How are shorts informed?
Short sellers, news, and information processing[*]

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Abstract

We find that a substantial portion of short sellers' trading advantage comes from their ability to analyze publicly available information. Using a database of short sales combined with a database of news releases, we show that the well-documented negative relation between short sales and future returns is twice as large on news days and four times as large on days with negative news. Further, we find that the most informed short sales are not from market makers but rather from clients, and we find only weak evidence that short sellers anticipate news events. Overall, the evidence suggests that public news provides valuable trading opportunities for short sellers who are skilled information processors.

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There is now overwhelming evidence that short sellers are informed traders. When short interest or short volume are high, future returns are predictably low (see, e.g., Senchack and Starks, 1993; Asquith, Pathak and Ritter, 2005; Boehmer, Jones, and Zhang, 2008). Return predictability, however, suggests only that short-sellers have an information advantage over other traders. In this paper, we ask *how* short-sellers obtain that advantage.

To address this question, we combine a large archive of all corporate news events with a large panel of daily short-selling. This unique combination allows us to comprehensively examine the relation between short selling and news events. We find that a substantial portion of short sellers' trading advantage comes from their ability to analyze publicly available information. In fact, while news events occur on only 22% of the days in our sample, these trading days account for over 45% of the total profitability from short-selling.

Although our evidence suggests that short sellers obtain an information advantage via superior information processing, some commentators have suggested other ways that short sellers achieve an advantage. The Securities and Exchange Commission suggested that short sellers spread "false rumors" in an effort to manipulate firms "uniquely vulnerable to panic."[1] If this type of manipulation were taking place, then it suggests that short sellers might initiate a trade and then spread rumors (see, e.g., van Bommel, 2003). In other words, we might expect to see short sellers trade before news events, even though the news events could turn out to contain false information.

We find little evidence to support the claim that short sellers' advantage comes from trading before information is released, even though short sellers have been shown to trade before the

[1] Cox, C., 2008. What the SEC really did on short selling. The Wall Street Journal, 24 July.

release of certain types of public information. For example, Karpoff and Lou (2010) show that short selling increases before the initial public revelation of firms' financial misrepresentation. Similarly, Christophe, Ferri, and Angel (2004) find evidence of informed short selling in the five days before earnings announcements.

In contrast, when we look at *all* corporate news events in the Dow Jones archive, we find that the trades of short sellers are similar to the trades of other market participants in the days leading up to a news release. Unconditionally, the ratio of short volume to total volume is 0.196 and this ratio falls by .019 on negative news days and rises by .022 on positive news days. However, during the days leading up to the news event, the ratio is the same or slightly *smaller* than the unconditional mean, irrespective of the news type. Moreover, during the days after a news event, the ratio is the same or slightly *larger* than the unconditional mean. The result suggests that, on average, short sellers trade on or after new release dates and they do not anticipate public news announcements.

Given that short sellers tend to trade on or after news events, we next ask whether these news events present profitable trading opportunities for short sellers. Interestingly, the extant theoretical literature provides mixed predictions on the role of news releases. On the one hand, a number of papers argue that news reduces information asymmetry (see, e.g., Korajczyk, Lucas, and McDonald, 1991; Diamond and Verrecchia, 1987). For example, if a firm announces a merger, investors who knew that the merger was likely no longer have an information advantage over those who did not. The news announcement therefore reduces the information asymmetry between informed and uninformed investors. Under this view, the trades of informed traders (short sellers) should be *less* profitable when they are initiated immediately following a news announcement.

On the other hand, several papers suggest that public news events can lead to differential interpretations by traders based on variation in the traders' skill (see, e.g., Kandel and Pearson, 1995). Rubenstein (1993) puts it succinctly: "In real life, differences in consumer behavior are often attributed to varying intelligence and ability to process information. Agents reading the same morning newspapers with the same stock price lists will interpret the information differently." Under this view, public news events present profitable trading opportunities for skilled information processors, which can explain not only high volume around news events (Kandel and Pearson, 1995) but also evidence of return predictability from "soft" information in news announcements (see, e.g., Engelberg, 2008; Demers and Vega, 2008). This suggests that news announcements should make the trades of informed traders (short sellers) *more* profitable on news days.

When we take both of these theories to the data, we find evidence in support of the second view. Several papers find that abnormal short selling unconditionally predicts lower future returns (see, e.g., Senchack and Starks, 1993; Asquith, Pathak and Ritter, 2005; Boehmer, Jones, and Zhang, 2008). We also find that abnormal short selling leads to lower future returns, but we find that this effect is concentrated around news events. In particular, the predictability for future returns more than doubles on news days and quadruples on days with negative news. While a long-short trading strategy based on the level of short-selling would have earned a return of 40% over our 2.5 year sample period, a long-short strategy that conditioned on short-selling and news events would have earned 60%. Moreover, a strategy based on short-selling and negative news would have earned an astonishing 180% during our 2.5 year sample period.

An alternative explanation for this result could be that some buyers make systematic mistakes around news events (Antweiler and Frank, 2006), and that these buyers' mistakes are reflected in

market makers' offsetting short sales. To determine whether short sellers' trades are due to superior information processing or to offsetting positions, we exploit a unique feature of the short selling data, namely, exempt versus non-exempt trade marking, which allows us to distinguish market makers from non-market makers (clients). We find that clients' trades are particularly well informed, and that these trades are much more profitable in the presence of news events. In contrast, market makers' trades are not particularly well informed, and there is no differential impact in the presence of news. Thus, there appears to be little support for the claim that return predictability from shorts is greater on news days because of market makers offsetting short sales.

Another alternative explanation for our main result is that short sales are profitable on news days because news days provide short sellers with increased liquidity. This explanation, however, requires that the costs of short selling are *lower* around news announcements. However, we find little evidence that market liquidity improves on news days. For example, we find that bid-ask spreads actually increase by nearly 5% around news announcements, which is consistent with existing models of market maker behavior in the presence of informed traders (see, e.g., Glosten and Milgrom, 1985; Kyle, 1985). When coupled with our finding that the trades of short sellers are more than twice as profitable in the presence of news, the evidence is consistent with the idea that public news events present profitable trading opportunities for skilled information processors and short sellers are, on average, skilled at processing public news.

The remainder of this paper proceeds as follows. Section 1 discusses related literature. Section 2 describes the databases used in this study and presents our main hypotheses. Section 3 presents our analyses and findings. Finally, Section 4 concludes.

1. Related literature

The ideas in this paper relate to three distinct branches of the existing literature. First, this paper relates to an extensive literature on the behavior of short sellers relative to other traders. Second, our paper contributes to a growing literature on how market participants respond to public news. Finally, this paper sheds light on an emerging debate on whether news increases or decreases information asymmetry. In this section, we first discuss prior papers that connect news to short selling. We then provide an overview of the relevant literature in each of these three branches.

In a contemporaneous working paper, Fox, Glosten, and Tetlock (2009) use news and short-selling data to examine the role of short-sellers from a regulator's perspective. Motivated by the intense scrutiny that short-sellers receive from the press and lawmakers, they investigate whether short-selling appears to be socially beneficial or harmful (and worthy of regulation). In addition, several extant papers look at short selling behavior in the context of a specific type of corporate news event. As such, these studies shed light on a subset of this paper's sample of news events. Karpoff and Lou (2010), for example, examine short sellers' positions in firms that are investigated for financial misconduct and find that short sellers generally anticipate public announcements of investigations. Christophe, Ferri, and Angel (2004) and Christophe, Ferri, and Hsieh (2010) focus on short sellers' trades around earnings announcements and analyst downgrades, respectively, and find evidence that short sellers are informed traders who can profit from these events. Similarly, Daske, Richardson, and Tuna (2005) and Boehmer, Jones, and Zhang (2010) look at short selling around management forecast announcements and earnings

announcements. While Daske, Richardson, and Tuna (2005) find no evidence that short sale transactions concentrate prior to bad news events, Boehmer, Jones, and Zhang (2010) find some evidence of anticipation, and they show that a significant fraction of short sellers' information advantage comes from trading around these events. Finally, Nagel (2005) looks at the cash flow news implied by a vector auto regression and finds an asymmetric effect on returns, indicating that short sellers help incorporate news into prices when short selling is not constrained.

While the above papers identify patterns in short selling around a handful of specific corporate news events, the current paper aims to uncover patterns in short sellers' trades around *all* types of corporate news events. Doing so allows us to speak more generally about short sellers' behavior around new releases of public information. In particular, using a list of all corporate news events, we can sort the universe of trading days into those with and without news and examine the differential performance of short sellers surrounding news events.

1.1. Short sellers' trading patterns

Several papers compare the trades of short sellers to the trades of other market participants. There are multiple dimensions over which trades can be compared. Much of the recent literature focuses on the profitability of trades, which, roughly speaking, can be measured using the performance of a stock's price after the initiation of a short sale. In one of the earliest articles to empirically examine short sales, Seneca (1967) finds a negative relation between short interest and returns and concludes that short positions are indicative of bearish opinions. Similarly, Boehme, Danielson, and Sorescu (2006) show that when short selling is constrained and there are relatively diverse opinions, abnormally high short interest can precede negative future

returns. Using transaction data at a higher frequency, Boehmer, Jones, and Zhang (2008) find that heavily shorted stocks significantly underperform lightly shorted stocks, especially stocks heavily shorted by non-program institutional traders, and Diether, Lee, and Werner (2008) show that not only do prices follow short selling, but short selling also follows prices; that is, short sellers tend to short after price run-ups. These results further indicate that short sellers could have an information advantage.[2] In sum, the above work establishes that the performance of short sellers' trades indicates that short sellers are informed traders. Our paper contributes to this literature by asking *how* short sellers come to enjoy an information advantage in the first place.

1.2. Public news

While a large literature examines volume and return phenomena around *specific* news events (e.g., earnings announcements, mergers, and dividend initiations and omissions), a more recent literature considers such phenomena around *any* corporate news event. Categorizing all Wall Street Journal stories between 1973 and 2001, Antweiler and Frank (2006) find that return responses vary widely across news categories, although they find evidence of overreaction (return reversal) on average. Also using a database of all news events, Tetlock (2011) finds evidence of even stronger return reversal following repeated news events, consistent with the idea that investors overreact to "stale" news stories. Several studies using comprehensive news

[2] A closely related dimension of research is whether short sellers' trades reveal information to other market participants. In other words, are short sellers' trades newsworthy in and of themselves? Senchack and Starks (1993) show that abnormally large short interest announcements have small but significant negative returns. Similarly, Aitken et al. (1998) show that short sales are followed by price declines within 15 minutes on the Australian Stock Exchange.

databases examine whether well-known asset pricing anomalies are related to news. Chan (2003) considers the momentum anomaly among stocks with and without recent news and finds evidence of price momentum only among news stocks. Similarly, Vega (2006) finds more earnings momentum among stocks with high differences of opinion on news days.

More recently, researchers have asked whether the content of news stories contains value-relevant information. Tetlock, Saar-Tsechansky, and Macskassy (2008) and Engelberg (2008) show that, indeed, the qualitative content of the information contained in news stories can predict both earnings surprises and short-term returns. These findings support the idea that there is value-relevant or "soft" information in news stories that is not immediately impounded into prices.

To summarize, this literature highlights the importance of looking at more than one news category when assessing the behavior of short sellers. Moreover, it shows that the information content of news leaves room for traders with different information processing abilities to arrive at different conclusions about the value relevance of the news event. Our work builds on these findings by analyzing the universe of corporate news events in the U.S. over our sample period, and by asking whether, in our sample, information processing ability plays a role in the performance of short sellers' trades.

