# Does Disagreement Facilitate Informed Trading?[*]

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**Abstract**

Using high-frequency disagreement data from the investor social network StockTwits, we find that greater investor disagreement facilitates informed trading by activists and short sellers. These findings are unexplained by sentiment, news and retail order flow, and they remain when we measure disagreement overnight, which alleviates concern that disagreement and informed trading respond to a common shock. When short selling is costly, the facilitating effect of disagreement on trading is dampened for informed buyers but is amplified for sellers. These findings suggest that informed traders respond meaningfully to valuation changes induced by disagreement.

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# 1  Introduction

Trading in the presence of disagreement has long been thought to be a behavioral phenomenon (e.g., Aumann, 1976). Indeed, most prior work on disagreement focuses on the behavior of less sophisticated traders (e.g., Antweiler and Frank, 2004), or proposes explicitly behavioral explanations for why disagreement leads to trading (e.g., Daniel, Hirshleifer, and Subrahmanyam, 1998; Hong and Stein, 1999; Scheinkman and Xiong, 2003). However, this influential perspective is incomplete because it does not account for how *sophisticated* investors react to disagreement in equilibrium. These investors are critical, as they play an outsized role in shaping market outcomes.[1]

In this paper, we consider how unsophisticated disagreement affects trading by an influential class of sophisticated investors: privately informed traders. We find that disagreement facilitates informed trading across two different classes of identifiable informed traders: activists and short sellers. Moreover, our tests shed light into the mechanisms that affect informed trading via an examination of the heterogeneity in how these informed traders respond to disagreement.

Investor disagreement can affect informed trading through two main channels. First, disagreement may lead to noise trading, creating greater scope for informed traders to buy or sell on their private information (e.g., Kyle, 1985; Collin-Dufresne and Fos, 2015). If disagreement improves liquidity (e.g., Garfinkel, 2009; Cookson and Niessner, 2020), it should also encourage informed trading through this liquidity channel irrespective of whether the informed trader buys or sells. Second, investor disagreement can lead to overvaluation because pessimism is not fully incorporated into prices when short-selling is limited (Miller, 1977; Diether, Malloy, and Scherbina, 2002; Berkman, Dimitrov, Jain, Koch, and Tice, 2009).

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[1]A segment of the literature considers disagreement in a rational expectations framework (e.g., Banerjee and Kremer, 2010 and Banerjee, 2011), which is useful to understand disagreement *among* sophisticated individuals. This perspective argues that disagreement ought to carry a risk premium, which in settings with sophisticated disagreement, can lead to greater expected returns (David, 2008). We take a conceptually distinct approach that studies how *mostly unsophisticated* disagreement affects the trading decisions of informed traders.

If the stock is overvalued because of disagreement, this should matter for informed traders because informed traders care about trading profits. By contrast to the liquidity channel, this valuation channel affects informed buyers and sellers differently: informed buyers are discouraged by overvaluation, whereas informed sellers are attracted by it.[2]

We begin by showing our core result that disagreement is positively related to informed trading for both activists and short sellers. This analysis is possible because the StockTwits disagreement measure and informed trading indicators are available at the daily frequency. We find that a one standard deviation increase in investor disagreement is associated with a 2.3% increase in the likelihood of activist trading and 6.2% increase in the likelihood of a spike in short interest. Relating to the competing mechanisms, these positive responses are evidence that the liquidity mechanism is more important the valuation mechanism, on average. However, informed sales respond nearly *three times as much* as informed purchases to investor disagreement. This heterogeneity suggests that the valuation mechanism could also be important informed trading. Such a mechanism could naturally lead to the heterogeneity we observe because overvaluation from disagreement discourages informed purchases while encouraging informed sales.

In the next part of our analysis, we investigate the liquidity and valuation mechanisms behind our main result. First, we verify in the broad sample of firm-day observations that disagreement has both liquidity and valuation effects. Specifically, we estimate that higher investor disagreement is associated with higher daily turnover and more positive stock returns. A one standard deviation increase in investor disagreement is associated with a 4.4% increase in daily turnover rate and 3.7% higher stock returns. Following the literature, we expect the valuation channel to be more pronounced in the sub-sample with high short selling costs (Miller, 1977), and test this using Markit data on short selling utilization as a proxy for the

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[2]Although the Miller (1977) perspective has empirical support, the literature proposes two other possibilities for the price consequences of disagreement. Disagreement could command a risk premium (Varian, 1985; Carlin, Longstaff, and Matoba, 2014), or idiosyncratic risk may be priced when investors are under-diversified (Boehme, Danielsen, Kumar, and Sorescu, 2009). In our setting, we use broad market tests and sample splits on short selling costs to show that Miller (1977) is a more powerful mechanism for explaining returns and informed trading than these risk-based alternatives.

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cost of short selling. Consistent with an overvaluation effect, we find the positive relationship between investor disagreement and stock returns is amplified in the high utilization sub-sample relative in the low utilization sub-sample.

Guided by this evidence of daily valuation effects of disagreement, we turn to evaluate heterogeneity in *informed trading* by short selling costs, which provides a more precise test of the valuation mechanism. To do this, we split the sample at the median of short selling utilization to contrast stocks with high versus low short selling costs. For the high utilization sub-sample, we see informed purchases have *no* relation to disagreement while informed sales are strongly related to disagreement. By contrast, in the low utilization sub-sample, we see the opposite pattern: disagreement is strongly related to informed purchases while the relation of informed selling to disagreement weakens. This heterogeneity by short selling costs is novel evidence that the valuation mechanism is important for informed trading decisions. Beyond showing this mechanism is relevant, our finding of no effect on activist purchases when short selling is costly shows that, in some cases, the valuation channel is important enough for informed trading that it can completely offset the liquidity channel.

One possible concern with the main results, which employ contemporaneous measurement of disagreement and informed trading, is that disagreement responds to trading rather than the other way around.[3] To address this concern, we evaluate the relationship between *overnight* disagreement and informed trading. All of our main findings hold just as strongly given overnight measurement of disagreement. This evidence is useful because, in these specifications, disagreement occurs distinctly before trading activity, which helps to rule out the possibility that investor disagreement merely reflects a reaction to heightened trading activity.

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[3]This concern is less likely to be important for activist trading because these trades are unknown to other market participants. Indeed, activists have strong incentives to keep their trades private until they must disclose their trades for regulatory purposes. All of the activist trades we consider occur *prior* to the disclosure of the activist campaign. As activists accumulate their stakes in target firms, they have strong incentives to keep their purchases private until they are required to disclose their holdings and intentions. We validate this intuition using texts of tweets posted to StockTwits (see Figure 1), which show virtually no mention of activism in the pre-file period followed by a large spike in discussion of the topic.

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Furthermore, the results are robust to alternative specifications, control variables, and sub-sample tests. First, in the case of activist trading, we can measure the intensive margin of informed trading. Even after conditioning on days when an activist trades, we find disagreement predicts more activist trading. Second, our estimates are not sensitive to controlling for coverage in traditional news media, investor sentiment, and retail order imbalance. Thus, it is likely that the results are due to dispersion of opinion, not directional changes in sentiment. Finally, we obtain the same broad findings, even after dropping observations in which there are no messages about a firm on a particular day.

Finally, we note that facilitating the trading activities of activists and short sellers is important not only because it affects price efficiency, but also because it can have real effects (e.g., Grullon, Michenaud, and Weston, 2015; Back, Collin-Dufresne, Fos, Li, and Ljungqvist, 2018). To this end, we consider whether activists that face higher investor disagreement during their accumulation stages also tend to accumulate a greater stake in the underlying firm. Specifically, when shareholders of target firms exhibit below-median disagreement, activist investors accumulate about 3.5% of shares outstanding during the pre-filing sixty day period. In contrast, during events with above-median disagreement, Schedule 13D filers accumulate about 5.5% of shares outstanding during the pre-filing sixty day period. As activists have real effects on their target firms and greater effects when they acquire more of a stake in the firm, this finding suggests that disagreement may have important real effects through its effects on sophisticated and informed traders.[4]

Our paper makes several contributions. First, our paper contributes to the literature on the effects of investor disagreement on the trading environment. Trading by informed investors has traditionally been thought of as falling outside of disagreement models (Harris and Raviv, 1993; Kandel and Pearson, 1995; Hong and Stein, 1999; Xiong, 2013). For instance, Harris and Raviv (1993) assume that traders have access to common information but interpret market

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[4]Our findings could attract interest from the literature on the real effects of financial markets. Recent work has shown that disagreement affects real estate prices, the valuation of conglomerate firms, and security prices when assets are held in portfolios (Bailey, Cao, Kuchler, and Stroebel, 2018; Reed, Saffi, and Wesep, 2020; Huang, Hwang, You, and Yin, 2020).

information differently. Hong and Stein (1999) assume that the same information diffuses gradually through the marketplace. Neither of these perspectives considers the actions of informed traders separately from those of uninformed traders. As we show, however, disagreement among the mostly uninformed has an important effect on informed trading across a variety of sophisticated investor types. This equilibrium response by informed traders provides a fuller understanding the effects of disagreement and suggests modeling avenues for the interactions between sophisticated and unsophisticated market participants.[5]

Second, our results highlight an important tension between the valuation and liquidity effects of disagreement on informed trading. Notably, our results show that informed trading is not completely captured by a pure liquidity perspective like Kyle (1985), nor by a valuation-focused perspective like Miller (1977). Indeed, in the high utilization sub-sample, we find that informed purchases are less sensitive and informed sales are more sensitive to disagreement than a pure liquidity channel would predict. For this subset of trades, disagreement bears *no* relation to informed purchases due to offsetting valuation and liquidity effects. Our findings are not well explained by a pure valuation perspective either. Indeed, our core result that disagreement facilitates informed trade highlights that, on average, the liquidity mechanism is more powerful than the valuation mechanism. This suggests that models of informed trading should incorporate both valuation and liquidity channels, rather than one in isolation.

