5 (high flow vol)	-0.090	-0.017	-0.423***	0.010	0.169***	0.134
	(-1.19)	(-0.23)	(-5.58)	(0.17)	(2.62)	
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes	

Panel B: Abnormal Trades of Mutual Funds by Flow Volatility Quintiles

Q1 (low flow vol)	-0.014	-0.038**	-0.043**	-0.021	0.000	0.005
	(-0.75)	(-2.10)	(-2.38)	(-1.22)	(0.02)	
2	-0.035**	-0.053***	-0.019	-0.031	0.045**	0.009
	(-1.94)	(-3.07)	(-1.07)	(-1.64)	(2.48)	
3	-0.005	-0.033*	-0.032**	-0.005	0.069***	0.017
	(-0.24)	(-1.75)	(-1.67)	(-0.23)	(3.24)	
4	-0.036	-0.043*	-0.084***	-0.063***	0.036	0.036
	(-1.51)	(-1.82)	(-3.63)	(-2.63)	(1.56)	
Q5 (high flow vol)	-0.027	-0.045*	-0.095***	-0.038*	0.026	0.108
	(-1.14)	(-1.90)	(-3.97)	(-1.65)	(1.11)	
Stock Fixed Effects	Yes	Yes	Yes	Yes	Yes	

Table A26: Summary Statistics of Flow Volatility Measures

The table reports the summary statistics of the quarterly measures of funds' flow volatility for hedge funds (in Panel A) and mutual funds (in Panel B) separately. We use hedge fund's past 2-year (mutual fund's past year) monthly flows to calculate the flow volatility $FlowVol_{i,t}$ used in the regression analyses in Table 6. Hedge funds usually have a redemption notice period of one to three months and a redemption frequency varying from a month to a year, whereas open-ended mutual funds' redemption notice periods are much shorter than hedge funds' and their redemption frequencies are much higher. Therefore, we choose two years for hedge funds and one year for mutual funds to calculate this flow volatility. Summary statistics both before and after the standardization are reported.

Panel B: Summary statistics of hedge funds' past 2-year monthly flow volatility

	# of obs.	Mean	Std	Min	Max
Flow volatility (in %)	2,556	0.065	0.043	0.001	0.219
FlowVol (standardized)	2,556	0	1	-1.48	3.56

	p10	p25	p50	p75	p90
Flow volatility	0.016	0.030	0.060	0.091	0.128
FlowVol (standardized)	-1.14	-0.82	-0.12	0.60	1.46

Panel B: Summary statistics of mutual funds' past year flow volatility

	# of Obs.	Mean	Std	Min	Max
Flow volatility	5,329	0.028	0.040	0.001	0.285
FlowVol (standardized)	5,329	0	1	-0.67	6.44

	p10	p25	p50	p75	p90
Flow volatility	0.004	0.006	0.013	0.031	0.069
FlowVol (standardized)	-0.60	-0.54	-0.38	0.08	1.02