1.3. Public news and informed trading

There are two views regarding the relation between the trading patterns of skilled investors and the release of public news items such as the articles contained in the Dow Jones archive. Under the first view, public information does not provide traders with an information advantage;

that is, managers who rely on public information (rather than generate private information) are low-skilled. Consistent with this view, Kacperczyk and Seru (2007) estimate managers' reliance on public information (RPI) as the R-squared of a regression of percentage changes in fund managers' portfolio holdings on changes in analysts' past recommendations and find that fund managers with low RPIs (low reliance on public information) perform better than fund managers with high RPIs (high reliance on public information).

Under the alternative view, the public release of information presents trading opportunities for skilled processors of information; that is, when news is released, traders with superior information processing skills can convert this news into valuable information for trading (Kandel and Pearson, 1995). Earnings announcements, for example, are often accompanied by lengthy documents and conference calls that are scrutinized by information processors. Those traders who show exceptional skill in converting such data into value-relevant information are rewarded with superior returns on event-driven trades. Evidence consistent with this view comes from studies that attempt to look at the textual content of news and firm announcements. Specifically, Tetlock et al. (2008), Engelberg (2008), Demers and Vega (2008), and Feldman, Govindaraj, Livnat, and Segal (2009) all show that the content of corporate news predicts returns, which is consistent with the view that information processing skills can generate superior returns.

Our paper sheds light on the above debate by finding additional evidence in support of the second view by showing that trades occurring after the release of news stories can be more profitable than trades in non-news periods.

2. Hypotheses and methodology

2.1. Hypothesis development

In this section, we formalize many of the ideas introduced in the beginning of the paper. Our first set of hypotheses concerns the timing of trades, while the second set concerns the profitability of trades. Finally, we have two sets of hypotheses that aim to explore the source of short sellers' profitability.

The timing of trades is one of the areas in which short sellers can differ from other traders. Prior research finds some evidence that short sellers trade before public information is released (see, e.g., Karpoff and Lou, 2010; Christophe, Ferri, and Angel, 2004). Similarly, the Securities and Exchange Commission has suggested that short sellers spread "false rumors" in an effort to manipulate firms. Furthermore, in the popular press, there have been allegations of insider trading by well-known hedge funds such as SAC and Galleon.[3,4] Although there are many possible channels through which short sellers' trades could be profitable, our first set of hypotheses seeks to empirically test whether the timing of short sales is different than that of other trades. We refer to this as the *Anticipation* hypothesis. Formally:

H1: In the presence of news events, short sellers trade before other traders.

This hypothesis is an alternative to the null hypothesis that there is no difference in timing.

We next turn to the profitability of short sellers' trades around news events. The literature is split as to whether news events increase or decrease asymmetric information, thereby increasing

[3] E.g., Rothfeld, Michael, Susan Pulliam, and Chad Bray, 2011. Fund Titan Found Guilty --- Rajaratnam Convicted of Insider Trading; Jurors Cite Tapes: 'Just a Lot of Evidence'. The Wall Street Journal, 12 May.

[4] Our approach is not designed to detect specific instances of insider trading, but rather, it is designed to examine the average trading patterns of short sellers.

or decreasing the profitability of informed trades. On the one hand, many papers model news events as points in time associated with reduced information asymmetry (see, e.g., Korajczyk, Lucas, and McDonald, 1991; Diamond and Verrecchia, 1987). If news events do indeed reduce asymmetric information, the trades of informed traders (e.g., short sales) should be *less* profitable on news days. On the other hand, other papers suggest that public news events are subject to differential interpretations by traders (see, e.g., Rubenstein, 1993; Kandel and Pearson, 1995). Under this view, public information events present profitable trading opportunities for skilled information processors, and thus the trades of informed traders (e.g., short sellers) should be *more* profitable after news days. This discussion leads to the following set of hypotheses, which we call the *Profitability* hypotheses:

$H2_a$: Short sales are less profitable after news announcements.

$H2_b$: Short sales are more profitable after news announcements.

These hypotheses rest against the backdrop of the null hypothesis, which states that short sales are as profitable after news events as they are at other times.

Since our empirical work finds that short sales are more profitable after news events, we also explore *why* profitability increases. While the literature finds that news events create trading opportunities for informed traders (see, e.g., Engelberg, 2008; Demers and Vega, 2008), other potential explanations exist. The first alternative explanation posits that some buyers make systematic mistakes around news events (see, e.g., Antweiler and Frank, 2006), and that these mistakes are reflected in market makers' offsetting short sales. We formalize this idea in our third set of hypotheses, which we call the *Uninformed Counterparty* hypotheses:

H3: The profitability of short sales comes from market makers' offsetting trades.

This hypothesis rests against the null hypothesis that the profitability of short sales comes equally from market maker and non-market maker trades.

Another alternative explanation relates to liquidity. Given the increase in volume around news events, news events could provide a trading opportunity for those traders for whom liquidity is an important factor in a trade's profitability. As a result, the perceived profitability of short sales around news events could have nothing to do with information; rather, short sellers could simply be trading around news events because news events create liquidity, which allows them to execute profitable trades. This relation between news events and liquidity is the basis for our fourth and final set of hypotheses, which we call the *Liquidity* hypotheses:

H4: The profitability of short sales around news events is due to the increased liquidity that news events provide.

The null hypothesis is that the profitability of short sales around news events is not a result of the liquidity that news events provide.

2.2. Data

To test the hypotheses developed above, we employ two main databases. The first database contains information on short sales, while the second contains news articles from the Dow Jones archive.

2.2.1. Short sales

Information on short sales comes from the NYSE Trade and Quote (TAQ) Regulation SHO database. Regulation SHO was adopted by the SEC in June of 2004 to establish new rules governing short sales in equity transactions and to evaluate the effectiveness of price test restrictions on short sales. As one consequence of Regulation SHO, transaction-level short sales data were publicly disclosed. The Regulation SHO database covers the period January 3, 2005 through July 6, 2007 and contains data for all short sales that were reported to the NYSE for NYSE-listed and traded securities during this period.[5] The database contains the stock ticker, the date and time of the transaction, the number of shares traded, and the execution price. While the data allow us to observe the opening of short positions, they do not contain information on the covering of these short positions. Thus, like other papers, we are constrained by the lack of information on short-covering transactions**.** In addition, the data also include an indicator that denotes whether a transaction was exempt from price test rules. One of the reasons a short sale transaction could be classified as exempt is that it was made by market makers engaged in bona fide market making activity. The exempt indicator has thus been used to separate trading by market makers from trading by non-market makers (see, e.g., Evans, Geczy, Musto, and Reed, 2009; Christophe, Ferri, and Angel, 2004; Boehmer, Jones, and Zhang, 2008; Chakrabarty and Shkilko, 2011).[6] However, when Regulation SHO was implemented, a group of randomly selected stocks was selected to be part of a pilot study for which the exempt/non-exempt

[5] The vast majority of trades in the database are for NYSE-listed securities. Occasionally, securities that are not listed on the NYSE do trade on the NYSE, and these trades also appear in the Regulation SHO database.

[6] For example, NASD NTM 06-53 notes that "Rule 5100(c)(1) provides an exception to the bid test for short sales by a market maker registered in the security in connection with bona fide market making activity."

classification was no longer required. We exclude these pilot firms when using the exempt indicator variable in our analyses (i.e., Tables 6 and 7).[7]

For the purposes of our analysis, we aggregate the transaction data to the daily level, and we use the TAQ master files to add CUSIPs to the database. We then use the Center for Research in Security Prices (CRSP) Daily Stock Event file to add PERMNOs to the database. Finally, we add returns, closing bid price, closing ask price, total volume, and shares outstanding from CRSP. Using these data, we calculate the Amihud (2002) Illiquidity measure defined as $10^7 * |ret_{it}| / volume_{it}$, where $volume_{it}$ is the dollar volume, and we calculate the daily bid-ask spread as a percentage of the closing mid-price.

In addition, we add information on the daily volume weighted rebate rate for equity loans in each stock over the sample period. The rebate rate for an equity loan is the rate at which interest on collateral is rebated back to the borrower. Thus, the rate is inversely related to the cost of shorting a stock. Our data on rebate rates come from a proprietary database on equity loan transactions as described in Kolasinski, Reed, and Ringgenberg (2011). The data are compiled by a third-party provider that is both a market maker in the equity loan market and a data aggregator for major equity lenders.

2.2.2. Dow Jones archive

[7] Details regarding the Regulation SHO pilot study, including a list of firms involved, are available on the SEC website: http://www.sec.gov/rules/other/34-50104.htm. Our results are robust to the inclusion of the Regulation SHO pilot firms.

To compile our sample of news events, we use the Dow Jones archive as in Tetlock (2010). This archive contains all Dow Jones News Service stories and Wall Street Journal stories over our 2005 to 2007 sample period. Each observation in the news database is a news item; each news item includes at least one subject code and Dow Jones's designation of the corporations that are mentioned in an article and are the subject of the story. Table 1 displays an example article and the associated entry in the Dow Jones archive. The database contains subject codes that identify the information content of each news article; for example, in Table 1 the subject code *RND* indicates that the article contains information about research and development.

We adopt Dow Jones's subject categorizations, which give us 71 different news categories. However, many of these subject codes are general codes that do not provide valuable information about the content of a news article. For example, nearly every article in the database has the code *CNW*, indicating that the article contains company news, in addition to a more specific news code. We remove these general codes from our analysis to obtain a final list of subject codes that contains 39 different news categories.[8] Finally, if news is released before the market closes at 4:00 PM, we assign the current trading day to the news story; if news occurs after 4:00 PM, we assign the next trading day.

The resulting news database contains the date and time an article was released, a unique firm identifier, subject codes, and a dummy variable that takes the value of one if a story was released in multiple pieces over the news day. The data also contain two dictionary-based sentiment score variables that indicate whether a story contains negative words in the headline and body of

[8] Specifically, after computing the correlations between subject codes, we exclude subject codes if their correlation with a more specific news category exceeds 80%. We also drop news categories that are associated with fewer than 1,000 news events over the entire sample (see Table 2 for the frequency of each news event in our sample).

the text. The first sentiment variable is constructed using the Harvard-IV-4 dictionary as in Tetlock (2007) and Engelberg (2008), while the second sentiment measure uses the negative word list developed by Loughran and McDonald (2011). In both cases, the sentiment score is constructed as the sum of the number of negative words in an article's headline and body divided by the sum of the total number of words in the headline and body.

We also use the announcement day return on the day of news events as another sentiment variable in the analyses. While the negative word measures discussed above do provide some indication of the content of an article, they do not contain information on the market's prior expectations. In other words, while a news article could contain a large number of negative words, if the market was expecting even worse news, then the negative article could be associated with a positive market response. Accordingly, when examining the timing of short sellers' trades we use the announcement day return to sign the content of news. Our results are qualitatively unchanged if we use the negative word measures.

We use the unique firm identifier to match the news data to the short sales database. The resulting database has 1,888,868 observations over the period January 3, 2005 to July 6, 2007. The database contains 3,167 unique firm identifiers and we include ordinary common shares in U.S. firms, American Depositary Receipts (ADRs), Real Estate Investment Trusts (REITs), and closed-end funds. Fig. 1 provides an example of the time-series evolution of short sales, news, and returns for an example firm, Williams-Sonoma, from January 1, 2007 through February 28, 2007. Over this time period, Williams-Sonoma experienced three positive news events and one negative news event and short sales (as a percentage of total volume) ranged from a low of 17.4% on February 28 to a high of 43.6% on February 6, one day after the negative news event occurred.