Finally, our work relates to the growing literature on investor social media (Cookson and Niessner, 2020; Pedersen, 2021), which primarily focuses on its information content and market consequences (Chen, De, Hu, and Hwang, 2014; Farrell, Green, Jame, and Markov, 2021). For example, existing work employs StockTwits data on geography to identify distinct sources of information (Giannini, Irvine, and Shu, 2017), and related research uses social

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[5]By connecting the actions of sophisticated investors with uninformed trades induced by disagreement, we provide a partial reconciliation between the large disagreement literature and the notion that sophisticated investors play an outsized role in shaping market outcomes (e.g., Koijen, Richmond, and Yogo, 2020). This is related to recent work that identifies uninformed trades by retail investors from Robinhood (e.g., Barber, Huang, Odean, and Schwarz, 2020; Ozik, Sadka, and Shen, 2020; Welch, 2020; Glossner, Matos, Ramelli, and Wagner, 2021; Eaton, Green, Roseman, and Wu, 2021). A unique feature of our setting is that both informed trading and disagreement can be observed explicitly.

connections and sharing behavior to understand information frictions in financial markets (Chen and Hwang, 2021; Cookson, Engelberg, and Mullins, 2022). Alternatively, other work uses StockTwits data to identify differences in investment philosophies or other ideology (Cookson, Engelberg, and Mullins, 2020). Our work is closest to recent research on the market and informational consequences of social media and retail investors (e.g., Dessaint, Foucault, and Frésard (2021) and Eaton et al. (2021)). Our contribution is to study how privately informed investors − who are unlikely to participate in investor social media − react to disagreement on investor social media. This finding provides evidence that investor disagreement can spill over into decisions made by other market participants.

## 2   Data

### 2.1   StockTwits Data

We measure investor disagreement using data from the investor social network StockTwits. StockTwits was founded in 2008 as a social networking platform that enables investors to share their opinions about stocks. The website has a Twitter-like format, where participants post short messages and use "cashtags" with the stock ticker symbol (e.g., *$AAPL*) to link a user's message to a particular company. According to a website analytics tool, Alexa, StockTwits was ranked as the 505th most popular website in the US as of June 2021. Its users are predominantly male, and the number of users on StockTwits with a graduate school degree is over-represented relative to the educational attainment of users of other websites.

StockTwits provided us with the universe of messages posted between January 1, 2010 and December 31, 2018. In total, there are 144,641,361 messages posted by 487,265 unique users who mention 13,248 unique assets. For each message, we observe a user identifier and the message content. We also observe indicators for sentiment (bullish, bearish, or unclassified), and "cashtags" that link the message to particular assets. For more information about the data, please refer to Cookson and Niessner (2020), who perform a series of validation exercises

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for using StockTwits data to measure disagreement.

Following prior work, we restrict attention to messages that mention only one ticker to focus on sentiment that can be directly linked to a particular stock. Because it will be useful for our decomposition of disagreement into distinct types, we retain StockTwits messages posted by users who select an investment approach, a holding period, and experience in their profile information. Further, to facilitate the link to informed trading data, we focus on firms that are headquartered in the United States and thus make regular filings with the SEC. After these sampling restrictions, our final sample contains 22,475,108 messages posted by 68,284 unique users on 9,306 unique tickers.

We construct our disagreement measure by computing the standard deviation of expressed sentiment across messages for a given $firm \times day$. Because the underlying sentiment variable is binary (-1 for a bearish sentiment and 1 for a bullish sentiment), the variance in the sentiment measure for a firm $i$ during a time period $t$ equals $1 - AvgSentiment_{it}^2$, where $AvgSentiment_{it}$ is the average sentiment of messages posted about firm $i$ during time period $t$. Thus our disagreement measure is

$$Disagreement_{it} = \sqrt{1 - AvgSentiment_{it}^2}. \tag{1}$$

The $AvgSentiment_{it}$ measure ranges from $-1$ (all bearish) to $+1$ (all bullish). This disagreement measure ranges from 0 to 1, with 1 signifying maximal disagreement. We apply the formula to firm-day observations that have non-zero messages. When there are no messages for a particular firm-day-group, it is not possible to compute the standard deviation of sentiment across messages. For this corner case, we maintain the assumption that non-posting means that traders do not wish to buy or sell in the near term. Accordingly, we normalize disagreement in the no-message case to 0, consistent with latent agreement, following the definition in Cookson and Niessner (2020). This choice regarding how to normalize the no-message case is consistent with the idea that minimal disagreement should

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correspond to minimal trading. Our tests consider robustness to this definition by excluding zero and one-message days from the analysis.

## 2.2   Data on Informed Trades

Our empirical tests rely on measuring informed trades from two types of sophisticated trades: activist investors on the precipice of an activist campaign and discrete increases in short selling activity.

### 2.2.1   Activist Trades from Schedule 13D filings

We extract information on the timing and size of privately informed trades by activists from the mandated disclosure of beneficial ownership to the SEC. Specifically, Rule 13d-1(a) of the 1934 Securities Exchange Act requires investors to file their status with the SEC within 10 days of acquiring beneficial ownership of more than 5% of a voting class of a company's equity securities registered under Section 12 of the Securities Exchange Act of 1934. We refer to the date when the beneficial ownership crosses the 5% threshold as the "event date" and the date when the filing is sent to the SEC as the "filing date."

Information on trades executed by Schedule 13D filers is reported in Item 5(c). To quote from Item 5(c), filers have to "...describe any transactions in the class of securities reported on that were effected during the past sixty days or since the most recent filing of Schedule 13D, whichever is less,..." Thus, filers are required to report the date, price, and quantity of all trades in the underlying security (common stock) executed during the 60 days that precede the filing date.

The sample of Schedule 13D filings with information on trades is constructed as follows.[6] First, we identify all Schedule 13D filings from 2010 through 2018. Next, we check the sample manually and identify events accompanied by information on trades. Because the trading characteristics of ordinary equities might differ from those of other assets, we retain only assets

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[6]See Collin-Dufresne and Fos (2015) for a detailed description of the procedure. Ye and Zhu (2020) use Schedule 13D data to study trading avenue choices made by informed traders.

whose CRSP share codes are 10 or 11. We discard certificates, ADRs, shares of beneficial interest, units, companies incorporated outside the U.S., Americus Trust components, closed-end funds, preferred stocks, and REITs. We further exclude stocks whose prices are below \$1 or above \$1,000. Finally, we exclude Schedule 13D/A filings (i.e., amendments to previously submitted filings) that are mistakenly classified as original Schedule 13D filings. The final sample comprises the universe of all Schedule 13D filings that satisfy the above criteria from 2010 through 2018, which totals 1,409 events. During the sample period, an average of 157 events take place annually.

For each event, we extract the following information from the Schedule 13D filings in our sample: the CUSIP of the underlying security, the transaction date, the transaction type (purchase or sell), the transaction size, and the transaction price. In the vast majority of cases, transaction data are reported at daily frequency. If the transaction data are reported more frequently than daily, we aggregate them to the daily level. Specifically, for each day we calculate the total change in stock ownership and the average purchase price. The average price is the quantity-weighted average of transaction prices.

### 2.2.2 Short Selling Data

We employ Markit data on daily shares on loan as a fraction of shares outstanding, to measure the short seller trading activity. Unlike informed activist trades, we are only able to observe the overall amount of short selling, not identifiable short positions by individual traders. For this reason, we focus on clear cases where daily short selling discretely increases for a firm on a given day. That is, we define an indicator variable *Short Increase Spike* if there is at least a 1 percentage point increase in the fraction of shares on loan from day *t-1* to day *t*.

In addition, we use the short selling utilization information from Markit to split our tests by cases where short selling is costly (high utilization of shares in short selling) versus cases where short selling is not (low short selling utilization). In line with prior literature (Blocher and Ringgenberg (2018)), we consider high utilization to be utilization above 60%.

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These sample splits allow us to focus on cases where the valuation channel is more or less important. In a robustness test, we use stock lending fees as an alternative proxy for the cost of short selling.

## 2.3    Summary Statistics

Table 1 reports summary statistics for all our variables. The full sample contains 15,743,814 firm-day observations. We report *Turnover* and *Return* in percentage units to facilitate exposition of the regression specifications. Consistent with the high degree of daily trading volume observed in other settings (e.g., Hong and Stein (1999)), the sample average of *Turnover* is 1.32%. The *Disagreement* measure ranges from 0 (complete agreement) to 1 (maximal disagreement), with a relatively small mean (0.054) that is driven by a large number of 0 disagreement days. These days in which disagreement is zero are mostly driven by days with 0 or 1 messages in which disagreement is not possible. Naturally, when we drop these days from the sample, we observe a larger mean (0.529). Therefore, we consider robustness of our findings to dropping days with 0 or 1 messages.

For each of the informed trading measures, informed trades are infrequent in the full firm-day panel, irrespective of the type of informed trade: 0.569% (high short increases) and 0.133% (informed activist trades) of firm-day observations correspond to a day with informed trade. However, in the case of activist trading, we can focus on the pre-file window to understand how likely informed trade is, conditional on being informed. We observe that 37.3% of days in the 60-day window prior to a Schedule 13D filing are days when the activist trades. Viewed this way, there is a high likelihood of informed trade during periods when traders are informed.

