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Abstract: Short sellers trade more on days with qualitative news – i.e. news containing fewer numbers. We show that this behavior is not informationally motivated but can be explained by short sellers exploiting higher liquidity on such days. We document that liquidity and noise trading increase in the presence of qualitative news thus enabling short sellers to better disguise their informed trades. Natural experiments support our findings. For example, qualitative news has a bigger effect on short sellers' trading after a decrease in liquidity following a stock's deletion from S&P 500 and a lower effect when investor attention is distracted by the Olympic Games.

Keywords: Short Selling, Information, Liquidity

JEL classifications: G10, G12, G14

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Introduction

Does the market react differently to qualitative and quantitative information? "Soft"– i.e. more qualitative – information gets transmitted within an organization differently from hard information (e.g., Stein (2002)). However, we know relatively little about the way financial markets react to these different type of information. In this paper, we investigate this issue by studying how short sellers react to qualitative news releases. We focus on short sellers, because prior research has demonstrated that they are informed/sophisticated investors (Cohen, Diether and Malloy (2007), Boehmer, Jones and Zhang (2008), Engelberg, Reed and Ringgenberg (2012)) and thus should be less influenced by media sentiment. The focus on short sellers is also of particular interest given the recent debate on their role in financial markets: while politicians and the public often view short selling as a destabilizing factor, financial research regards them as informed participants, who maintain market quality and improve price efficiency.

We use media coverage of firm-specific news and separate it into tangible (or quantitative) and intangible coverage. Tangibility is measured as the percentage of numbers relative to words across all media articles about a company on a given day. Intuitively, while quantitative news is easier to interpret in terms of market expectations, intangible news admits more ambiguous interpretation. For example, an earnings announcement that (quantitatively) falls short of expectations will unambiguously provide a bad signal and depress the stock price, while an article describing a firm's strategy verbally can be interpreted differently by optimists and pessimists.

As in Saffi and Sigurdsson (2011), we use equity lending data from DataExplorers (now Markit), which offers the most comprehensive data on short selling publicly available. We measure daily short selling activity at the stock level from July 2006 to December 2008. Importantly, we can observe both the newly initiated short positions and the closing of existing short positions.

Exploiting this data feature, we construct a non-directional measure of short sellers' trading activity that can be compared to the overall trading volume in the stock and is well-suited to study the effects of media coverage on short sellers' trading. Media coverage data are taken from Factiva. The sample of firms include all public U.S.-based companies that ranked in the top 1,000 by market capitalization at any time between January 1999 and December 2008. For each company, we define information intangibility at the daily frequency as one minus the percentage of numbers across all articles featuring the company in major news and business publications, newswires, and press releases.

We investigate how intangibility affects short selling. We consider days with company news coverage ("news days") and find that short sellers' trading activity is significantly greater on news days dominated by intangible information. That is, for a given company, short selling activity is greater on news days that feature relatively more soft information. Specifically, our results indicate that the ratio of short sellers' trading to the overall trading volume in a given stock increases by 5% relative to its median on days with above-median information intangibility, even after controlling for other stock characteristics which may influence short selling behavior. This result is significant at the 1% level and is robust to alternative definitions of short sellers' trading activity and to various subsamples. Interestingly, both the initiations of new short positions and the closings of old positions increase on intangible news days.

How do we explain the surprising result that short-sellers, who are apparently sophisticated investors react more strongly to intangible information? We consider two alternative hypotheses. The first is the information hypothesis. It posits that short sellers are better able to interpret intangible information. This intuition is in line with the recent findings by Engelberg, Reed and Ringgenberg (2012), who show that short sellers possess superior information processing skills

that allow them to decode valuable information from public news announcements.[1] If this skill is more pronounced for intangible news, this could explain our result. The second hypothesis is the liquidity hypothesis. It posits that intangible news releases attract more noise trading thereby increasing liquidity. Short sellers can then exploit this liquidity to post their informed trades, as in Kyle (1985). To summarize, we ask whether active trading of short sellers on intangible news days is driven by improved liquidity conditions on such days (*liquidity hypothesis*) or by short sellers' ability to extract valuable information from intangible news (*information hypothesis*).