Table 2 contains summary statistics for the combined database. The mean number of articles per firm-day is 1.26. However, there is substantial cross-sectional variation in this number, and larger firms typically have more news articles on a given day. Certain news categories also appear much more often than others. For example, the category *High Yield Issuers* appears 168,803 times in the database, while the category *10K* appears only 1,183 times. To address the potential issue of news clustering and to avoid problems with multicollinearity, we remove stories that are within 30 days of a previous story when we conduct panel data analyses in Tables 3, 8, and 9 and Figures 2 and 4. Specifically, if an article is in the same category as an article that occurred within the last 30 days for that same firm, we remove the second article from the database.

3. Analyses and results

In this section we explore how short sellers differ from other traders. We begin by asking whether short sellers respond to news before other market participants. We find that short sellers tend to trade at the same time as other traders, and when they do not, they tend to trade more *after* news events occur. These results suggest that short sellers do not anticipate most news events. Next, we ask whether short sellers' trades are more profitable than other trades, consistent with a superior ability to process news, and we find evidence in favor of this view. Finally, we analyze which types of information are associated with short sellers' profitability.

3.1. Do short sellers anticipate news?

One way in which short sellers can differ from other traders is in the timing of their trades. There is some evidence that short sellers anticipate bad news announcements (see, e.g., Christophe, Ferri, and Angel, 2004; Karpoff and Lou, 2010). However, these findings correspond to specific types of corporate events. Here, we seek to shed light on short sellers' timing behavior around all types of news events in our sample period.

To determine the extent of short sales timing around news events, in Panel A of Fig. 2 we plot daily short sales volume (solid line), total volume (dashed line), and the ratio between the two (dotted line) in event time around our universe of news events. The basic result is readily apparent: short sellers typically trade when other traders do. In other words, the figure provides visual evidence in support of the null hypothesis, and against the alternative, the *Anticipation* hypothesis *(H1)*. Clearly, all traders respond to news, as there is a significant increase in volume on the news event day and on surrounding days. However, the ratio of short sales to total volume is nearly constant over the news period, with no significant change in the ratio around news events. The result suggests that, on average, short sellers do not uncover and trade on information before it becomes publicly available.

Of course, in line with the prior research discussed above, it could be the case that short sellers respond more to certain types of news, particularly bad news. Thus, in Panels B and C of Fig. 2, we examine volume around negative and positive news events, respectively, where negative news events are defined as events with an announcement day return in the bottom quintile of all returns and positive news events are defined as events with announcement returns in the top quintile of all returns that day. Interestingly, the results are largely unchanged, indicating that the timing of short sellers' response to news does not depend on whether the news is bad or good.

Next, we formally examine the timing of short sellers' trades around news events. We begin by regressing the ratio of short sales volume to total volume (hereafter, the short volume ratio) on an indicator variable that takes the value one if any news event occurs, and zero otherwise. To control for the well-documented response of short sellers to past returns (see, e.g., Diether, Lee, and Werner, 2008), we include two lags of daily returns. To understand the timing of short sales transactions around news events, we run six different specifications in which we vary the timing of the dependent variable relative to the news event. Specifically, we run six panel regressions of the form:

$$Short\ Volume\ Ratio_{it} = \beta_1(ret_{i,t-1}) + \beta_2(ret_{i,t-2}) + \beta_3(News\ Event_{it}) + FE + \varepsilon \qquad (1)$$

The results, shown in Table 3, are largely consistent with the results in Fig. 2 and suggest that around news days, short sellers tend to trade when other investors trade. In Panel A, the results suggest that short sellers actually trade slightly less than other investors in the days leading up to a news event. When we consider negative news separately in Panel B, we find more short-selling right before (t-1) and right after (t+1, t+2) negative news events. The fact that short selling increases the day before negative news is consistent with the *Anticipation* hypothesis; however, the fact that short selling also increases after the news event coupled with the fact that there is no significant decrease in our measure of the difference, *After Minus Before*, provides mixed evidence on the timing of short sellers trades. Moreover, consistent with the results in Fig. 2, the magnitude of the coefficient estimates suggests that the increase in the short volume ratio on the days before news events is relatively small. The coefficient of 0.003 at *t-1* indicates that the day preceding negative news events experiences an increase of 0.30% in the short volume ratio, which amounts to a 1.5% increase in the short volume ratio relative to its unconditional mean of 0.196; for the average stock, this amounts to an increase of approximately

2,300 shares sold short.[9] This effect seems relatively small when compared to the unconditional standard deviation of the short volume ratio, which is approximately 0.272. Thus, the regression results provide weak evidence that some short sellers anticipate negative news events. When we consider positive news separately in Panel C, we find evidence that the ratio of short sales to other trades is small in the days leading up to a news event. However, again, the magnitude of the coefficient estimates is relatively small and the results suggests that, for the most part, short sellers' trades are similar to the trades of other investors in the days before a positive news event.

Overall, the evidence suggests that short sellers generally trade at the same time as other traders, and in those instances in which they show different timing, short sellers tend to trade *after* other traders, not before. The results suggest that, on average, the previously documented information advantage of short sellers (see, e.g., Boehmer, Jones, and Zhang, 2008; Asquith, Pathak, and Ritter, 2005) does not stem from an ability to anticipate news.

3.2. Do short sellers have superior information processing ability?

Given our finding above, in this subsection we ask whether short sellers' information advantage derives from an alternative source, namely, a superior ability to process the information contained in publicly available news.

[9] This calculation is an approximation based on the unconditional mean number of shares shorted which equals 153,324 shares. Thus, 2,300 shares = 1.5% * (153,324), where 1.5% = 0.003 / 0.196.

To answer this question as directly as possible, we begin by replicating Table IV of Boehmer, Jones, and Zhang (2008), shown in our Table 4, below (column 1).[10] Specifically, we run Fama-MacBeth (1973) regressions of the form:

$$Ret_{i;t+1,t+20} = \alpha + \beta_1(Short\ Volume\ Ratio_{it}) + \varepsilon \quad (2)$$

where the dependent variable is 20-day rolling returns (i.e., t+1 to t+20) from January 3, 2005 through July 6, 2007 and the independent variable is *Short Volume Ratio* on day *t*, which is defined as daily short volume divided by total volume. We calculate standard errors using the standard deviation of the time-series of coefficient estimates and we use the Newey-West (1987) standard error correction with 20 lags as in Boehmer, Jones, and Zhang (2008). We use two different measures of returns as the dependent variable: models 1 through 3 use raw returns, while models 4 through 6 use returns adjusted using 25 size and momentum portfolios, where momentum is measured using monthly returns over the last 12 months. In both cases, the Boehmer, Jones, and Zhang (2008) result comes through strongly. In each of the specifications, *Short Volume Ratio* is negative and statistically significant, indicating that high levels of short selling predict future prices decreases; the results confirm the existing finding that short sellers are informed traders.

Given our previous results, we next ask whether this information advantage is concentrated on news days. To test for this effect, we add a *News Event* indicator and a *Short Volume Ratio* *

[10] We replicate the Boehmer, Jones, and Zhang (2008) methodology, however we use a different sample; Boehmer, Jones, and Zhang's (2008) sample covers January 2000 to April 2004 while our sample covers January 2005 through July 2007.

News Event interaction term in columns 2 and 5. Specifically, we run Fama-MacBeth (1973) regressions of the form:

$$Ret_{i;t+1,t+20} = \alpha + \beta_1(Short\ Volume\ Ratio_{it}) + \beta_2(News\ Event_{it}) + \beta_3(Short\ Volume\ Ratio_{it} * News\ Event_{it}) + \varepsilon \quad (3)$$

While the coefficient on the *News Event* indicator is small and insignificant, the coefficient on *Short Volume Ratio* * *News Event* is -0.479 and highly significant. Comparing this to the coefficient on *Short Volume Ratio* of -0.453, the main result is clear: the predictive power of *Short Volume Ratio* more than doubles on news days.

Of course, news events can contain negative or positive sentiment and the sentiment of a news event might impact the ability of short sellers to profit from it. To see whether the increased predictability of *Short Volume Ratio* depends on the content of news events, we decompose the *News Event* variable into three indicator variables: *Negative News Event*, *Neutral News Event,* and *Positive News Event*. As before, a *Negative News Event* occurs when there is news and a firm's announcement day return is in the bottom quintile of all returns on a given day, a *Positive News Event* occurs when there is news and a firm's return is in the upper quintile of all returns on a given day, and a *Neutral News Event* occurs when there is news and a firm's return is in neither the top nor the bottom quintile. Our Fama-MacBeth (1973) regressions thus include three news event indicators and three interactions terms as shown in Eq. 4, below:

$$Ret_{i;t+1,t+20} = \alpha + \beta_1(Short\ Volume\ Ratio_{it}) + \sum_{n=1}^{3}(\beta_{n+1} News\ Event_{n,i,t}) + \sum_{n=1}^{3}(\beta_{n+4} Short\ Volume\ Ratio_{it} * News\ Event_{n,i,t}) + \text{controls} + \varepsilon \quad (4)$$

The results are shown in the final columns (3 and 6) and include additional controls for size and lagged returns following Diether, Lee, and Werner (2008). The result suggests that our main

effect is stronger for negative news events (-1.805, t-statistic of -4.26) than for positive news events (-1.113, t-statistic of -2.40).[11] The magnitude of the coefficients also suggests that the size of the predictability for future returns nearly quadruples on negative news days and triples on positive news days. We also find that on neutral news event days, when the potential advantage from processing information is likely minimal, the effect is smaller in column 3 and insignificant in column 6. Overall, while news events occur on only 22% of the days in our sample, our results suggest that these days account for over 45% of the total predictability associated with short sales.[12]

Fig. 3 illustrates the main results using a trading strategy approach in which we form long/short portfolios based on *Short Volume Ratio* and/or the presence of news events; Table 5 reports the associated summary statistics on the monthly performance of these portfolios. Panel A of Fig. 3 displays the cumulative returns from a portfolio that goes short stocks in the highest quintile of *Short Volume Ratio* and long stocks in the lowest quintile of *Short Volume Ratio*. This equal-weighted portfolio is initiated the day after *Short Volume Ratio* is observed and it is

[11] One possible explanation for the finding that returns are lower when short sellers increase trading in the presence of positive news is that short sellers can identify overreactions to positive news.

[12] Similar to the calculation in Boehmer, Jones, and Zhang (2010), we calculate the total underperformance associated with a one-standard deviation increase in short sales as: (percentage of days with news * the underperformance with news) + (percentage of days without news * the underperformance without news). Using the estimates in Table 4, the total underperformance = −0.724% = [4.83% * (−0.509 − 1.805)] + [5.09% * (−0.509 – 1.113)] + [12.00% * (−0.509 – 0.597)] + [(1 − 4.83% − 5.09% − 12.00%) * −0.509], where the first three terms represent the portion attributable to negative, positive, and neutral news days, respectively, and the last term represents the portion attributable to non-news days. News days account for 45% of this total underperformance.

held for the next 20 days.[13] The portfolio formation process is repeated each day so that 1/20 of the portfolio is effectively rebalanced each day as in Boehmer, Jones, and Zhang (2008). Conditioning on short-selling alone, as shown in Panel A, leads to a cumulative return of approximately 40% over our sample period, which corresponds to a mean monthly portfolio return of approximately 1.4%.