[Insert Table 1 here]

Before presenting our evidence on the relation between these informed trades and disagreement at the daily level, we present monthly evidence that activist trades and short

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selling spikes are informed. To do this, we construct indicator measures for whether there was an informed trade (activist purchase or short selling spike) in month $t$, and we relate these indicators in a monthly panel regression with next-month $t+1$ return as the dependent variable. The results from this exercise are reported in the Appendix (Table A1). Consistent with these trades being informed (as opposed to generating short-term price pressure), activist trade in month $t$ predicts roughly 1.5 percentage points greater stock return in the following month. Similarly, short selling is informed in the opposite direction, a short interest spike is associated with between 0.2 and 0.3 percentage point reduction in next-month returns. These returns results are similar if we look at the return in the next two month period, as well.

# 3  Disagreement and Informed Trading

In this section, we present our core findings on how disagreement facilitates informed trading, and how liquidity versus valuation channels matter for disagreement's relationship with informed trade.

## 3.1  Empirical Strategy

Our empirical strategy is to recognize two features of the valuation channel: the asymmetry with respect to purchases versus sales and the importance of short sale constraints.

First, the valuation channel discourages informed purchases but encourages informed sales, while the liquidity channel encourages any type of informed trade. On this logic, we expect that sophisticated and informed selling ought to have a stronger relationship to disagreement than sophisticated and informed purchasing. Indeed, whether informed purchases respond positively or negatively to disagreement is an empirical question about whether valuation or liquidity is more important for informed traders.

Second, the valuation channel should be strongest when short sale constraints are most binding. For this reason, we consider sample splits between high versus low utilization stocks

to provide deeper insight into how much valuation versus liquidity mechanisms matter for informed traders.

We implement this empirical strategy by estimating the following panel regression:

$$Y_{it} = \alpha_i + \alpha_t + \beta Disagreement_{it} + X_{it}'\gamma + \varepsilon_{it}, , \tag{2}$$

where $Y_{it}$ is an indicator variable for informed trading on day $t$ in firm $i$, $Disagreement_{it}$ is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, $\alpha_i$ are firm fixed effects, $\alpha_t$ are date fixed effects, and $X$ is a vector of control variables (contemporaneous and lagged number of messages, lagged disagreement, lagged informed trade, media coverage, lagged volatility, and lagged cumulative abnormal returns). We separately consider specifications with an indicator of informed purchases (*Activist Trade Dummy*) and informed sales (*Short Increase Spike*) as the dependent variable. Our interest in these specifications is in contrasting how much informed purchases respond to disagreement with how much informed sales do.

## 3.2   Results on Informed Trading

Following the first part of our empirical strategy, we report the estimated relationships between disagreement and different kinds of informed trade in Table 2.

[Insert Table 2 here]

Irrespective of the kind of informed trade considered, we estimate a positive and significant relationship between disagreement and informed trade. For informed purchases (column 1 Activist purchases), these results indicate that the liquidity channel is more important for informed trading than the valuation channel, on average. For example, during the 60 day window prior to a Schedule 13D filing, a standard deviation increase in disagreement is associated with 0.84 percentage point greater likelihood that the activist purchases shares on that day. This coefficient reflects an increase of 2.262% of the baseline rate of activist trades during this 60 day window.

Because the different kinds of informed trade have different base rates, it is most informative to compare the economic magnitude relative to the base rate across columns. When drawing this comparison, we see that the economic magnitude of the disagreement coefficient is much greater for informed sales (column 2) versus informed purchases (columns 1). Specifically, the disagreement coefficient is 2.3% of the likelihood of informed purchases, but 6.2% of the likelihood of a short interest spike. This pattern is consistent with the idea that the valuation channel discourages informed purchases, but encourages informed sales.

## 3.3 Liquidity and Valuation Channels

The main findings in the previous section show a strong empirical link between disagreement and informed trading, and the relative magnitudes suggest that both valuation and liquidity mechanisms could be at play. In this section, we investigate these mechanisms more precisely. Specifically, we show how disagreement gives rise to both a liquidity channel and a valuation channel. This evidence takes the form of panel regressions that relate disagreement at the stock-day level to stock-day stock turnover and returns outcomes. We follow the format of the specifications in equation (2), but instead of informed trading proxies, we include outcome variables related to liquidity and valuation − daily turnover, illiquidity measures, or returns − in a broad panel of firm-day observations.

Using daily turnover as the dependent variable, we obtain the findings in Panel A of Table 3, columns 1 and 2. We estimate that a one-standard-deviation increase in $Disagreement$ for a given observation ($sd = 0.054$) is associated with 0.22 percentage points greater $Turnover$. In column 2, we find that disagreement at a one-day lag does not predict stock turnover. Thus, we are confident that the estimates do not reflect persistent effects of disagreement and trading from previous days. This estimated magnitude is economically significant, representing approximately one sixth of the average daily turnover, which equals 1.32 percent, and approximately 4.46% of the standard deviation of daily turnover.

[Insert Table 3 here]

These results on daily turnover are consistent with a liquidity channel in which disagreement reduces market illiquidity. To further highlight this liquidity channel, we replace the dependent variable in columns 1 and 2 with a variety of explicit illiquidity measures from the literature (e.g., Amihud (2002) illiquidity, as well as different measures of spread and price impact). These results are reported in Table A2 in the Appendix. Regardless of how we proxy for illiquidity, we find that greater disagreement corresponds to less market illiquidity.

Next, to establish the relevance of the valuation channel, we consider the relationship between disagreement and contemporaneous daily stock returns in an analogous specification. The results are reported columns 3 and 4 of Table 3. The results indicate that disagreement and stock returns are positively related, consistent with a valuation channel. Based on the estimate in column 3, a one-standard-deviation increase in disagreement is associated with higher returns of approximately 9.6 basis points daily. This finding is consistent with Hong and Stein (1999), who posit that disagreement should lead to positive price pressure in the short term. Based on the results in column 4, this estimated coefficient is robust to including lagged measures of disagreement and number of messages. Relative to the daily standard deviation of returns, these estimated coefficients reflect a similar economic magnitude as the turnover results: A standard deviation increase in disagreement is associated with an increase of 3.5% of a standard deviation in returns.[7]

To provide further evidence on the valuation channel, we estimate the relation between returns and disagreement separately for stocks with a high fraction of shares on loan (high utilization) versus those with a low fraction of shares on loan (low utilization). These sample splits reveal whether the disagreement-return relationship is stronger in the presence of short sale constraints (high utilization stocks), as predicted by the Miller (1977) model. The results from estimating the returns specification on these sub-samples are reported in Panel B of Table 3. Consistent with the Miller hypothesis, we observe a stronger relationship

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[7]The coefficient on lagged disagreement is negative and statistically significant in column 4. This finding suggests that there is some reversion in returns after an initial increase coincident with high disagreement. Such a finding is consistent with the prediction of Miller (1977) model as short sale constraints ease.

between stock returns and disagreement in the high utilization sub-sample (columns 1 and 2) than we do in the low utilization sub-sample (columns 3 and 4). In the specifications that control for lagged disagreement and number of messages (columns 2 versus 4), a standard deviation increase in disagreement is associated with 13.9 basis points greater return in the high utilization sub-sample, but only 8.7 basis points more return in the low utilization sub-sample. The difference in these coefficient estimates is highly statistically significant.[8]

## 3.4  Liquidity and Valuation Mechanisms for Informed Trading

To more precisely test this valuation mechanism, we appeal to the logic that the valuation channel is strongest when it is difficult to short sell. Specifically, in Table 4, we present results from the same specifications separately for the high utilization sub-sample (Panel A) versus the low utilization sub-sample (Panel B). Under the valuation channel, the *ex ante* prediction is that disagreement will be less (more) related to informed purchases (sales) in the high utilization sub-sample.[9] This is precisely what we find. Referring to column 1 Panel A, activist purchases are unrelated to disagreement in the high utilization sub-sample, indicating that the valuation channel and the liquidity channel completely offset one another. Consistent with a valuation channel at play, column 2 shows that the relationship between disagreement and informed selling becomes much greater in the presence of short sale constraints, with a standard deviation increase in disagreement reflecting an increase in informed selling likelihood of between 7.6% of the baseline rate. Panel C of the table presents these economic magnitudes together with tests for differences in coefficients across specifications.

[Insert Table 4 here]

Turning to the low utilization sub-sample in Panel B, the relationship between disagreement and informed purchasing strengthens in economic magnitude (going from 0.01% in

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[8]These results also hold if we control for firm-day sentiment, alleviating the concern that the return result (and thus, evidence of the valuation channel) is driven by returns. See Table A3 in the Appendix.

[9]In a robustness test, we use stock lending fees as an alternative measure of costs of short selling. Internet Appendix Table A4 shows that results are qualitatively similar to the results obtained we split based on stock utilization rate.

Panel A to 2.7% in Panel B), whereas the relationship between disagreement and informed selling weakens (going from 7.6% to 3.6% in Panel B). Taken together, these findings show that disagreement facilitates informed trade for both informed purchases and informed sales, on average, and that the overall response of informed trade to disagreement reflects both liquidity and valuation channels. Viewed through the lens of the high versus low utilization sample splits, both channels have an economically important effect on informed trading.

For convenience, Panel C of Table 4 presents pairwise tests of differences in coefficients for high versus low short selling utilization (high minus low). For informed buys, the economic magnitude in the low utilization sample is greater by 2.64 percentage points is statistically significant at the 10% level. For informed sales, the economic magnitude is smaller by 3.99 percentage points and is statistically significant at the 1% level. These shifts in the economic effect size that are consistent with there being an important valuation channel at play.

# 4    Robustness and Implications

In this section, we present several robustness exercises and supplemental results that point to the implications of our main findings.

## 4.1    Overnight Disagreement and Informed Trading

A first order concern about relating informed trading to investor disagreement is that the two measures are contemporaneous to one another. It is, thus, difficult to tell whether disagreement facilitates informed trading or whether the trading generates disagreement. In the case of activists, the context makes us more confident that those who express disagreement are unaware of informed trading. However, other kinds of trading may be more easily monitored by market participants (e.g., short selling).