We first test if short sellers derive a greater information advantage from intangible news. If this were the case, their trades on intangible news days would be more profitable and better able to predict future returns (Engelberg, Reed and Ringgenberg (2012)). Alternatively, increased liquidity on intangible news days should not affect how well trades predict future returns. We find that, while shorting on news days is profitable on average, this profitability is not higher on days with intangible news. This finding fails to support the information hypothesis, suggesting that short sellers do not draw unique and valuable information signals from intangible news.

We then examine the liquidity hypothesis. We document that liquidity and noise trading increase on days with qualitative news. We consider two tests. The first test shows that intangible news induces noise trading and stimulates stock liquidity as described in Kyle (1985). Specifically, we follow Campbell, Grossman and Wang (1993), Llorente, Michaely, Saar and Wang (2002), and Tetlock (2010) and use mean reversion in stock prices as a measure of noise trading. We show that returns tend to mean-revert more strongly following intangible news-days. On average, in the 10 days following the news day about 5% of the original event-day return is eliminated. This effect increases to about 8% as the fraction of non-numeric words in the article goes up by one standard

[1] We replicate this study within our sample and find consistent results (Appendix 3), confirming an overall ability of short sellers to better decode valuable information transmitted through public news.

deviation. In line with the liquidity hypothesis, this evidence suggests that less fundamental information is incorporated into the stock price on days with intangible media releases.

The second test focuses on the link between intangibility of media articles about a company and the liquidity of the company's stock. We show that liquidity increases in the presence of intangible news. This result is statistically and economically significant. Amihud illiquidity goes down by around 21% relative to the median when the fraction of non-numerical words in a news article increases by 5 percentage points (about one standard deviation). This finding suggests that intangible information results in more noise trading, either by increasing the dispersion of opinion in the market or by attracting additional attention to the stock.

We provide further evidence of the liquidity hypothesis using two natural experiments. First, we use the Olympic Games as an exogenous shock to attention. While the Olympic Games have very limited effects on the real economy, they are a large distraction for attention-motivated noise traders. Indeed, our results indicate that the effect of news intangibility on liquidity completely disappears during the Olympic Games, consistent with the idea that attention-driven trading is less prevalent at such times. Supporting the liquidity hypothesis further, we also find that short-sellers do not react to information intangibility during the Olympic Games.

The second experiment is linked to exogenous shifts in stock liquidity. If the stronger reaction of short sellers to qualitative news is driven by liquidity, we would expect short sellers to react less to intangible news for stocks that are already more liquid for some institutional reason. We focus on the exogenous increase in liquidity associated with the addition of a stock to the S&P 500 index. We find that short sellers' trading is less sensitive to news intangibility after a stock is added to the S&P 500 index, further supporting the hypothesis that liquidity plays a key role in determining short sellers’ reactions to intangible news.

Overall, our findings are consistent with the (liquidity) hypothesis that short sellers rely on the overall increase in trading activity at times of investor disagreement to better disguise their bets. In other words, because the presence of noise traders reduces the market impact of short sellers' orders, short sellers prefer to execute their trades on days characterized by lower news tangibility, as suggested by the theoretical arguments in information economics (e.g., Kyle (1985), Admati and Pfleiderer (1988)).

It is important to note that we are not investigating the causal effect of different media channels on investor behavior, as is done, for example, in Engelberg and Parsons (2011), Dougal, Engelberg, Garcia and Parsons (2012), or Beschwitz, Keim and Massa (2015). Instead, we acknowledge that the underlying corporate events elicit a stock market reaction rather than a particular coverage of these events by the media. We simply analyze the parameters of media articles to understand the nature of the events and the extent to which the information they reveal is quantifiable.

Our findings contribute to different strands of the finance literature. First, we add to the literature on short-selling and liquidity. Several studies show that short sellers increase liquidity and market efficiency (Bris, Goetzmann and Zhu (2007), Boehmer, Jones and Zhang (2013), Boehmer and Wu (2013), Saffi and Sigurdsson (2011), Beber and Pagano (2013)). We contribute to this literature by showing that there exists an effect in the opposite direction: short sellers tend to exploit excess liquidity created by noise traders to place their trades. Overall, our findings are consistent with studies showing that hedge funds are net *users* rather than *providers* of liquidity (e.g., Ben-David, Franzoni and Moussawi (2012), Cao, Chen, Liang and Lo (2013)).