In Panel B, firms with negative news are assigned to the short portfolio and firms with positive news are assigned to the long portfolio. Conditioning on news alone leads to a mean monthly return of approximately 0.7%, which leads to a total cumulative return of only 20%. However, conditioning on short-selling *and* news together, as shown in Panel C, leads to a cumulative return of approximately 60% over our sample period and a mean monthly return of 2%. In fact, when we further condition on the sign of the news in Panel D, it leads to a mean monthly return of almost 6% and a total cumulative return of approximately 180% over the sample period.

Taken together, the results in this section suggest that among stocks with high short volume, those with news have significantly lower future returns than those without news, a finding that directly supports the *Profitability* hypothesis ($H2_b$). Our results thus provide new insight into the source of short sellers' information advantage. In particular, we find that the previously documented relation between short volume and future returns is much stronger for stocks that

[13] The cumulative portfolio returns we show do not account for transaction costs. Furthermore, over our sample period, short volume was not publicly observable without a delay, and thus these cumulative portfolio returns do not represent a trading strategy that could be implemented. Instead, these portfolio returns are indicative of the compensation earned by short sellers for processing publicly available information. While information processing is not costless, these results suggest that short sellers can earn substantial compensation.

have a public news event.[14] The results suggest that short-sellers are good at processing the information contained in news events, especially when the news is negative.[15]

3.2.1. Alternative interpretations

We interpret our evidence that the profitability of short sales is higher on news days as evidence that short sellers process news events well. However, there are several possible alternatives that could also explain the evidence: (1) short sales could be more profitable on news days because these days provide liquidity to traders who make systematic mistakes around news events (i.e., the *Uninformed Counterparty* hypothesis (H3)) and (2) short sales could be more profitable on news days because the cost of shorting is lower on news days (i.e., the *Liquidity* hypothesis (H4)). The following results suggest that neither alternative is supported by the evidence.

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[14] The Boehmer, Jones, and Zhang (2008) result can be thought of as a high-frequency analog of the results in Asquith, Pathak, and Ritter (2005). These papers measure short trading with short interest instead of short volume, and they use future returns that are measured over longer periods. Although we would like to examine the relation between news and short sellers' advantage in the context of these short interest-based findings, there is an econometric challenge in making a direct comparison. Specifically, news in our database is marked with daily time stamps, so we would either have to aggregate news to match the monthly frequency of short interest or we would have to throw out much of our news data. It is not clear how a reduction in the frequency of the news variable would change expectations about the short positions.

[15] The fact that short-sellers also profit from positive news events is consistent with the third prediction in Hong, Kubik, and Fishman (2011), which implies that short sales initiated after positive news will be profitable, since good news can initially lead to the covering of short positions that were open prior to the event, leading to an overreaction.

One drawback to using total short sales volume as a measure of short selling is that some short sales are generated as a result of market making – to the extent that some buyers make systematic mistakes, the corresponding short sales are simply offsetting positions, not informed trades. Thus, with the total measure of short sales volume used in Table 4, we cannot distinguish the effect of short sales that arise in response to counterparty purchases from the effect of shorts that arise for the purpose of gaining a negative exposure. This raises the question of whether our results in Table 4 can be attributed to informed trading. To address this concern, we take advantage of a unique feature of the data, namely, the exempt versus non-exempt classification of trades. This classification allows us to separate shorts into market making and non-market making (i.e., client) trades.[16]

Tables 6 and 7 report the results for non-exempt and exempt trades, respectively. In Table 6 the statistically significant coefficient estimate of −0.976 on *Short Volume Ratio* in column 6 indicates that high short volume is a significant predictor of low future returns. Moreover, the magnitude on short volume is almost double the corresponding coefficient for total short sales volume in Table 4, which suggests that the ability of short sales to predict future returns is particularly strong for non-market-making trades. We also see that the short-news interactions are large and negative, indicating that non-market makers' shorts are more profitable in the presence of news events than at other times. As before, the effect is stronger for negative news events (-2.445, t-statistic of -3.95) than for positive news events (-1.408, t-statistic of -3.16) and

[16] Anecdotal evidence suggests that the exemption is sometimes abused, but only in one direction: trades can be inappropriately marked as exempt when they are not. Since the exemption removes potential restrictions, it is unlikely that exempt trades would ever be inappropriately marked as non-exempt. In other words, exempt trades can include client trades, but non-exempt trades are unlikely to include market maker trades.

the effect is not statistically significant on neutral news event days, when the potential advantage from processing information is likely minimal.

In contrast, the results in Table 7 indicate that market makers' trades are not particularly well informed: the short-news interactions are largely insignificant and when they are statistically significant, the coefficient is positive, indicating that the short sales of market makers are actually associated with *positive* future returns on news days. Overall, the evidence suggests that the most informed short sales are those made for the purpose of gaining a negative exposure, and that these trades are particularly well informed in the presence of news events. In other words, we find evidence rejecting the *Uninformed Counterparty* hypothesis.

Another potential explanation is that short sales are profitable on news days because news days provide short sellers an opportunity to trade at a lower cost. Under this view, short sellers have an information advantage well before a news announcement. However, they cannot execute their trades if transaction costs are high or liquidity is low. Since news days tend to have higher than normal volume, it could be that these days are low cost and/or high liquidity days on which short sellers can execute their trades. As a result, if news events provide opportunities to transact at lower costs, then short sellers could *appear* to have more profitable trades around news announcements, even if the news events themselves are not the source of an information advantage.

This story, however, requires that the costs of short selling are lower around news announcements. Fig. 4, which presents a plot of rebate rates, the Amihud (2002) Illiquidity measure, and bid-ask spreads around news events, suggests that this is not the case. Both rebate rates and the Amihud measure show no significant improvement on news days; moreover, bid-

ask spreads actually sharply increase on news days. More specifically, Table 8 tabulates the mean values of these variables around news announcements and confirms that rebate rates and the Amihud measure show no significant improvement on news days, while bid-ask spreads actually rise on news days. Moreover, the increase in bid-ask spreads, which results in higher transaction costs on news days, is consistent with existing models of market maker behavior in the presence of informed traders (see, e.g., Glosten and Milgrom, 1985; Kyle, 1985).[17] The results suggest that transaction costs do not decrease on news days and the evidence suggests that the *Liquidity* hypothesis (H4) should be rejected in favor of the null. In other words, the evidence suggests that the significant relation between short sales, news, and returns is not a result of the liquidity that news events provide.

Finally, while we interpret our findings as evidence that short sellers process news events well, it is possible that our results are the product of either reverse causality or an omitted variable. For example, a news article can come in response to a price decline, rather than the other way around. However, for many of our analyses, we stress that news and short-volume today predict *future* returns (e.g., Tables 4, 6, and 7), so the timing of our tests suggests that reverse causality is less of a concern. Nevertheless, it could be that some omitted variable causes both news and high short-volume today as well as low returns in the future. Although we cannot rule out such an explanation, it is worth noting that the timing tests and the cross-sectional test in the paper are consistent with an information processing story.

[17] The fact that bid-ask spreads increase on news days is consistent with Meulbroek (1992), who finds that the market is significantly more sensitive to abnormal volume on days with insider trading and this information is impounded into prices. In other words, the results here and the results in Meulbroek (1992) are both consistent with the idea of market participants responding to the suspected presence of informed traders.

3.3. Robustness

Our results demonstrate that a significant portion of short sellers' trading advantage comes from their ability to analyze publicly available information; when we look at short sellers' trades around all types of corporate news events we find that the negative relation between short sales and future returns more than doubles. As a robustness check, in this section we use the subject categorizations provided in the Dow Jones archive to examine the relation between short sales, returns, and specific types of news events. While several extant papers examine a subset of this paper's sample of news events, our analysis extends the sample to include a broader range of news events in order to better understand the sources of informed trading.

3.3.1. Price responses by news category

In an extension to the profitability analysis discussed above, in this section we ask whether short sellers' information processing ability is uniformly strong across news categories. To get at this question, we examine the relation between short sales, news, and returns separately for each of the 39 news categories in our database. In each regression, the dependent variable is the compound market-adjusted return from the first to the twentieth trading day after the news event, where the market-adjusted return is calculated net of the value-weighted market return from CRSP. The main independent variable of interest is *short vol / total vol*, which is the amount of short selling relative to total volume on the day of the news event. Specifically, we estimate the following panel regression separately for each news category and only when a news event occurs:

$$Ret_{i;t+1,t+20} = \alpha + \beta_1 \left(\frac{short\ vol_{t=0}}{total\ vol_{t=0}}\right) + \beta_2 Size_{t-1} + \beta_3 ret_{t-1} + \beta_4 ret_{t-2} + FE_i + \varepsilon \quad (5)$$

As in Table 4, we include controls for firm size and the previous two days of returns and we include firm fixed effects to control for possible unobserved heterogeneity in the panel. The results, shown in Table 9, indicate that short sellers have some ability to identify trades that are likely to be profitable around certain news events. Specifically, we find that the coefficient estimates on *short vol / total vol* are significantly negative for 13 of the 39 news categories; of these, five are statistically significant at the 1% level (*Earnings, Earnings Projections, High Yield Issuers, New Products & Services,* and *Stock Ownership*), and four more are significant at the 5% level (*Analyst Comments and Ratings, Bond Ratings and Comments, Divestitures or Asset Sales,* and *Lawsuits*). Moreover, these categories are consistent with the findings of Christophe, Ferri, and Angel (2004), Christophe, Ferri, and Hsieh (2010), and Boehmer, Jones, and Zhang (2010), who find that short sellers are informed traders who can profit from earnings announcements and analyst downgrades.

Overall, the 13 categories that are significantly negative represent approximately 68% of the news categories by frequency count (see Table 2). While the remaining categories account for approximately 32% of news events, many of these events occur relatively infrequently; as a result, our category specific regressions may not be powerful enough to pick-up a relation between short sales around these events and future returns. As a further test of statistical significance, we conduct a Fisher test of combined probability to determine whether the cross-sectional distribution of the *p*-values from each regression differs significantly from a uniform zero-one distribution. The Fisher test rejects this null at the 1% level of significance across all

news categories, suggesting that the coefficient on short volume is statistically different from zero for the cross-section.

Taken together, our results indicate that when short selling predicts future returns, short sellers appear to be making profitable trades. This evidence lends further support to the idea that short sellers' information advantage stems from their superior ability to process publicly available information. In other words, the results show that the inverse relation between short volume and future returns is strongest around news events, whereas during non-news events this relation could be insignificant or even go in the other direction. These results lend additional support to our main finding that the previously documented information advantage of short sellers is driven in large part by short sellers' superior ability to process information contained in publicly available news.

4. Conclusion

Previous research shows that short sellers are informed traders (see, e.g., Boehmer, Jones, and Zhang, 2008; Asquith, Pathak, and Ritter, 2005). Yet we know little about the source of short sellers' information advantage. This paper seeks to fill this gap by asking how short-sellers become informed. To do this, we combine a database of all public news events in the U.S. with a database of short sales.

We find little evidence that short-sellers can anticipate news events. In fact, the ratio of short sales to total volume is nearly constant over news periods, with no significant change in the ratio around news events. However, we do find some differences between the timing of short sellers' trades and the overall market: there is a significant increase in short selling *after* news events.

This finding is consistent with short sellers trading on publicly available information. In other words, the evidence suggests that their information advantage is, on average, not due to an ability to create news stories or anticipate information before it becomes public. Accordingly, we reject the *Anticipation* hypothesis.