To refine our interpretation, we consider specifications that replace the $Disagreement$ measure with the sub-daily measure $Disagreement\ Night_{it}$ (the standard deviation of

StockTwits message sentiment from the overnight period about firm $i$, i.e., from 4 p.m. on day $t-1$ to 9 a.m. of day $t$). Similar to the $Disagreement$ measure, we replace one of control variables, the number of messages, with the number of messages during the night. We do this to ensure that the variation in the $Disagreement$ measure is not purely reflecting differences in attention. The coefficient of interest in the coefficient on $Disagreement\ Night_{it}$, which occurs distinctly prior to the informed trades on date $t$.

Empirically, StockTwits investors seem to be relatively unaware of the actions of informed traders across both measures of informed trade. In support of this, we plot the fraction of mentions to "activist" and "short" in an event window around when these trades are disclosed to the market in Figure 1. In each case, the event window exhibits a spike on the day of the disclosure and a few days following. This confirms that StockTwits users pay attention to the actions of informed traders, but also highlights that StockTwits users do not anticipate these trades. Although the activist trades typically take place weeks before their disclosure with the broader market unaware, there is some contemporaneous attention short selling, which is immediately observable to market participants. Thus, particularly to highlight the differential response of buyers versus sellers to disagreement, it is helpful to evaluate whether disagreement that precedes informed trades predicts informed trading.

[Insert Figure 1 here]

Table 5 presents the results of this *overnight disagreement* specification. Analogous to our main findings, we estimate that disagreement overnight facilitates informed trade the next day, irrespective of whether we consider activist purchases or informed short selling. In addition, consistent with our main findings, the economic magnitudes of informed sales response to disagreement are greater than the analogous magnitudes for informed buys. In addition, the evidence of a difference between high and low short selling costs is somewhat stronger in terms of statistical significance. These findings highlight that our general conclusions about whether disagreement facilitates informed trade and the relative weight of valuation versus

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liquidity channels are not driven by the contemporaneous measurement of disagreement and informed trade.[10]

[Insert Table 5 here]

## 4.2   Intensive Margin of Informed Trading

One aspect of the main measures of informed trading is that they are indicator measures for whether the sophisticated investor took a position on that day. Such measurement naturally leads one to wonder if there is something special about the days that generate informed trade. To evaluate this possibility, we focus on activist trading because the Schedule 13D disclosures reveal *how much* the activist trades in addition to whether they trade on a given day. Using this intensive margin measurement, we construct a measure *Activist Turnover* that reflects the fraction of shares acquired by the activist in the target firm on a given day (restricting the sample to the 60-day window before disclosure of the activist campaign).

   Using this measure, we estimate how disagreement relates to the intensive margin of informed trade by restricting to days in which the activist made at least one purchase. Table 6 reports the results. For reference, column 1 repeats the extensive margin specification. In column 2, we observe a positive and significant relationship of the intensive margin of activist purchasing Moreover, the economic magnitude is quite a bit stronger than the extensive margin estimate: a standard deviation increase in disagreement is associated with an increase of activist turnover of 17.7% of the average shares traded.

[Insert Table 6 here]

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[10]The results presented in the main tables are for the sample splits by short selling utilization. We have also estimated a version of this overnight disagreement test in the overall sample, finding that the main result is robust to this measurement. See Table A5 in the Appendix.

## 4.3 Other Robustness

We have performed several other robustness tests to account for alternative explanations of our finding.

First, one concern is that, in the case where there are zero messages or one message, the disagreement measure is automatically zero. In Appendix Table A6, we present the main result table without observations in which there are zero messages or only one message about the firm on a given day on StockTwits, and we find very similar results to our main specifications.

A second class of robustness concerns is that the disagreement measure may not reflect pure dispersion of opinion, but directional sentiment and or the directional trading of retail investors. The appendix accounts for this possibility by controlling for average sentiment on StockTwits (Table A7) and controlling for retail trader imbalance using the retail trade classification of Boehmer, Jones, Zhang, and Zhang (2020) (Table A8). Neither of these controls changes the estimates in a quantitatively meaningful fashion.

## 4.4 Direct Observation of the Liquidity Channel

Next, we use activist setting to show more explicitly the link to liquidity. In this setting, we have the special feature where the activist is truly privately informed about their intentions to engage in activism. By contrast, short sellers may rely on signals that other sophisticated market participants also use. Unlike these market participants, informed activist trading is largely uncorrelated with other traders' information. This allows us to decompose overall stock turnover into the turnover due to activists, and the remainder of (uninformed) ex-activist turnover.

We calculate *Ex-activist trading* by regressing turnover on activist turnover and taking the residual. The results are reported in Table 7, which reports ex-activist turnover as a percentage by multiplying it by 100. For column 1, we focus on the $[t-60, t-1]$ period prior to Schedule 13D filings. We estimate that greater investor disagreement leads to higher

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ex-activist trading.[11]

[Insert Table 7 here]

The results reported in columns 2 and 3 show that the relationship between investor disagreement and ex-activist trading differs between days when activist investors trade and the days on which they do not trade. Specifically, for activist trading days (column 2), the relationship between disagreement and ex-activist trading on days when activists trade is *stronger* than the relationship between disagreement and ex-activist trading on days when activists do not trade (0.8432 versus 0.1141). Overall, the results are consistent with the idea that activist investors trade on days when uninformed investors react especially strongly to investor disagreement. Because ex-activist trading activity is, by construction, the fraction of daily turnover that is uncorrelated with activist trading activity, this finding provides further evidence consistent with the liquidity channel.

## 4.5 Real Effects of Disagreement: Activist Stakes in Target Firms

We conclude this section by presenting a result that connects the disagreement and trading results to a potential real effect. This test focuses on the eventual stakes that activists acquire, which are important because greater stakes incentivize greater effort on the part of the activist investor (e.g., Back et al., 2018).

For this test, we consider whether activists who target firms that face greater disagreement in their pre-filing periods also acquire greater stakes in their target firms. Using raw data at the event level, we illustrate this relationship by focusing on the mean acquisition stake of activists by comparing whether a targeted firm exhibited above- or below median-disagreement in the pre-filing period. Consistent with the facilitation of activism by disagreement, Panel (a) of Figure 2 shows that activists acquire significantly higher numbers of shares when shareholder disagreement about a target firm is high. Specifically, when shareholders of target

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[11]These results are robust to using an alternative measure of ex-activist turnover: total turnover minus activist turnover.

firms exhibit below-median disagreement, activist investors accumulate about 3.5% of shares outstanding. In contrast, during events with above-median levels of messages, Schedule 13D filers accumulate about 5.5% of shares outstanding. This finding indicates that, when investor disagreement increases, activist investors purchase lager fractions of shares outstanding and therefore are likely to devote more time and energy to activism (Back et al., 2018).

[Insert Figure 2 here]

In Panel (b) Figure 2 we also show that this period of higher disagreement is associated with greater overall stock turnover. Consistent with the liquidity mechanisms we have highlighted throughout the paper, high disagreement appears to be a useful signal about greater trading volume.

# 5   Conclusion

This paper studies how a particular class of sophisticated investors − informed traders − respond to shareholder disagreement. We find that greater investor disagreement facilitates informed trading by activists and short sellers. These findings are unexplained by sentiment, news, and retail order flow, and they remain when we measure disagreement in the overnight period, which alleviates concern that disagreement and informed trading respond to a common shock. When short selling is costly, the effect of disagreement is dampened for informed buyers but is amplified for sellers.

Our findings show that disagreement has important effects on both the timing and intensity of informed trading through two distinct mechanisms. On one side, disagreement generates trading by uninformed investors and therefore opens up trading opportunities for informed investors. On the other side, disagreement increases valuation, particularly when short selling is costly, and therefore discourages informed buyers and encourages informed sellers.

Overall, our results highlight the importance of informed and sophisticated market

participants to a full understanding of the effects of disagreement in financial markets. Based on our findings, more research is needed to incorporate sophisticated investors' actions into market equilibrium in settings dominated by the actions of behavioral agents.

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## Figure 1: Informed Trade and StockTwits Messages About Them

Note: This figure presents four plots of the fraction of messages that refer to each of the informed trading events we study. The first panel presents mentions of "activist" for a window of $t = -80$ to $t = +20$ days around an activist's Schedule 13D filing. This shows the pretrend for the whole pre-filing period, prior to disclosure in the Schedule 13D filing. The second plot presents mentions of "short" for a window of $t = -10$ to $t = +10$ days around short sale spike events.