Second, we contribute to the literature on short selling and information. Several papers show that short sellers' trading activity predicts future stock returns (e.g., Boehmer, Jones and Zhang

(2008), Engelberg, Reed and Ringgenberg (2012), Cohen, Diether and Malloy (2007), Diether, Lee and Werner (2009)). This result suggests that either short sellers have access to private information or that they are able to utilize publicly available information more efficiently. The latter view is supported by the recent paper by Engelberg, Reed and Ringgenberg (2012), which attributes short sellers' trading activity and success to their superior information interpretation skills. We refine this argument by showing that this mechanism holds largely for news with little ambiguity (i.e. quantitative news). In contrast, for qualitative news, a different mechanism is in operation – the strategic usage of liquidity to avoid the adverse selection discount.

Third, our findings contribute to the literature on financial media. This literature has largely focused on the effect of media on the cost of capital (Fang and Peress (2009)), information asymmetry (Tetlock (2010), Bushee, Core, Guay and Hamm (2010)), and distortions to stock valuations (Tetlock (2007, 2011), Tetlock, Saar-Tsechansky and Macskassy (2008), Dougal, Engelberg, Garcia and Parsons (2012)). Fewer papers examine the difference in the type of news. A recent paper by Boudoukh, Feldman, Kogan and Richardson (2015) shows that only a subsection of news affects stock returns. While being less impactful itself, unimportant news might still increase attention to a stock and improve liquidity. In general, little is known about how different types of information are linked to liquidity and, more specifically, how different classes of investors make use of media events. In this paper, we bring together these research agendas. Ours is the first paper to establish the effect of the type of news on the behavior of short sellers, who have been shown to utilize information more efficiently.

Accordingly, we add to the literature on the strategic behavior of informed investors. A number of theoretical (e.g., Grinblatt and Ross (1985), Hirshleifer, Subrahmanyam and Titman (1994)) and empirical (e.g., Chakravarty (2001), Griffin, Harris and Topaloglu (2003)) studies

emphasize informed investors' ability to take advantage of uninformed traders. We contribute to this literature by showing how qualitative information amplifies uninformed trading thus allowing informed investors to place their trades at lower costs.

Our study is related to two novel papers. Comerton-Forde, Jones and Putnins (2015) examine the different properties of short sales depending on whether short sellers place limit or market orders. Collin-Dufresne and Fos (2015) show that when active investors accumulate positions, measures of adverse selection and liquidity are both high. However, these papers sidestep the issue of separating short selling activity from overall trading and do not conduct any analysis based on news or other exogenous sources of liquidity. In our paper, we show how a particular type of public news can be *an observable source* of liquidity, consistent with the behavioral arguments on attention effects of media discussed in Barber and Odean (2008) and Tetlock (2011)).

The remainder of the paper is organized as follows. Section 2 describes the sample and the main variables of interest. Section 3 establishes the basic relationship between news intangibility and short sellers' trading. Section 4 relates news intangibility to stock characteristics, such as liquidity and price informativeness. Section 5 addresses the main competing hypothesis and presents additional evidence on the role of liquidity. Section 6 includes several robustness checks. A brief conclusion follows.

2. The Data and the Main Variables

We mainly use two datasets: equity lending data provided by DataExplorers (now Markit) and media coverage data extracted from Factiva. In addition, we retrieve data on stock returns, trading volume, balance sheet items, analyst coverage, and institutional ownership from the conventionally used databases, as described below.

2.1. Equity lending data

We obtain equity lending data from DataExplorers, a privately owned company that supplies financial benchmarking information to the securities lending industry and short-side intelligence to the investment management community. DataExplorers collects information from custodians and prime brokers that lend and borrow securities and is the leading provider of securities lending data. While DataExplorers supplies international data for bonds as well as equity, we restrict our sample to the 1,581 largest American stocks that are covered in our media sample. The data is available at a daily frequency from July 2006 to December 2008. For each stock, DataExplorers reports the following variables at daily frequency: lendable value in dollars, active lendable value in dollars, total balance value on loan in dollars, and weighted average loan fee (across active contracts) in basis points.

The main reason for borrowing equity is short selling. To keep their positions open overnight, short sellers must borrow the stock from its owner. Thus, the level of equity on loan serves as a good approximation of short selling interest. Equity lending data has been used to study short selling in numerous studies, including Geczy, Musto and Reed (2002) and Saffi and Sigurdsson (2011).