Given the finding that short sellers' advantage is not due to anticipation, we next ask whether short sellers' information advantage derives from an alternative source, namely, a superior ability to process the information contained in publicly available news. We find supportive evidence. In particular, we find that across all types of news, short selling's predicative effect on future returns is twice as strong on news days.

We find that this result is not a reflection of persistent mistakes by buyers, as the most informed short sales are not from market makers but rather from clients, and these client shorts are particularly well informed in the presence of news. Moreover, we find no evidence that short selling around news events is more profitable because of the liquidity that news events provide, as the bid-ask spread is actually found to increase by approximately 5% on news days. Taken together, the evidence suggests that short-sellers gain an information advantage from superior processing of public news.

More broadly, our results shed light on the evolution of informed traders in financial markets. Although many models of financial markets assume the existence of informed traders who have superior information about asset values, these models often beg the question: where do these informed traders come from? Because short-sellers are well known to be informed traders, we can think of the environment in our study as a laboratory for informed trading in general. From

this perspective our paper addresses a more fundamental question: how do informed traders become informed?

The answer in our study is perhaps surprising. Instead of leveling the information playing field between informed and uninformed traders, news events appear to be precisely the moment when informed traders in our setting gain an information advantage over others. Thus, the evidence herein paints informed traders as skilled information processors with news as fodder for their processing.

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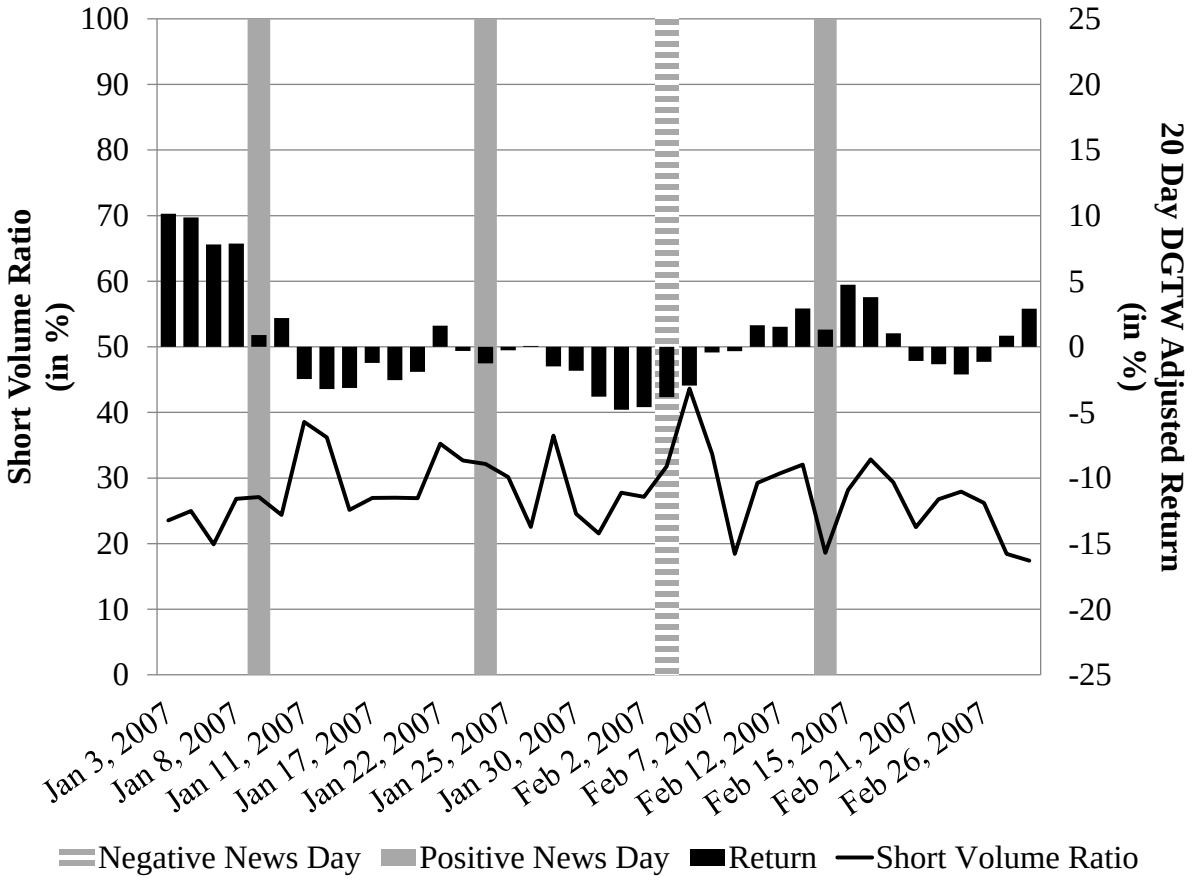
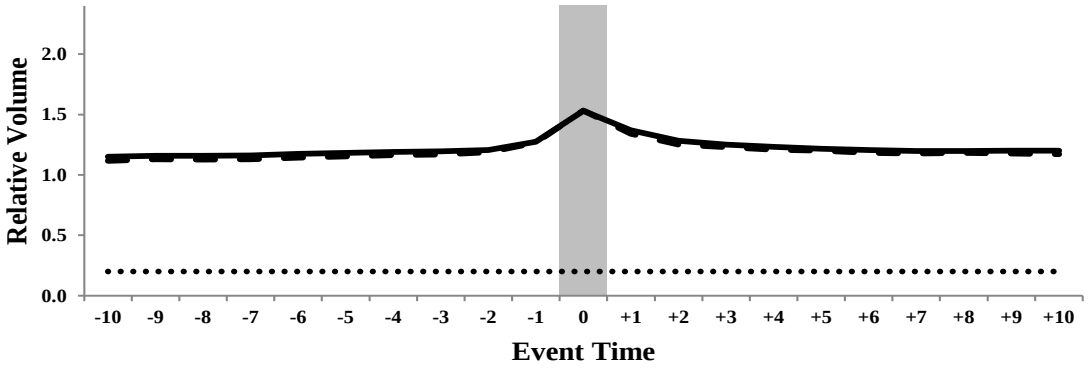


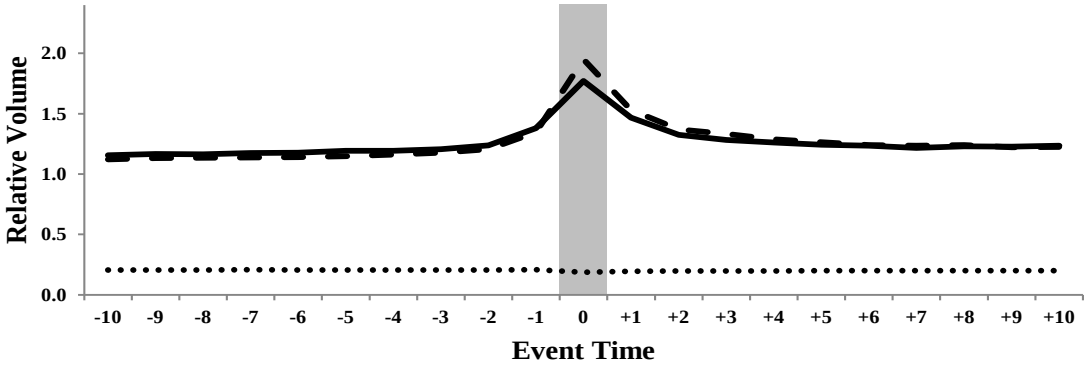
Fig. 1. Example time series of short sales, news, and 20-day portfolio returns

The figure displays portfolio returns (right axis) and the short volume ratio (left axis) each day for one example firm, Williams-Sonoma, from January 1, 2007 through February 28, 2007. Portfolio returns are the buy and hold (compound) return percent over the subsequent 20 trading days and are calculated using size and momentum-adjusted returns. *Short Volume Ratio* is daily short volume / total volume. Negative (positive) news days are defined as days on which a news article about Williams-Sonoma is released and the firm's announcement day return is in the bottom (top) quintile of all returns that day, respectively.

Panel A: All News Events



Panel B: Negative News Events



Panel C: Positive News Events

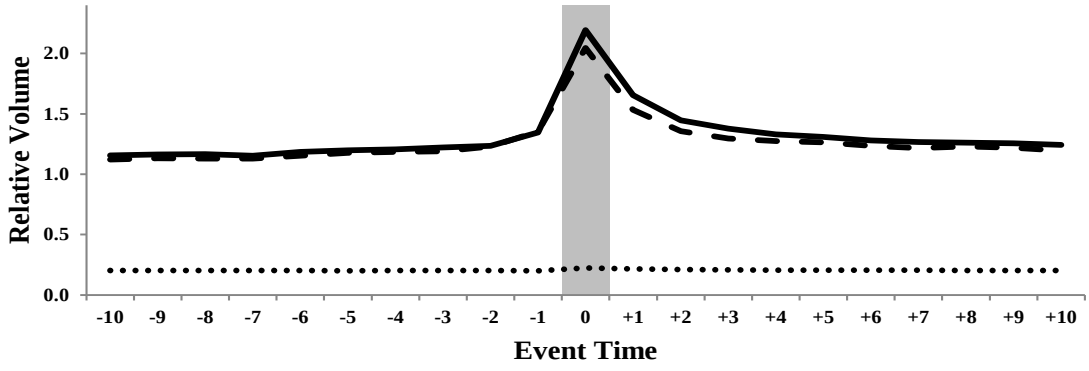


Fig. 2. Daily Volume around news events

The figure displays daily short volume, total volume, and the ratio of short volume to total volume for the ten days before and after news events. Short volume and total volume are scaled by their mean values over the period *t*-16 to *t*-30. Panel A displays volume around all news events (n = 152,595), while panels B and C display volume for negative (n = 34,780) and positive (n = 37,742) news events, respectively. Negative (positive) news events are defined as events with an announcement day return in the bottom (top) quintile of returns on a given day.