### Mentions of "Activist" around 13-D disclosure dates
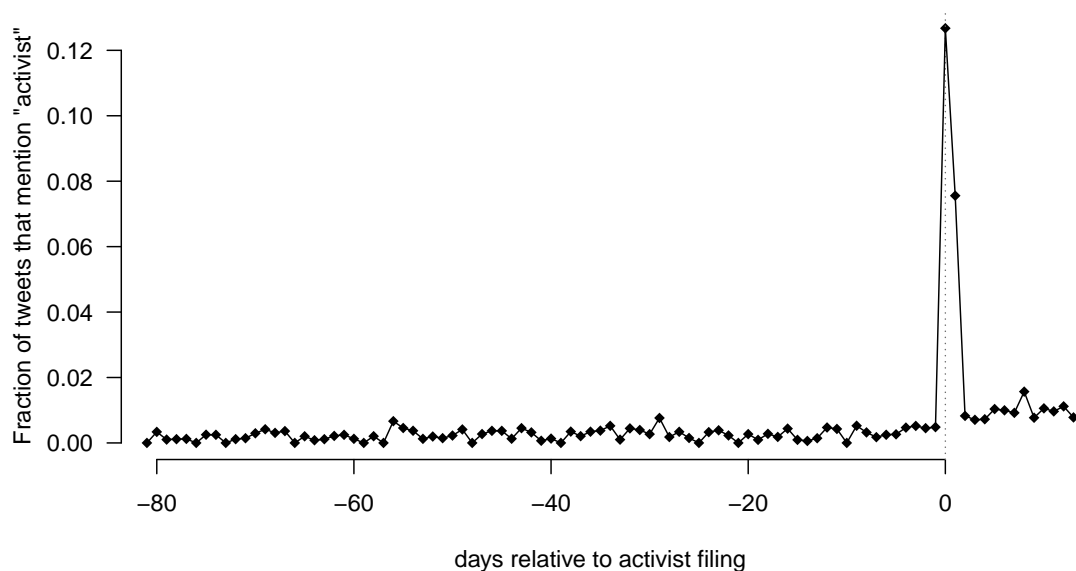


### Mentions of "Short" around short interest spikes



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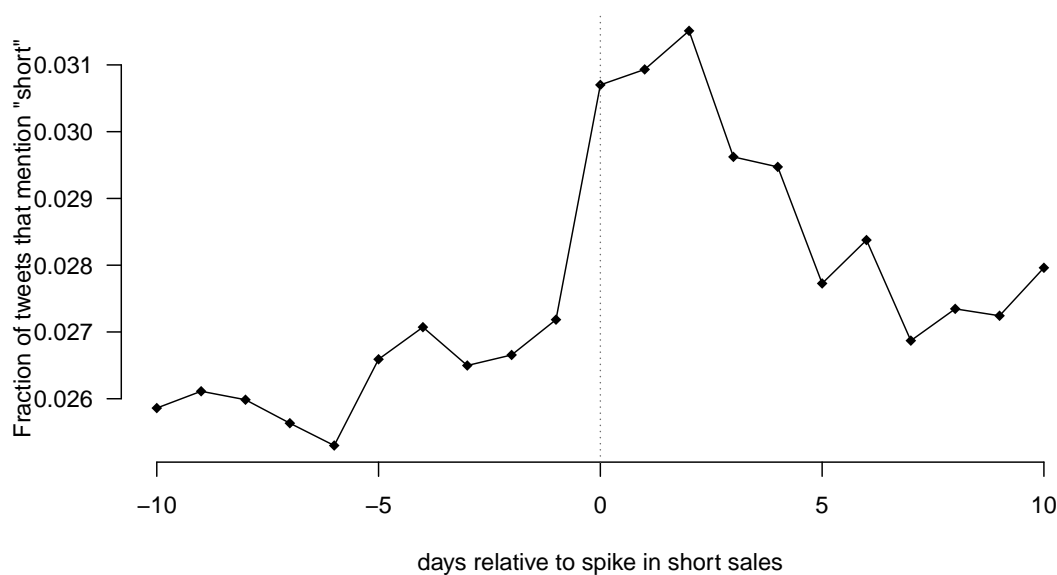
# Figure 2: Shares acquired and investor disagreement

Note: Panel (a) plots the fraction of shares outstanding acquired by a focal activist investor during the 60-day period prior to a Schedule 13D filing. Panel (b) plots the average turnover during the 60-day period prior to a Schedule 13D filing. Panel (c) plots the average ex-activist turnover during the 60-day period prior to a Schedule 13D filing. The x-axis represents the average level of disagreement during those 60 days. The level of disagreement is divided above and below the median level of disagreement. The standard error bars represent confidence intervals at the 95% level.

## (a) Shares Acquired
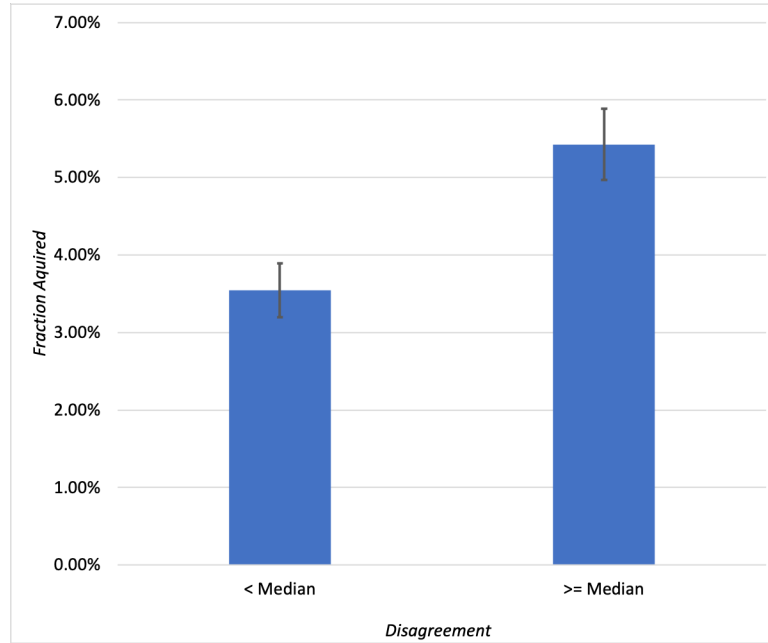
**(b) Average Turnover**
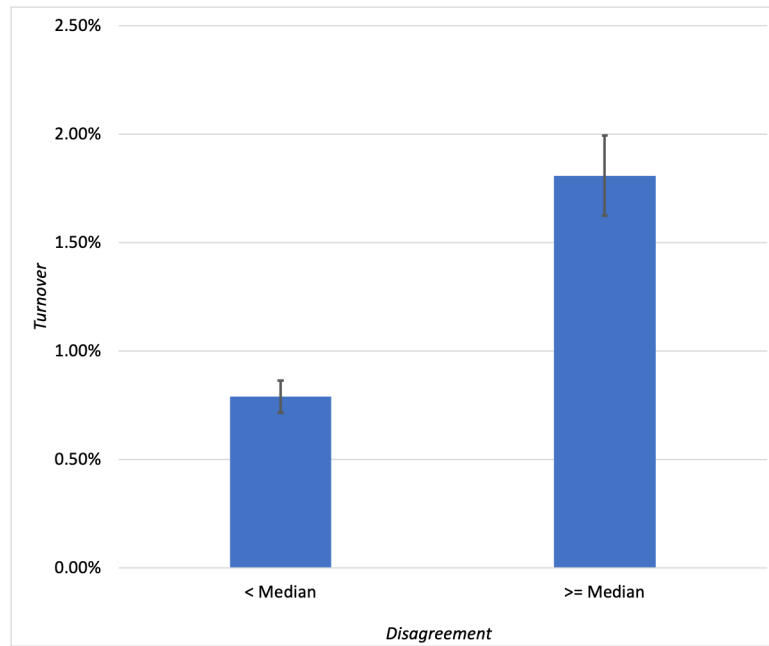
**Table 1: Summary Statistics**

Note: In this table, we report summary statistics or firm-day-level variables. The sample covers the 2010-2018 period when StockTwits data are available. Activist turnover variables are reported during the 60-day period prior to a Schedule 13D filing. All potentially unbounded variables are winsorized at 1% and 99%.

|  | N | mean | sd | min | p25 | median | p75 | max |
|---|---|---|---|---|---|---|---|---|
| Turnover | 15,743,814 | 1.321 | 4.989 | 0.000 | 0.189 | 0.449 | 0.966 | 93.829 |
| Return | 15,743,814 | 0.029 | 2.682 | -17.403 | -0.906 | 0.000 | 0.916 | 22.371 |
| Disagreement | 15,743,814 | 0.054 | 0.215 | 0.000 | 0.000 | 0.000 | 0.000 | 1.000 |
| Disagreement \| num. messages > 1 | 1,609,631 | 0.529 | 0.450 | 0.000 | 0.000 | 0.771 | 0.943 | 1.000 |
| Number of messages | 15,743,814 | 1.292 | 16.667 | 0.000 | 0.000 | 0.000 | 0.000 | 5,769 |
| High Utilization | 15,743,814 | 0.466 | 0.499 | 0.000 | 0.000 | 0.000 | 1.000 | 1.000 |
|  |  |  |  |  |  |  |  |  |
| *Informed Trading Measures* |  |  |  |  |  |  |  |  |
| High Short Increase | 15,743,814 | 0.569 | 7.524 | 0.000 | 0.000 | 0.000 | 0.000 | 100.000 |
| Activist Trade Dummy |  |  |  |  |  |  |  |  |
| ... full sample | 15,743,814 | 0.133 | 3.638 | 0.000 | 0.000 | 0.000 | 0.000 | 100.000 |
| ... 60 days before filing | 55,958 | 37.282 | 48.356 | 0.000 | 0.000 | 0.000 | 100.000 | 100.000 |
| Activist Turnover |  |  |  |  |  |  |  |  |
| ... full sample | 15,743,814 | 0.000 | 0.016 | 0.000 | 0.000 | 0.000 | 0.000 | 1.790 |
| ... 60 days before filing | 55,958 | 0.090 | 0.260 | 0.000 | 0.000 | 0.000 | 0.047 | 1.790 |
| Ex Activist Turnover |  |  |  |  |  |  |  |  |
| ... full sample | 15,743,814 | -0.180 | 4.988 | -1.500 | -1.311 | -1.051 | -0.535 | 92.315 |
| ... 60 days before filing | 55,958 | -0.417 | 3.715 | -1.500 | -1.364 | -1.085 | -0.510 | 92.315 |

## Table 2: Investor Disagreement and Informed Trading

In this table, we report results pertaining to the relationship between informed trading and disagreement among investors. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day t, and is standardized. In column (1), the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day t, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2), the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day t, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects where indicated. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy | Short Increase Spike |
|---|---|---|
| | (1) | (4) |
| Disagreement | 0.8432*** | 0.0414*** |
| | (0.202) | (0.006) |
| Number of messages | 0.1416*** | -0.0020* |
| | (0.027) | (0.001) |
| Trade Dummy (t-1) | 0.4605*** | 0.0295*** |
| | (0.008) | (0.001) |
| Turnover (t-1) | 0.2992*** | 0.3879*** |
| | (0.068) | (0.019) |
| Media | 1.2240 | 0.0925*** |
| | (0.961) | (0.016) |
| Volatility (t - 5, t - 1)) | 22.0313** | -1.6391*** |
| | (8.703) | (0.535) |
| CAR(t-1, t-5) | 8.6800*** | -1.4262*** |
| | (2.868) | (0.114) |
| CAR(t-30,t-6) | 4.8508*** | -0.2797*** |
| | (1.781) | (0.041) |
| Observations | 55,029 | 8,614,152 |
| R-squared | 0.413 | 0.037 |
| | | |
| Disagreement effect size | 2.262% | 6.193% |
| Mean | 37.281 | 0.668 |
| | | |
| Firm FEs | Yes | Yes |
| Date FEs | Yes | Yes |

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## Table 3: Liquidity and Valuation Channels

In this table, we report results pertaining to the relationship between turnover, returns and disagreement among investors. Turnover, on day t is multiplied by 100. Returns, is calculated as the close-to-close return obtained from CRSP. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day t, and is standardized. For Panel A, the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day t, and zero otherwise. The sample covers 2010-2018. For Panel B, we split the sample into high and low utilization subsamples. The utilization measure on day t is obtained from Markit data set and high utilization is defined as the average utilization over days $t-5$ to $t-1$ being greater or equal to 60%. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day t, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| *Panel A: Full Sample* | | | | |
|---|---|---|---|---|
| Dependent variable: | Turnover | | Returns | |
| | (1) | (2) | (3) | (4) |
| Disagreement | 0.2151*** | 0.2115*** | 0.0956*** | 0.0991*** |
| | (0.012) | (0.013) | (0.004) | (0.004) |
| Number of messages | 0.0247*** | 0.0465*** | 0.0057*** | 0.0129*** |
| | (0.006) | (0.009) | (0.001) | (0.003) |
| Disagreement (t-1) | | -0.0051 | | -0.0247*** |
| | | (0.005) | | (0.002) |
| Number of messages (t-1) | | -0.0318*** | | -0.0103*** |
| | | (0.006) | | (0.002) |
| Turnover (t-1) | 0.6212*** | 0.6313*** | -0.0108*** | -0.0071*** |
| | (0.014) | (0.014) | (0.001) | (0.001) |
| Media | 0.1913*** | 0.1703*** | 0.0428*** | 0.0371*** |
| | (0.019) | (0.018) | (0.008) | (0.008) |
| Volatility (t-1, t-5) | 0.7445 | 1.8074*** | -0.3560 | 0.0647 |
| | (0.462) | (0.407) | (0.235) | (0.229) |
| CAR(t-1, t-5) | -0.2239** | -0.0828 | -1.7257*** | -1.6783*** |
| | (0.087) | (0.075) | (0.134) | (0.134) |
| CAR(t-30,t-6) | 0.1283*** | 0.1606*** | -0.1577*** | -0.1449*** |
| | (0.029) | (0.026) | (0.031) | (0.031) |
| Observations | 15,377,819 | 15,377,819 | 15,377,869 | 15,377,869 |
| R-squared | 0.688 | 0.692 | 0.112 | 0.113 |
| | | | | |
| Disagreement effect size | 4.46% | 4.40% | 3.50% | 3.68% |
| Standard Deviation | 4.989 | 4.989 | 2.682 | 2.682 |
| | | | | |
| Firm FEs | Yes | Yes | Yes | Yes |
| Date FEs | Yes | Yes | Yes | Yes |

*Panel B: Stock utilization sub-samples*

| Dependent variable: | Returns | | | |
|---|---|---|---|---|
| Sub-sample: | High Utilization | | Low Utilization | |
| | (1) | (2) | (3) | (4) |
| Disagreement | 0.1311*** | 0.1398*** | 0.0873*** | 0.0869*** |
| | (0.010) | (0.010) | (0.004) | (0.005) |
| Number of messages | 0.0073*** | 0.0128*** | 0.0039* | 0.0078** |
| | (0.002) | (0.002) | (0.002) | (0.003) |
| Disagreement (t-1) | | -0.0545*** | | -0.0092*** |
| | | (0.006) | | (0.002) |
| Number of messages (t-1) | | -0.0086*** | | -0.0059** |
| | | (0.002) | | (0.002) |
| Turnover (t-1) | -0.0486*** | -0.0319*** | -0.0151*** | -0.0068** |
| | (0.005) | (0.004) | (0.003) | (0.003) |
| Media | -0.0246 | -0.0324 | 0.0520*** | 0.0487*** |
| | (0.037) | (0.036) | (0.007) | (0.007) |
| Volatility (t-1, t-5) | 0.0230 | 0.1914 | 0.6797*** | 0.7466*** |
| | (0.397) | (0.393) | (0.254) | (0.254) |
| CAR(t-1, t-5) | -1.1088*** | -1.1139*** | -1.8908*** | -1.8856*** |
| | (0.136) | (0.134) | (0.117) | (0.116) |
| CAR(t-30,t-6) | -0.2521*** | -0.2433*** | -0.1609*** | -0.1593*** |
| | (0.044) | (0.042) | (0.030) | (0.030) |
| Observations | 680,010 | 680,010 | 8,277,558 | 8,277,558 |
| R-squared | 0.095 | 0.097 | 0.141 | 0.142 |
| | | | | |
| Disagreement effect size | 3.95% | 4.61% | 3.34% | 3.34% |
| Standard Deviation | 2.742 | 2.742 | 2.629 | 2.629 |
| | | | | |
| Firm FEs | Yes | Yes | Yes | Yes |
| Date FEs | Yes | Yes | Yes | Yes |

## Table 4: Investor Disagreement and Informed Trading:
## The Role of Short Selling Constraints

In this table, we report results pertaining to the relationship between informed trading and disagreement among investors, separately for high and low utilization samples. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day t, and is standardized. In column (1), the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day t, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2), the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Panel A reports results for observations with high utilization, Panel B for low utilization, and Panel C the difference in effect sizes. The utilization measure on day t is obtained from Markit data set and high utilization is defined as the average utilization over days t-5 to t-1 being greater or equal to 60%. Controls in all regressions include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day $t$, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy (1) | Short Increase Spike (2) |
|---|---|---|
| *Panel A: High Utilization* | | |
| Disagreement | 0.0035 | 0.0936*** |
| | (0.191) | (0.018) |
| Number of messages | -0.2795 | -0.0005 |
| | (0.206) | (0.001) |
| Trade Dummy (t-1) | 0.3320*** | 0.0207*** |
| | (0.045) | (0.003) |
| Observations | 1,481 | 640,522 |
| R-squared | 0.662 | 0.070 |
| | | |
| Mean | 36.290 | 1.230 |
| *Panel B: Low Utilization* | | |
| Disagreement | 0.9934*** | 0.0231*** |
| | (0.234) | (0.005) |
| Number of messages | 0.1922*** | -0.0007 |
| | (0.047) | (0.000) |
| Trade Dummy (t-1) | 0.4614*** | 0.0276*** |
| | (0.009) | (0.002) |
| Observations | 43,602 | 7,800,485 |
| R-squared | 0.430 | 0.040 |
| | | |
| Mean | 37.473 | 0.637 |

| Dependent variable: | Activist Trade Dummy | Short Increase Spike |
|---|---|---|
| | (1) | (2) |
| *Panel C: High minus Low Utilization* | | |
| | | |
| High Utilization Dis effect size (%) | 0.010 | 7.610 |
| Low Utilization Dis effect size (%) | 2.651 | 3.624 |
| Difference in the coefficients | -2.641* | 3.986** |
| | (1.414) | (2.020) |

## Table 5: Overnight Investor Disagreement and Informed Trading: The Role of Short Selling Constraints

In this table, we report results pertaining to the relationship between informed trading and disagreement among investors, separately for high and low utilization samples. Disagreement Night is disagreement between 4 p.m. on day $t-1$ and 9 a.m. on day $t$, and is standardized. In column (1), the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day t, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2), the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Panel A reports results for observations with high utilization, Panel B for low utilization, and Panel C the difference in effect sizes. The utilization measure on day t is obtained from Markit data set and high utilization is defined as the average utilization over days $t-5$ to $t-1$ being greater or equal to 60%. Controls in all regressions include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day t, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy (1) | Short Increase Spike (2) |
|---|---|---|
| *Panel A: High Utilization* | | |
| Disagreement - Night | 0.002 | 0.0686*** |
| | (0.132) | (0.017) |
| Number of messages - Night | -0.7304 | -0.0023 |
| | (1.017) | (0.002) |
| Trade Dummy (t-1) | 0.3713 | 0.1454*** |
| | (0.477) | (0.012) |
| Observations | 1,481 | 640,522 |
| R-squared | 0.662 | 0.070 |
| | | |
| Mean | 36.290 | 1.230 |
| *Panel B: Low Utilization* | | |
| Disagreement - Night | 1.0278*** | 0.0087* |
| | (0.242) | (0.005) |
| Number of messages - Night | 0.6047*** | -0.0017* |
| | (0.145) | (0.001) |
| Trade Dummy (t-1) | 0.3450*** | 0.5768*** |
| | (0.064) | (0.025) |
| Observations | 43,602 | 7,800,485 |
| R-squared | 0.430 | 0.039 |
| | | |
| Mean | 37.473 | 0.637 |

| Dependent variable: | Activist Trade Dummy | Short Increase Spike |
|---|---|---|
| | (1) | (2) |
| *Panel C: High minus Low Utilization* | | |
| | | |
| High Utilization Dis effect size (%) | 0.006 | 5.577 |
| Low Utilization Dis effect size (%) | 2.743 | 1.365 |
| Difference in the coefficients | -2.737** | 4.212*** |
| | (1.257) | (1.521) |