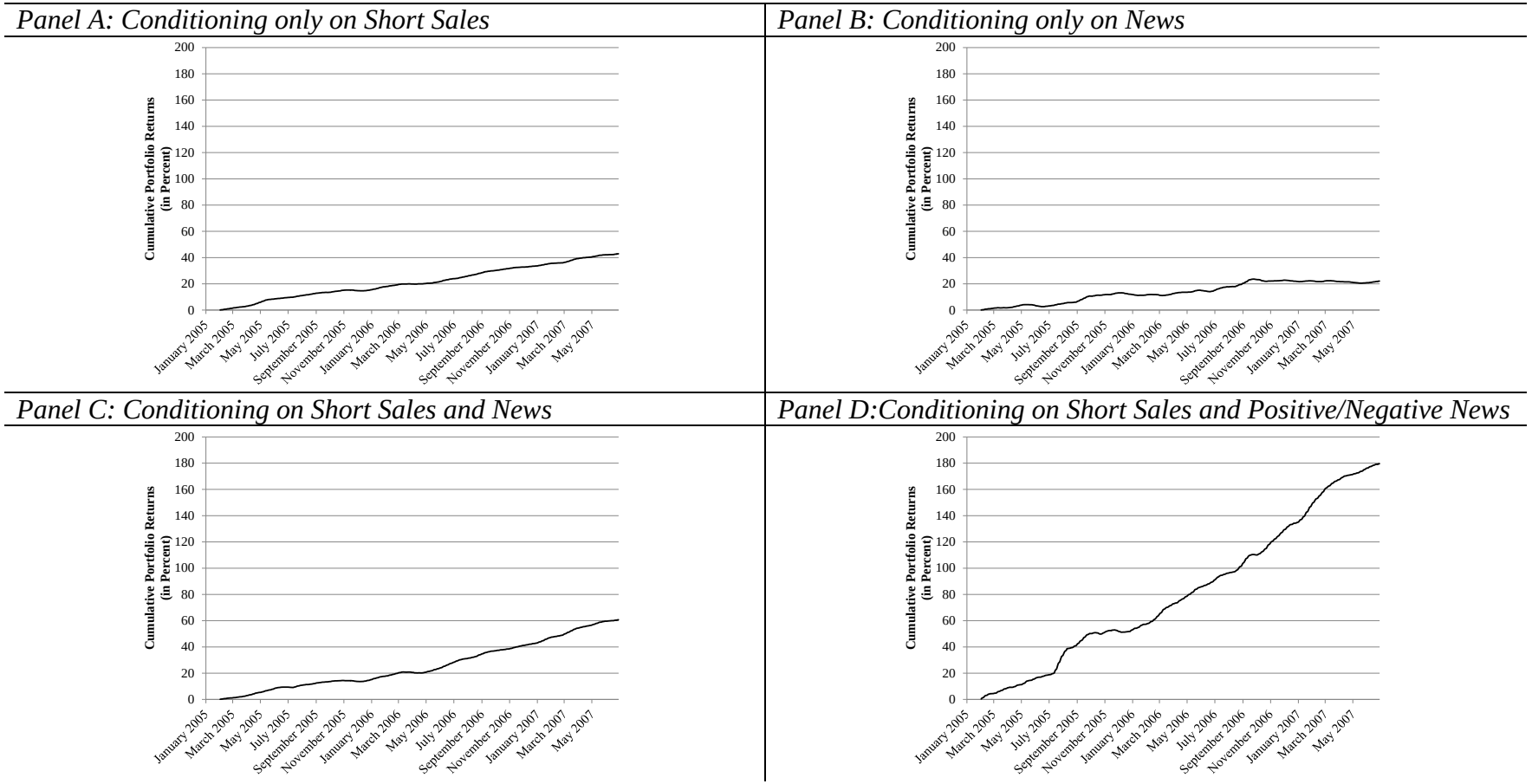
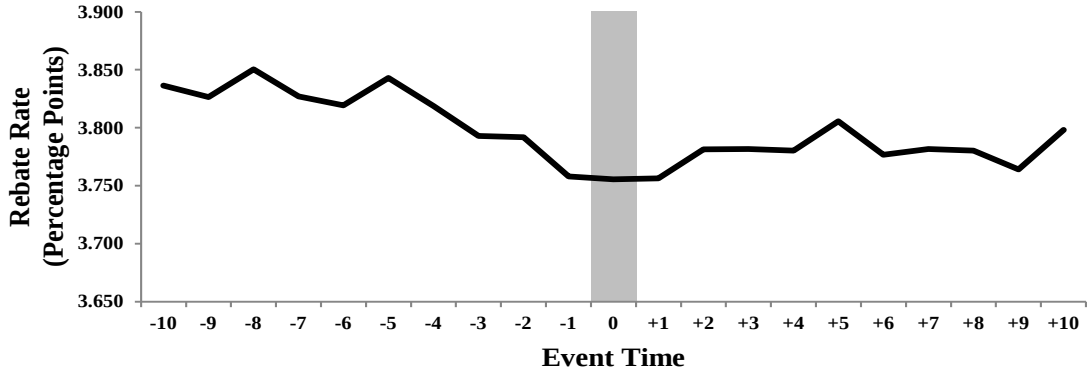


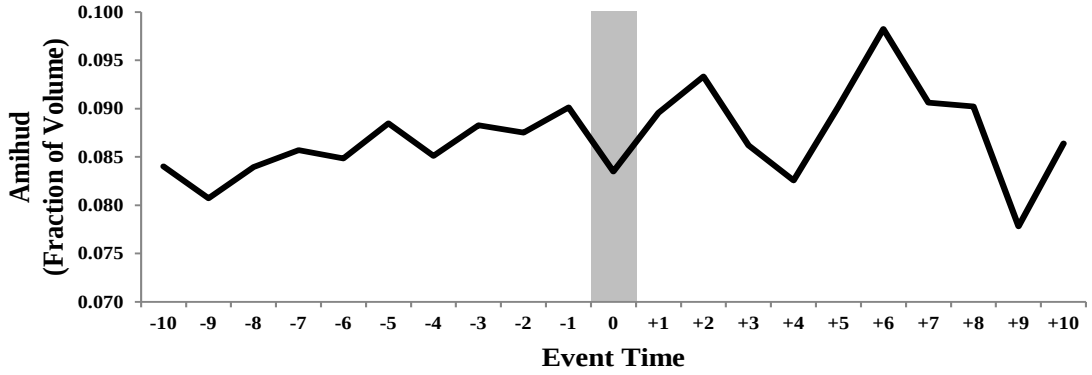
Fig. 3. Cumulative portfolio returns

The figure displays cumulative returns from long/short portfolios formed by conditioning on short sales and/or news events over the period January 3, 2005 to July 6, 2007. Each day, portfolios are formed by conditioning on the previous day's level of short sales and/or by conditioning on the occurrence of news events the previous day. These equal-weighted portfolios are then held for 20 days and the portfolio formation process is repeated each day so that 1/20 of the portfolio is effectively rebalanced each day, as in Boehmer, Jones, and Zhang (2008). The total daily portfolio return is thus the mean return calculated across the 20 separate positions that are open at each point in time. In Panel A, firms with short sales in the lowest (highest) quintile are assigned to the long (short) portfolio. In Panel B, firms with positive (negative) news are assigned to the long (short) portfolio. In Panel C, firms that experienced news and had short sales in the lowest (highest) quintile are assigned to the long (short) portfolio. In Panel D, firms with positive (negative) news *and* short sales in the lowest (highest) quintile are assigned to the long (short) portfolio.

Panel A: Rebate Rates around News Events



Panel B: Amihud Illiquidity Measure around News Events



Panel C: Bid-Ask Spread around News Events

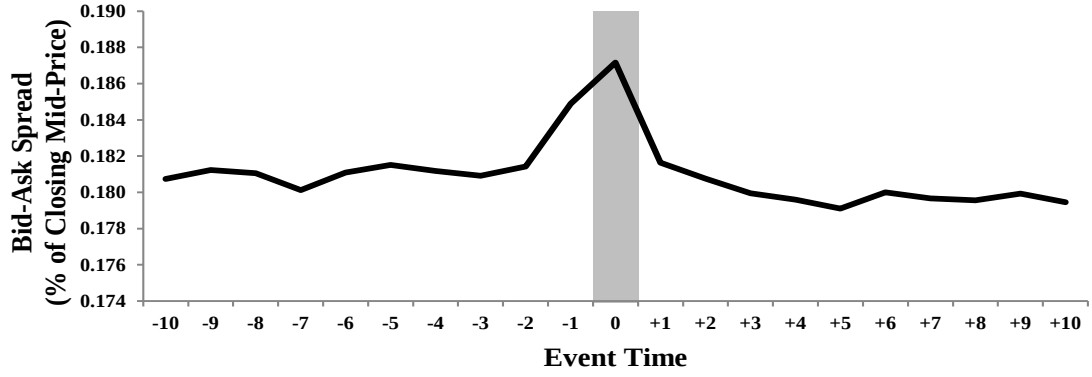


Fig. 4. Market quality around news events

The figure displays *Rebate Rates*, *Amihud Illiquidity*, and *Bid-Ask Spread* measures for the ten days before and after news events. Panel A contains the *Rebate Rate*, which is the rate at which interest on collateral is rebated back to the borrower in an equity loan transaction. Panel B contains the daily *Amihud (2002) Illiquidity* measure defined as $10^7 * |ret_{it}| / volume_{it}$ where $volume_{it}$ is the dollar volume. Panel C contains the *Bid-Ask Spread* measured as a percentage of the closing mid-price on each day.

Table 1
Dow Jones archive

The table provides an example of the information contained in the Dow Jones archive. Panel A displays the text of an example article, while Panel B contains the associated entry in the Dow Jones archive. The archive entry contains the date and time the article was released as well as the stocks symbols of firms mentioned in the article and a series of subject codes that identify the content areas of the article. For example, the code *RND* indicates that the article pertained to research and development. Articles can have more than one time stamp, indicating that the article was updated following its initial release.

Panel A: Example News Article

GlaxoSmithKline And EPIX Pharmaceuticals Enter Drug Discovery And Development Alliance

DOW JONES NEWSWIRES

Epix Pharmaceuticals Inc. (EPIX) said it entered into a drug discovery and development pact with GlaxoSmithKline (GSK). As part of deal, Epix will receive an upfront payment of $35 million, which includes $17.5 million from the sale of 3 million shares of its common stock.

Epix will also be eligible for up to $1.2 billion for the achievement of certain milestones, and royalties on product sales. Epix shares closed Monday unchanged at $5.52 and Glaxo shares fell 9 cents to $52.43. Epix said it expects to end 2006 with more than $100 million in cash and marketable securities. The company expects that its existing cash and marketable securities together with the expected revenue from the GlaxoSmithKline collaboration and other partnerships will be sufficient to fund operations through 2008.

Panel B: Dow Jones Archive Values for the Example Article

Story code = 20061212003980
Date = 12/12/2006
Time = 06:12:00:29, 06:12:02:36, 06:12:16:34, 06:12:24:59
Stock Symbols = EPIX, GSK
Subject Codes = CNW, DJEN, DJGP, DJGS, DJGV, DJI, DJIN, DJIV, FCTV, SPOT, WEI, RND, HDL

Table 2

Summary statistics

The database has 1,888,868 daily observations over the period January 3, 2005 through July 6, 2007. The database contains 3,167 entities including ordinary common shares in U.S. firms, ADRs, REITs, and Closed-End Funds. Panel A provides summary statistics at the firm level. News articles could be reissued throughout the day as more information becomes available; in such situations we consider all of the related article updates to be one unique news event and we keep track of the number of articles that are rolled-into this unique news event. *News Articles per Firm-Day* is a count of all news articles including reissued (updated) articles, while *Unique News Events per Firm-Day* is a count of the unique stories, excluding subsequent updates to an article. *Short Vol. / Total Vol.* is short volume from the NYSE TAQ Regulation SHO database as a fraction of total volume; *Exempt* and *Non-Exempt* denote market maker short sales (exempt) from non-market maker short sales (non-exempt); see Section 2.2.1 for details. *Market Capitalization* is from CRSP. Panel B contains summary statistics on the frequency of each news category in the database; news articles can be classified into more than one category at the same time.