## Table 6: Effects of Investor Disagreement on Activist Trading

Note: In this table we reports results pertaining to the relationship between activist trading and disagreement among investors. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and standardized. In column (1), the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day t, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2), the dependent variable is activist turnover for firm $i$ on day $t$, multiplied by 100. The sample covers days on which activists trade during the 60-day period prior to Schedule 13D filings during 2010-2018. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day $t$, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed-effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

|  | Activist Trade (1) | Activist Turnover (2) |
|---|---|---|
| Disagreement | 0.8432*** | 0.0426*** |
|  | (0.202) | (0.004) |
| Number of messages | 0.1416*** | 0.0024*** |
|  | (0.027) | (0.001) |
| Trade Dummy (t-1) | 0.4605*** | 0.1499*** |
|  | (0.008) | (0.015) |
| Observations | 55,029 | 20,479 |
| R-squared | 0.413 | 0.429 |
|  |  |  |
| Disagreement effect size | 2.262% | 17.694% |
| Mean | 37.282 | 0.241 |
|  |  |  |
| Controls | Yes | Yes |
| Firm FEs | Yes | Yes |
| Date FEs | Yes | Yes |

**Table 7: Investor Disagreement on Ex-activist Turnover**

In this table, we report the relationship between ex-activist trading and disagreement among investors. The dependent variable, ex-activist turnover, is calculated by regressing turnover on activist turnover and taking the residual, and is multiplied by 100. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and is standardized. For columns (1) and (2), the sample covers the 60-day periods prior to a Schedule 13D filing. For columns (3) and (4) the sample covers days during the 60-day periods prior to Schedule 13D filings, during which some activist turnover occurs. For columns (5) and (6) the sample covers days during the 60-day periods prior to Schedule 13D filings, during which no activist turnover occurs. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day $t$, $Volatility(t5, t1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Ex-activist Turnover | | |
|---|---|---|---|
| Sample: | 60-day period | Days with Activist Trading | Days without Activist Trading |
| | (1) | (2) | (3) |
| | | | |
| Disagreement | 0.4590*** | 0.8432*** | 0.1141* |
| | (0.053) | (0.094) | (0.061) |
| Number of messages | 0.1668*** | 0.1476*** | 0.2122*** |
| | (0.028) | (0.025) | (0.049) |
| Activist Turnover (t-1) | -0.5589*** | -0.7649*** | -0.2288 |
| | (0.119) | (0.180) | (0.147) |
| Observations | 55,029 | 20,479 | 34,525 |
| R-squared | 0.362 | 0.440 | 0.539 |
| | | | |
| Disagreement effect size | 12.359% | 16.871% | 4.279% |
| Standard deviation | 3.714 | 4.998 | 2.667 |
| | | | |
| Controls | Yes | Yes | Yes |
| Firm FEs | Yes | Yes | Yes |
| Date FEs | Yes | Yes | Yes |

# Internet Appendix to : "Does Disagreement Facilitate Informed Trading?"

## Table A1: Informed Trading and Returns

In this table, we report monthly results pertaining to the relationship between activist and short sellers' trading and future returns. The dependent variable is next month's returns. *Trade Dummy* is an indicator variable that equals 100 if there was activist trading for firm i in month t, and zero otherwise. *Short Increase Spike* is 100 if there was at least a 1% daily increase in fraction of shares on loan in month t, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Controls include *Media*, equals 1 if the company had at least one story on Dow Jones News Wire in prior month, *Volatility prior month*, is the standard deviation of abnormal returns over the prior calendar month. Regressions include month fixed effects, where noted. Heteroskedasticity-robust standard errors reported in parenthesis. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Returns | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Trade Dummy | 1.4277*** | 1.5851*** | | |
| | (0.254) | (0.258) | | |
| Short Increase Spike | | | -0.3272*** | -0.2143*** |
| | | | (0.069) | (0.070) |
| Media prior month | | -0.0273 | | -0.2034*** |
| | | (0.036) | | (0.041) |
| Volatility prior month | | -5.5139*** | | -3.2706*** |
| | | (0.755) | | (1.000) |
| Return prior month | | -0.0282*** | | -0.0303*** |
| | | (0.001) | | (0.002) |
| Return prior year | | 0.0023*** | | 0.0012*** |
| | | (0.000) | | (0.000) |
| Observations | 747,018 | 685,478 | 448,571 | 424,348 |
| R-squared | 0.000 | 0.009 | 0.000 | 0.009 |
| Month FEs | | Yes | | Yes |

## Table A2: Alternative Liquidity Measures

Note: In this table we consider alternative measures of liquidity to turnover. Amihud illiquidity measure is based on Amihud (2002), Quote Spread, Effective Spread, Realized Spread, and Price Impact are constructed from high-frequency TAQ data. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and is standardized. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day $t$, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| | Amihud (1) | Bid-Ask Spread (2) | Quoted Spread (3) | Effective Spread (4) | Realized Spread (5) | Price Impact (6) |
|---|---|---|---|---|---|---|
| Disagreement | -0.0604*** | -0.0623*** | -0.0516*** | -0.0118** | -0.0994*** | 0.0679*** |
| | (0.005) | (0.003) | (0.010) | (0.006) | (0.005) | (0.004) |
| Number of messages | -0.0019* | -0.0023*** | -0.0010 | 0.0000 | -0.0010* | 0.0009 |
| | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) | (0.001) |
| Observations | 14,994,105 | 15,377,784 | 10,094,747 | 10,061,924 | 10,059,288 | 10,058,521 |
| R-squared | 0.117 | 0.515 | 0.690 | 0.646 | 0.326 | 0.174 |
| | | | | | | |
| Disagreement effect size | -0.58% | -1.60% | -0.21% | -0.07% | -0.55% | 0.66% |
| Standard Deviation | 10.444 | 3.901 | 24.515 | 16.788 | 18.033 | 10.277 |
| | | | | | | |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FEs | Yes | Yes | Yes | Yes | Yes | Yes |
| Date FEs | Yes | Yes | Yes | Yes | Yes | Yes |

## Table A3: Liquidity and Valuation Channels: Controlling for Sentiment

In this table, we report results pertaining to the relationship between turnover, returns and disagreement among investors. Turnover, on day t is multiplied by 100. Returns, is calculated as the close-to-close return obtained from CRSP. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and is standardized. For Panel A, the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day $t$, and zero otherwise. The sample covers 2010-2018. For Panel B, we split the sample into high and low utilization subsamples. The utilization measure on day t is obtained from Markit data set and high utilization is defined as the average utilization over days $t-5$ to $t-1$ being greater or equal to 60%. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day $t$, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. *Avg. Sentiment* is the average sentiment of messages posted about firm $i$ during time period $t$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| *Panel A: Full Sample* | | | | |
|---|---|---|---|---|
| Dependent variable: | Turnover | | Returns | |
| | (1) | (2) | (3) | (4) |
| Disagreement | 0.2174*** | 0.2144*** | 0.0985*** | 0.1032*** |
| | (0.012) | (0.013) | (0.004) | (0.004) |
| Number of messages | 0.0246*** | 0.0463*** | 0.0056*** | 0.0126*** |
| | (0.006) | (0.009) | (0.001) | (0.003) |
| Disagreement (t-1) | | -0.0089* | | -0.0301*** |
| | | (0.005) | | (0.002) |
| Number of messages (t-1) | | -0.0317*** | | -0.0102*** |
| | | (0.006) | | (0.002) |
| Turnover (t-1) | 0.6208*** | 0.6310*** | -0.0114*** | -0.0075*** |
| | (0.014) | (0.014) | (0.001) | (0.001) |
| Media | 0.1778*** | 0.1574*** | 0.0248*** | 0.0193** |
| | (0.018) | (0.017) | (0.008) | (0.008) |
| Volatility (t-1, t-5) | 0.6934 | 1.7686*** | -0.4237* | 0.0109 |
| | (0.461) | (0.407) | (0.235) | (0.229) |
| CAR(t-1, t-5) | -0.2355*** | -0.0939 | -1.7410*** | -1.6938*** |
| | (0.087) | (0.075) | (0.134) | (0.134) |
| CAR(t-30,t-6) | 0.1244*** | 0.1571*** | -0.1628*** | -0.1497*** |
| | (0.029) | (0.026) | (0.031) | (0.031) |
| Avg. Sentiment | 0.1614*** | 0.1559*** | 0.2140*** | 0.2160*** |
| | (0.009) | (0.010) | (0.005) | (0.006) |
| Observations | 15,377,819 | 15,377,819 | 15,377,869 | 15,377,869 |
| R-squared | 0.688 | 0.692 | 0.112 | 0.114 |
| | | | | |
| Disagreement effect size | 4.36% | 4.30% | 3.67% | 3.85% |
| Standard Deviation | 4.989 | 4.989 | 2.682 | 2.682 |
| | | | | |
| Firm FEs | Yes | Yes | Yes | Yes |
| Date FEs | Yes | Yes | Yes | Yes |

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*Panel B: Stock utilization sub-samples*

| Dependent variable: | Returns | | | |
|---|---|---|---|---|
| Sub-sample: | High Utilization | | Low Utilization | |
| | (1) | (2) | (3) | (4) |
| Disagreement | 0.1424*** | 0.1544*** | 0.0905*** | 0.0905*** |
| | (0.010) | (0.010) | (0.004) | (0.004) |
| Number of messages | 0.0072*** | 0.0126*** | 0.0037* | 0.0075** |
| | (0.001) | (0.002) | (0.002) | (0.003) |
| Disagreement (t-1) | | -0.0671*** | | -0.0122*** |
| | | (0.006) | | (0.002) |
| Number of messages (t-1) | | -0.0084*** | | -0.0058** |
| | | (0.002) | | (0.002) |
| Turnover (t-1) | -0.0501*** | -0.0332*** | -0.0168*** | -0.0083*** |
| | (0.005) | (0.004) | (0.003) | (0.003) |
| Media | -0.0575 | -0.0653* | 0.0368*** | 0.0338*** |
| | (0.037) | (0.036) | (0.007) | (0.007) |
| Volatility (t-1, t-5) | -0.0486 | 0.1484 | 0.6446** | 0.7176*** |
| | (0.402) | (0.397) | (0.255) | (0.255) |
| CAR(t-1, t-5) | -1.1395*** | -1.1479*** | -1.9073*** | -1.9017*** |
| | (0.136) | (0.134) | (0.117) | (0.116) |
| CAR(t-30,t-6) | -0.2599*** | -0.2506*** | -0.1664*** | -0.1645*** |
| | (0.044) | (0.043) | (0.030) | (0.030) |
| Avg. Sentiment | 0.4611*** | 0.4704*** | 0.1671*** | 0.1663*** |
| | (0.018) | (0.018) | (0.005) | (0.005) |
| Observations | 680,010 | 680,010 | 8,277,558 | 8,277,558 |
| R-squared | 0.097 | 0.099 | 0.142 | 0.142 |
| | | | | |
| Disagreement effect size | 5.19% | 5.63% | 3.44% | 3.44% |
| Standard Deviation | 2.742 | 2.742 | 2.629 | 2.629 |
| | | | | |
| Firm FEs | Yes | Yes | Yes | Yes |
| Date FEs | Yes | Yes | Yes | Yes |

## Table A4: Investor Disagreement and Informed Trading: The Role of Short Selling Constraints

In this table, we report results pertaining to the relationship between informed trading and disagreement among investors, separately for high and low utilization samples. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and is standardized. In column (1), the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day t, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2), the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Panel A reports results for observations with high lending fees, and Panel B for observations with low lending fees. The lending fees on day $t$ are proxied for by indicative fee measure obtained from Markit data set and high lending fees are defined over days $t-5$ to $t-1$ being greater or equal to 1%. Controls in all regressions include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day t, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy (1) | Short Increase Spike (2) |
|---|---|---|
| *Panel A: High Fees* | | |
| Disagreement | 0.0084 | 0.0449*** |
| | (0.105) | (0.010) |
| Number of messages | 0.2213 | 0.0009 |
| | (0.198) | (0.002) |
| Trade Dummy (t-1) | 0.3623*** | 0.0135*** |
| | (0.044) | (0.004) |
| Observations | 1,430 | 621,583 |
| R-squared | 0.617 | 0.067 |
| | | |
| Mean | 37.512 | 0.639 |
| | | |
| *Panel B: Low Fees* | | |
| Disagreement | 0.9774*** | 0.0247*** |
| | (0.233) | (0.006) |
| Number of messages | 0.1829*** | -0.0016** |
| | (0.042) | (0.001) |
| Trade Dummy (t-1) | 0.4609*** | 0.0282*** |
| | (0.009) | (0.002) |
| Observations | 43,534 | 7,979,453 |
| R-squared | 0.433 | 0.040 |
| | | |
| Mean | 37.708 | 0.672 |

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| Dependent variable: | Activist Trade Dummy | Short Increase Spike |
| --- | --- | --- |
| | (1) | (2) |
| *Panel C: High minus Low Fees* | | |
| | | |
| High Fees Dis effect size (%) | 0.022 | 7.032 |
| Low Fees Dis effect size (%) | 2.588 | 3.958 |
| Difference in the coefficients | -2.565 | 3.073* |
| | (1.992) | (1.642) |

## Table A5: Informed Trading and Overnight Investor Disagreement

In this table, we report results pertaining to the relationship between informed trading and disagreement among investors. Disagreement Night is disagreement between 4 p.m. on day $t-1$ and 9 a.m. on day $t$, and is standardized. In column (1) the dependent variable is an indicator variable that equals 100 if there was activist trading for firm i on day t, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2) the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day t, $Volatility(t-5,t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects. Heteroskedasticity-robust standard errors are double-clustered at firm and date level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy | Short Increase Spike |
|---|---|---|
|  | (1) | (2) |
| Disagreement - Night | 0.9113*** | 0.0211*** |
|  | (0.207) | (0.006) |
| Number of messages - Night | 0.3331*** | -0.0045** |
|  | (0.100) | (0.002) |
| Trade Dummy (t-1) | 0.4607*** | 0.0295*** |
|  | (0.008) | (0.001) |
| Observations | 55,029 | 8,614,152 |
| R-squared | 0.413 | 0.037 |
|  |  |  |
| Disagreement effect size | 2.444% | 3.156% |
| Mean | 37.282 | 0.668 |
|  |  |  |
| Controls | Yes | Yes |
| Firm FEs | Yes | Yes |
| Date FEs | Yes | Yes |

## Table A6: Days with at least Two Messages

Note: In this table, we report results pertaining to the relationship between informed trading and disagreement among investors on days with at least two messages on StockTwits about the firm. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and is standardized. In column (1) the dependent variable is an indicator variable that equals 100 if there was activist trading for firm $i$ on day $t$, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2) the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day t, $Volatility(t-5,t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects where indicated. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy (1) | Short Increase Spike (2) |
|---|---|---|
| Disagreement | 0.3459* | 0.0247*** |
|  | (0.185) | (0.006) |
| Number of messages | 0.1288*** | 0.0002 |
|  | (0.025) | (0.001) |
| Trade Dummy (t-1) | 0.3728*** | 0.0394*** |
|  | (0.019) | (0.003) |
| Observations | 5,514 | 1,108,120 |
| R-squared | 0.605 | 0.051 |
|  |  |  |
| Disagreement effect size | 0.844% | 1.880% |
| Mean | 41 | 1.314 |
|  |  |  |
| Controls | Yes | Yes |
| Firm FEs | Yes | Yes |
| Date FEs | Yes | Yes |

## Table A7: Controlling for Investor Sentiment

Note: In this table we report results pertaining to the relationship between informed trading and disagreement among investors. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and is standardized. In column (1) the dependent variable is an indicator variable that equals 100 if there was activist trading for firm $i$ on day $t$, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2) the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day $t$, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. $Avg.\ Sentiment$ is the average sentiment of messages posted about firm $i$ during time period $t$. All regressions include firm and date fixed effects where indicated. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy (1) | Short Increase Spike (2) |
|---|---|---|
| Disagreement | 0.8401*** | 0.0423*** |
| | (0.203) | (0.006) |
| Number of messages | 0.1423*** | -0.0020** |
| | (0.027) | (0.001) |
| Trade Dummy (t-1) | 0.4605*** | 0.0295*** |
| | (0.008) | (0.001) |
| Avg. Sentiment | -0.189 | 0.0506*** |
| | (0.454) | (0.009) |
| Observations | 55,029 | 8,614,152 |
| R-squared | 0.413 | 0.037 |
| | | |
| Disagreement effect size | 2.253% | 6.328% |
| Mean | 37.281 | 0.668 |
| | | |
| Controls | Yes | Yes |
| Firm FEs | Yes | Yes |
| Date FEs | Yes | Yes |

# Table A8: Controlling for Retail Order Imbalance

Note: In this table we report results pertaining to the relationship between informed trading and disagreement among investors. Disagreement is measured from 4 p.m. on day $t-1$ to 4 p.m. on day $t$, and is standardized. Retail order imbalance is calculated as the difference between retail buying and selling volume, divided by the total retail trading volume. In column (1) the dependent variable is an indicator variable that equals 100 if there was activist trading for firm $i$ on day $t$, and zero otherwise. The sample covers the 60-day period prior to Schedule 13D filings during 2010-2018. In column (2) the dependent variable is 100 if there was at least a 1% increase in fraction of shares on loan from day $t-1$ to $t$, and zero otherwise. Fraction of shares on loan is calculated as the number of shares on loan divided by the number of shares outstanding. Controls include turnover on day $t-1$, $Media$, equals 1 if the company had at least one story on Dow Jones News Wire on day $t$, $Volatility(t-5, t-1)$, is the standard deviation of abnormal returns over days $t-5$ to $t-1$, and cumulative abnormal returns over days $t-30$ to $t-6$ and $t-5$ to $t-1$. All regressions include firm and date fixed effects where indicated. Heteroskedasticity-robust standard errors are double-clustered at the firm and date levels. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Dependent variable: | Activist Trade Dummy | Short Increase Spike |
|---|---|---|
| | (1) | (2) |
| Disagreement | 0.7525*** | 0.0421*** |
| | (0.204) | (0.006) |
| Number of messages | 0.1588*** | -0.0018* |
| | (0.028) | (0.001) |
| Trade Dummy (t-1) | 0.4685*** | 0.0285*** |
| | (0.008) | (0.001) |
| Retail Order Imbalance | -0.7184* | 0.0133* |
| | (0.383) | (0.007) |
| Observations | 51,275 | 7,983,559 |
| R-squared | 0.419 | 0.037 |
| | | |
| Disagreement effect size | 2.018% | 6.298% |
| Mean | 37.281 | 0.668 |
| | | |
| Controls | Yes | Yes |
| Firm FEs | Yes | Yes |
| Date FEs | Yes | Yes |