Panel A – Firm Level Statistics	Mean	Median	1st Percentile	99th Percentile	Standard Deviation
News Articles per Firm-Day	1.264	0.000	0.000	20.000	4.331
Unique News Events per Firm-Day	0.927	0.000	0.000	13.000	2.934
Short Vol. / Total Vol.	0.196	0.175	0.005	0.624	0.272
Short Vol. / Total Vol. – Exempt	0.036	0.014	<0.001	0.323	.081
Short Vol. / Total Vol. – Non-exempt	0.176	0.157	0.004	0.553	0.268
Market Capitalization ($ mm)	$5,857	$1,228	$33	$80,368	$19,331

Panel B – News Categories	*N*	*News Categories*	*N*
10K	1,183	Initial Public Offerings	9,166
8K	10,202	Insider Stock Buys	20,215
Acquisitions, Mergers, Takeovers	55,994	Insider Stock Sells	51,199
Analysts' Comments & Ratings	48,743	Joint Ventures	9,071
Annual Meetings	3,871	Labor Issues	12,302
Antitrust News	5,091	Lawsuits	14,784
Bankruptcy-Related Filings	5,979	Leveraged Buyouts	2,171
Bond Ratings & Comments	14,925	Management Issues	13,321
Buybacks	5,971	Market News	14,259
Contracts, Defense	4,406	Money Market News	1,209
Contracts, Government (not defense)	3,294	New Products & Services	24,434
Contracts, Nongovernment	19,050	Personnel Appointments	29,602
Corporate Governance	4,725	Point of View	15,487
Corporate Restructurings	5,519	Product Distribution	2,456
Divestitures or Asset Sales	11,265	Research & Development	5,541
Dividend News	23,653	Spinoffs	1,734
Earnings	41,556	Stock Options	5,777
Earnings Projections	36,774	Stock Ownership	25,462
Financing Agreements	6,816	Stock Splits	1,895
High-Yield Issuers	168,803		

Table 3

Regression analysis of short volume ratio around news events

The table contains the results of panel data regressions that examine short sales volume around news events. In each regression the dependent variable is daily firm short volume divided by total firm volume and the independent variable of interest is an indicator variable that takes the value one if a news story occurs and zero otherwise, regardless of whether there is news on any of the surrounding days. In Panel A we examine short sales volume around all news events, while in Panels B and C we examine short sales volume around negative and positive news events, respectively. We define a news event as negative (positive) if the announcement day return is in the bottom (top) quintile of returns on a given day, respectively. In each panel we examine six different regressions that vary the timing of the dependent variable relative to the news event to examine short volume changes around news. For example, *t-2* indicates that the dependent variable is observed two days prior to the news event. *After Minus Before* indicates that the dependent variable is the difference in short volume after the event relative to before the event. All regressions include fixed effects by firm and month. To control for the documented response of short sellers to past returns, we include two lags of daily returns (measured in decimals, where the lags are relative to the timing of the dependent variable). *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

	Event Time of the Dependent Variable					After Minus
	t-2	*t-1*	*t=0*	*t+1*	*t+2*	Before
Panel A: All News						
$Return_{(1\ day\ lag)}$	0.388***	0.385***	0.388***	0.389***	0.390***	0.606***
$Return_{(2\ day\ lag)}$	0.271***	0.273***	0.274***	0.274***	0.274***	-0.453***
News Event	-0.001**	-0.002***	<0.001	0.001	<0.001	0.003***
N	1,490,754	1,496,281	1,522,378	1,522,378	1,522,378	1,439,881
Adj. R^2	0.161	0.163	0.161	0.161	0.161	0.009
Panel B: Negative News						
$Return_{(1\ day\ lag)}$	0.388***	0.385***	0.340***	0.392***	0.390***	0.605***
$Return_{(2\ day\ lag)}$	0.271***	0.273***	0.274***	0.274***	0.277***	-0.452***
News Event	0.001	0.003***	-0.019***	0.002**	0.002*	-0.002
N	1,490,754	1,496,281	1,522,378	1,522,378	1,522,378	1,439,881
Adj. R^2	0.161	0.163	0.161	0.161	0.161	0.009
Panel C: Positive News						
$Return_{(1\ day\ lag)}$	0.388***	0.385***	0.388***	0.386***	0.390***	0.601***
$Return_{(2\ day\ lag)}$	0.271***	0.273***	0.274***	0.274***	0.274***	-0.452***
News Event	<0.001	-0.004***	0.022***	0.001*	<0.001	0.007***
N	1,490,754	1,496,281	1,522,378	1,522,378	1,522,378	1,439,881
Adj. R^2	0.161	0.163	0.161	0.161	0.161	0.009

Table 4

Cross-sectional relation between monthly percentage returns, short sales, and news

The table contains Fama and MacBeth (1973) regression results examining the relation between returns, short sales, and news. For each model, we run 609 daily cross-sectional regressions and we take the time-series mean of the coefficients and use the standard deviation to estimate standard errors. The dependent variable is the buy and hold (compound) return percent over the subsequent 20 trading days. For models 1-3 the dependent variable is raw returns, while models 4-6 use size and momentum adjusted returns. *Short Volume Ratio* is daily short volume / total volume and *Size* is the log of market capitalization lagged by one day. We define *Negative*, *Neutral*, and *Positive News Event* variables that equal one if a news event occurs and the announcement day return is in the bottom quintile, middle three quintiles, or top quintile of returns on a given day, respectively. *Short Vol. * News* is the product of *Short Volume Ratio* and the *News Event* indicator. *Return*$_{t=-1}$ is the return (in decimals) on each stock the day before short volume and news are observed. T-statistics are below the parameter estimates in italics and are calculated using Newey-West (1987) standard errors with 20 lags. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

	Dependent Variable: Raw Returns (in percent)			Dependent Variable: Adjusted Returns (in percent)		
	[1]	[2]	[3]	[4]	[5]	[6]
Intercept	1.712***	1.719***	1.721***	0.541***	0.546***	0.548***
	(4.70)	*(4.75)*	*(4.94)*	*(5.32)*	*(5.02)*	*(5.21)*
Short Volume Ratio	-0.529**	-0.453*	-0.509**	-0.686***	-0.597***	-0.652***
	(-2.19)	*(-1.90)*	*(-2.20)*	*(-3.27)*	*(-2.92)*	*(-3.19)*
News Event		-0.020			0.004	
		(-0.23)			*(0.05)*	
Short Vol. * News		-0.479**			-0.561**	
		(-2.16)			*(-2.51)*	
Size			-0.006***			
			(-2.76)			
Negative News Event			0.206			0.134
			(1.37)			*(1.05)*
Neutral News Event			0.021			-0.095
			(0.25)			*(-1.31)*
Positive News Event			0.384**			0.329**
			(2.41)			*(2.32)*
Short Vol. * Neg. News			-1.805***			-1.758***
			(-4.26)			*(-4.14)*
Short Vol. * Neut. News			-0.597***			-0.327
			(-2.72)			*(-1.55)*
Short Vol. * Pos. News			-1.113**			-1.155***
			(-2.40)			*(-2.74)*
Return$_{t=-1}$			2.591			2.909*
			(1.62)			*(1.86)*
Return$_{t=-2}$			3.566**			3.393**
			(2.42)			*(2.35)*

Table 5

Monthly percentage returns from portfolios formed by conditioning on short selling and/or news events

The table contains mean monthly percentage returns for portfolios calculated over the period January 3, 2005 through July 6, 2007. Each day, portfolios are formed by conditioning on the previous day's level of short sales and/or by conditioning on the occurrence of news events the previous day. These equal-weighted portfolios are then held for 20 days and the portfolio formation process is repeated each day, so that 1/20 of the portfolio is effectively rebalanced each day, as in Boehmer, Jones, and Zhang (2008). The total daily portfolio return is thus the mean return calculated across the 20 separate positions that are open at each point in time. Summary statistics are calculated across the individual daily returns and are multiplied by 20 to approximate a monthly return and all statistics are shown in percent. In Panel A, the conditioning variable is the previous day's level of short sales, such that firms with short sales in the lowest (highest) quintile are assigned to the long (short) portfolio. In Panel B, firms with positive (negative) news are assigned to the long (short) portfolio. In Panel C, firms that experienced news and had short sales in the lowest (highest) quintile are assigned to the long (short) portfolio. In Panel D, firms with positive (negative) news *and* short sales in the lowest (highest) quintile are assigned to the long (short) portfolio.

Panel A: Conditioning Variable = Short Sales Only			
	Long	Short	Long-Short
1st Percentile	-3.88	-6.33	-0.76
Median	2.75	1.53	1.45
Mean	2.40	0.97	1.43
99th Percentile	6.48	5.48	3.60
Panel B: Conditioning Variable = News Only			
1st Percentile	-7.84	-7.10	-2.89
Median	2.66	1.64	0.67
Mean	1.94	1.20	0.74
99th Percentile	7.41	8.28	5.33
Panel C: Conditioning Variable = Short Sales and News			
1st Percentile	-4.55	-8.25	-1.40
Median	3.01	1.11	2.04
Mean	2.64	0.62	2.02
99th Percentile	7.55	5.78	5.03
Panel D: Conditioning Variable = Short Sales and Positive/Negative News			
1st Percentile	-9.79	-12.93	-3.53
Median	5.98	0.80	5.30
Mean	6.24	0.30	5.94
99th Percentile	25.45	9.01	20.45

Table 6

Cross-sectional relation between monthly percentage returns, short sales, and news for non-exempt trades

The table contains Fama and MacBeth (1973) regression results examining the relation between returns, short sales, and news. The sample includes only those short sale transactions that were classified as non-exempt, as discussed in Section 2.2.1 of the text. For each model, we run 609 daily cross-sectional regressions and we take the time-series mean of the coefficients and use the standard deviation to estimate standard errors. The dependent variable is the buy and hold (compound) return percent over the subsequent 20 trading days. For models 1-3 the dependent variable is raw returns, while models 4-6 use size and momentum adjusted returns. *Short Volume Ratio* is daily non-exempt short volume / total volume and *Size* is the log of market capitalization lagged by one day. We define *Negative*, *Neutral*, and *Positive News Event* variables that equal one if a news event occurs and the announcement day return is in the bottom quintile, middle three quintiles, or top quintile of returns on a given day, respectively. *Short Vol. * News* is the product of *Short Volume Ratio* and the *News Event* indicator. *Return*$_{t=-1}$ is the return (in decimals) on each stock the day before short volume and news are observed. T-statistics are below the parameter estimates in italics and are calculated using Newey-West (1987) standard errors with 20 lags. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

	Dependent Variable: Raw Returns (in percent)			Dependent Variable: Adjusted Returns (in percent)		
	[1]	[2]	[3]	[4]	[5]	[6]
Intercept	2.013***	2.055***	2.090***	0.821***	0.858***	0.863***
	(5.57)	*(5.76)*	*(6.15)*	*(7.39)*	*(7.28)*	*(7.54)*
Short Volume Ratio	-0.869***	-0.743**	-0.799***	-1.025***	-0.889***	-0.976***
	(-2.93)	*(-2.54)*	*(-2.79)*	*(-3.88)*	*(-3.40)*	*(-3.73)*
News Event		-0.192*			-0.161*	
		(-1.96)			*(-1.84)*	
Short Vol. * News		-0.700***			-0.741***	
		(-2.69)			*(-2.82)*	
Size			-0.008***			
			(-3.84)			
Negative News Event			0.070			-0.015
			(0.41)			*(-0.10)*
Neutral News Event			-0.116			-0.261***
			(-1.26)			*(-3.22)*
Positive News Event			0.292			0.208
			(1.64)			*(1.35)*
Short Vol. * Neg. News			-2.578***			-2.445***
			(-4.43)			*(-3.95)*
Short Vol. * Neut. News			-0.828***			-0.437
			(-3.15)			*(-1.63)*
Short Vol. * Pos. News			-1.432***			-1.408***
			(-2.88)			*(-3.16)*
Return$_{t=-1}$			5.082***			5.291***
			(3.20)			*(3.42)*
Return$_{t=-2}$			6.029***			5.777***
			(4.06)			*(4.03)*

Table 7

Cross-sectional relation between monthly percentage returns, short sales, and news for exempt trades

The table contains Fama and MacBeth (1973) regression results examining the relation between returns, short sales, and news. The sample includes those short sale transactions that were classified as exempt, as discussed in Section 2.2.1 of the text. For each model, we run 609 daily cross-sectional regressions and we take the time-series mean of the coefficients and use the standard deviation to estimate standard errors. The dependent variable is the buy and hold (compound) return percent over the subsequent 20 trading days. For models 1-3 the dependent variable is raw returns, while models 4-6 use size and momentum adjusted returns. *Short Volume Ratio* is daily exempt short volume / total volume and *Size* is the log of market capitalization lagged by one day. We define *Negative*, *Neutral*, and *Positive News Event* variables that equal one if a news event occurs and the announcement day return is in the bottom quintile, middle three quintiles, or top quintile of returns on a given day, respectively. *Short Vol. * News* is the product of *Short Volume Ratio* and the *News Event* indicator. *Return*$_{t=-1}$ is the return (in decimals) on each stock the day before short volume and news are observed. T-statistics are below the parameter estimates in italics and are calculated using Newey-West (1987) standard errors with 20 lags. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

	Dependent Variable: Raw Returns (in percent)			Dependent Variable: Adjusted Returns (in percent)		
	[1]	[2]	[3]	[4]	[5]	[6]
Intercept	1.224***	1.254***	1.203***	0.318**	0.313**	0.306**
	(3.05)	*(3.13)*	*(3.10)*	*(2.40)*	*(2.12)*	*(2.14)*
Short Volume Ratio	-3.492***	-4.011***	-3.924***	-4.081***	-4.360***	-4.321***
	(-5.07)	*(-5.88)*	*(-5.93)*	*(-6.22)*	*(-6.77)*	*(-6.70)*
News Event		-0.100			0.019	
		(-0.97)			*(0.27)*	
Short Vol. * News		4.953***			3.023***	
		(4.77)			*(2.72)*	
Size			-0.003			
			(-1.51)			
Negative News Event			-0.173			-0.082
			(-1.00)			*(-0.60)*
Neutral News Event			-0.112			-0.044
			(-0.97)			*(-0.48)*
Positive News Event			0.195			0.206*
			(1.64)			*(1.90)*
Short Vol. * Neg. News			8.286**			3.892
			(2.35)			*(1.08)*
Short Vol. * Neut. News			4.595***			2.944**
			(3.73)			*(2.34)*
Short Vol. * Pos. News			4.264			1.257
			(1.52)			*(0.42)*
Return$_{t=-1}$			4.460*			4.031*
			(1.78)			*(1.80)*
Return$_{t=-2}$			5.831**			4.239**
			(2.50)			*(2.06)*

Table 8

Market quality around news events

The table displays the cross-sectional means of the *Rebate Rate*, *Amihud Illiquidity*, and *Bid-Ask Spread* measures in event time before, during, and after news events. *t-15* represents the value 15 days before a news event, *t=0* is the value on the day of a news event, and *t+15* represents the value 15 days after a news event. Panel A contains the cross-sectional mean value and Panel B contains the p-values from a dependent *t*-test of differences in mean values relative to the news date (*t=0*). Because the subsamples around news dates do not all have the same number of observations, the differences presented in Panel B are not identically equal to the difference of the means presented in Panel A. The *Rebate Rate* for an equity loan is the annualized rate (in percentage points) at which interest on collateral is rebated back to the borrower. The *Amihud (2002) Illiquidity* measure is the daily illiquidity measure defined as $10^7 * |ret_{it}| / volume_{it}$ where $volume_{it}$ is the dollar volume. *Bid-Ask Spread* is measured as a percentage of the closing mid-price on each day. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significance at the 10% level.

Panel A: Mean

Event Time	Rebate Rate (in %)	Amihud Illiquidity	Bid-Ask Spread
t-15	3.854	0.082	0.152
t-10	3.849	0.084	0.151
t-5	3.849	0.088	0.154
t=0	3.846	0.084	0.160
t+5	3.860	0.090	0.154
t+10	3.870	0.086	0.153
t+15	3.875	0.091	0.151

Panel B: P-Values from Dependent T-test of Differences

t=0 vs. *t-15*	0.042***	-0.001	0.003***
t=0 vs. *t-10*	0.029***	-0.001*	0.004***
t=0 vs. *t-5*	0.016***	<-0.001	0.002**
t=0 vs. *t+5*	-0.016***	<0.001	0.006***
t=0 vs. *t+10*	-0.034***	<0.001	0.005***
t=0 vs. *t+15*	-0.057***	<0.001	0.007***

Table 9

Equity returns following specific news events

The table examines equity returns following news events according to the model:

$$Ret_{i;t+1,t+20} = \alpha + \beta_1 \left(\frac{short\ vol_{t=0}}{market\ \ vol_{t=0}}\right) + \beta_2 Size_{t-1} + \beta_3 ret_{t-1} + \beta_4 ret_{t-2} + FE_i$$

where the dependent variable is the buy and hold (compound) market-adjusted return percent from day 1 to day 20 following the news event and the short volume ratio is short volume as a fraction of total volume on the day of the news event. *Size* is the log of market capitalization for each firm in billions, lagged by one day, and ret_{t-1} is the lagged return for each firm. The market-adjusted return is calculated net of the value-weighted market return from CRSP. Regressions are run individually for each news event and only when a news event occurs. As discussed in Section 2.2.2 of the text, to address the potential issue of news clustering we remove stories in the same category that occur within 30 days of another story for the same firm. We include firm fixed effects in each regression. *** indicates significance at the 1% level, ** indicates significance at the 5% level, and * indicates significant at the 10% level.

	Short Volume Ratio$_{t=0}$		Size$_{t-1}$		Return$_{t-1}$		Return$_{t-2}$		
News Events	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	N
10K	1.120	*0.23*	-0.216***	*-3.20*	-0.415	*-1.16*	1.589**	*2.08*	892
8K	-1.045	*-0.79*	-0.108***	*-2.60*	-0.081	*-1.23*	0.011	*0.15*	5,705
Acquisitions, Mergers, Takeovers	-1.568	*-1.57*	-0.336***	*-5.92*	0.035	*0.50*	-0.074	*-1.01*	8,643
Analysts' Comments & Ratings	-2.010**	*-2.40*	-0.392***	*-8.17*	-0.035	*-0.84*	0.025	*0.47*	11,032
Annual Meetings	1.981	*0.90*	-0.037*	*-1.79*	0.087	*0.78*	0.153	*0.88*	2,382
Antitrust News	-0.675	*-0.44*	-0.079***	*-4.47*	-0.162	*-0.94*	-0.144	*-0.89*	2,027
Bankruptcy-Related Filings	2.023	*0.59*	-0.062*	*-1.69*	0.081	*0.38*	0.560***	*4.60*	1,513
Bond Ratings & Comments	-2.701**	*-2.00*	-0.122***	*-4.46*	-0.037	*-0.79*	0.283*	*1.93*	6,116
Buybacks	-1.310	*-0.91*	-0.065**	*-2.36*	-0.071	*-0.71*	0.039	*0.38*	3,323
Contracts, Defense	2.981	*0.58*	-0.068**	*-2.53*	-0.331	*-0.95*	0.249	*1.20*	589
Contracts, Government (not defense)	-2.620	*-0.92*	-0.130***	*-2.58*	-0.332	*-0.65*	0.170	*0.74*	1,224
Contracts, Nongovernment	0.115***	*10.46*	-0.210***	*-4.77*	-0.108	*-1.00*	-0.077	*-0.80*	5,547
Corporate Governance	-2.424	*-0.92*	-0.079**	*-2.48*	0.057	*0.32*	0.139	*1.35*	1,862
Corporate Restructurings	-0.729	*-0.31*	-0.066***	*-3.16*	0.317**	*1.99*	-0.020	*-0.11*	2,122
Divestitures or Asset Sales	-3.217**	*-2.34*	-0.082***	*-3.50*	-0.025	*-0.26*	0.007	*0.05*	3,905
Dividend News	-1.069*	*-1.80*	-0.138***	*-4.23*	0.030	*0.61*	-0.060	*-1.36*	13,358
Earnings	-2.762***	*-4.25*	-0.277***	*-5.41*	-0.065	*-1.32*	0.018	*0.30*	17,850
Earnings Projections	-2.915***	*-3.88*	-0.340***	*-6.60*	0.001	*0.02*	-0.003	*-0.05*	13,127
Financing Agreements	-3.371	*-1.52*	-0.165***	*-4.60*	0.057	*0.32*	-0.011	*-0.03*	3,353
High-Yield Issuers	-2.425***	*-2.66*	-0.556***	*-5.58*	0.052	*1.00*	0.126	*1.47*	9,649
Initial Public Offerings	1.375	*0.79*	-0.053**	*-2.46*	-0.014	*-0.16*	0.031	*0.20*	2,201
Insider Stock Buys	-1.741*	*-1.83*	-0.108**	*-2.48*	0.038	*0.57*	0.125*	*1.92*	7,511

Table 9 (continued)

News Events	Short Volume Ratio$_{t=0}$		Size$_{t-1}$		Return$_{t-1}$		Return$_{t-2}$		N
	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	
Insider Stock Sells	-1.558*	*-1.81*	-0.145***	*-5.18*	0.045	*0.49*	-0.107	*-0.91*	9,250
Joint Ventures	-0.441	*-0.28*	-0.159***	*-4.51*	-0.021	*-0.18*	-0.243*	*-1.93*	3,335
Labor Issues	-0.243	*-0.15*	-0.103***	*-3.12*	0.128**	*2.15*	0.028	*0.26*	3,632
Lawsuits	-3.105**	*-1.97*	-0.223***	*-5.38*	0.194*	*1.76*	0.135	*1.06*	3,826
Leveraged Buyouts	-4.019	*-1.19*	-0.024	*-0.90*	-0.113	*-0.43*	0.074	*0.34*	922
Management Issues	-0.150	*-0.11*	-0.148***	*-3.54*	-0.061	*-0.81*	0.191	*1.46*	4,775
Market News	-0.138	*-0.08*	-0.224***	*-4.79*	-0.208	*-0.93*	0.183	*1.57*	3,644
Money Market News	-1.850	*-0.39*	-0.083***	*-4.07*	-0.425**	*-2.01*	0.161	*0.34*	432
New Products & Services	-5.424***	*-4.11*	-0.153***	*-4.36*	0.091	*0.56*	-0.168*	*-1.65*	4,978
Personnel Appointments	-0.982	*-0.99*	-0.261***	*-4.52*	-0.065	*-0.97*	0.178*	*1.65*	9,025
Point of View	0.070	*0.04*	-0.179***	*-3.83*	0.034	*0.36*	-0.313**	*-2.53*	3,721
Product Distribution	-2.526	*-1.02*	-0.071**	*-2.27*	-0.246	*-1.25*	-0.195	*-0.88*	1,320
Research & Development	-3.803	*-1.08*	-0.076**	*-2.11*	-0.084	*-0.30*	-0.104	*-0.36*	1,175
Spinoffs	-8.727	*-1.34*	-0.065	*-1.63*	-0.230	*-0.87*	-0.178	*-0.47*	738
Stock Options	-1.420	*-0.44*	-0.116***	*-5.90*	-0.053	*-0.47*	0.167	*0.98*	2,544
Stock Ownership	-1.805***	*-2.83*	-0.167***	*-4.89*	0.078	*1.37*	0.115**	*2.19*	16,677
Stock Splits	-3.862*	*-1.70*	-0.044	*-1.42*	-0.009	*-0.05*	-0.017	*-0.14*	1,551
Fisher Stat	192.97***								
Fisher P-Value	0.00%								