In the United States, equity transactions are settled after three trading days, while equity loans are settled immediately. Accordingly, a short seller does not need to borrow a stock until three days after taking the short position has been established. Therefore, following Geczy, Musto and Reed (2002) and Thornock (2013), we compute the amount of stock shorted on day t using equity lending information from day t+3. We illustrate the difference between the shorting and the lending dates in Figure 1, which displays *Total Turnover* and *Equity Lending* around important news events when a company is mentioned in more than 3 articles. While the trading volume spikes on the

news day, equity lending peaks exactly 3 days later. In Panel B and the rest of the paper, we compute shorting using the newly borrowed shares on day t+3. After this time adjustment, the peaks in the trading volume and the short selling coincide, validating the adjustment.

The DataExplorers dataset is unique in that it contains information on the number of shares that are on loan as well as the number of shares that have been lent out during the day.[2] This feature of the data allows us to compute the number of shares returned to lenders during the day as follows:[3]

$$Shares\ Returned_t = Shares\ newly\ borrowed_t - Shares\ on\ loan_t + Shares\ on\ loan_{t-1}$$

We call the number of shares newly lent out at t+3 divided by the number of shares outstanding *Shorting* and the number of shares returned to lenders at t+3 divided by the number of shares outstanding *Closing*. We define *Short Sale Turnover* as the sum of these two variables. Importantly, unlike some variables in the literature that have been dubbed "short sale trading volume", this measure has the unique feature of being non-directional, as it incorporates short selling as well as buying of a stock to cover a short position. Therefore, this variable can be naturally compared to the overall trading volume in the market.

We calculate several proxies of short sellers' trading activity. Our main proxy is *Relative Short Sale Turnover.*[4] It is defined as the ratio of *Short Sale Turnover* to total turnover, where total turnover is the ratio of share trading volume to the number of shares outstanding. We also consider *Relative Shorting* and *Relative Closing*, whereby we divide our *Shorting* and *Closing* variables by

[2] Strictly speaking, the dataset provides information about the value of stocks on loan ("Total Balance Value") as well as the value of stocks lent out during the latest day ("Balance Value 1 day"). We compute the number of shares by dividing these values by the closing price of the stock on the day.
[3] Due to minor data inconsistencies, this variable can be negative in a small number of cases. In such cases we set it equal to zero.
[4] Due to minor data inconsistencies, this variable can be above two in a small number of cases (two is the maximum possible logical value for this variable; it occurs when all buy and sell orders in the market are placed by short sellers). In such cases, we set it equal to two.

the total turnover. As a robustness check, we also calculate two alternative measures of short selling activity: *Abnormal Relative Short Sale Turnover*, defined as the log of the ratio of the *Relative Short Sale Turnover* on the day to its average value over the trailing 125 trading days, and *Difference in Abnormal Turnover*, defined as the difference between *Abnormal Short Sale Turnover* and *Abnormal Total Turnover*. These variables allow us to detect unusual spikes in short selling activity as compared to its long-run average level.

2.2. Media data

We obtain media data from Factiva, a subsidiary of Dow Jones & Company that collects data from over 28,000 news sources worldwide. We collect the data for any U.S. company that ranked in the top 1,000 by market capitalization at any time between 1999 and 2008. For each of the 1,581 companies that fit this definition, we obtain a Factiva intelligent indexing code by searching for the company name in Factiva. Codes are assigned by Factiva to assist researches in finding articles that mention a specific company in a meaningful context. Wherever the code assignment is ambiguous – e.g., where different codes identify the same company over different time periods – we analyze several articles returned by the Factiva engine to determine the proper correspondence. We eliminate company-years for which the Factiva-CRSP link cannot be reliably established.

For each Factiva code, we download all the articles that are categorized under "Major News and Business Publications", "Press-release Wires", or "Reuters Newswires". We limit our search to all articles in the English language appearing between January 1999 and December 2008.

In addition to the text of the article, we are able to obtain information about the exact date and time of publication (where indicated), the author of the piece (if applicable), the number of words in the article, the name of the source (e.g., "The Wall Street Journal"), and the title. After the download, we eliminate duplicate articles. We further eliminate articles that contain empty bodies,

articles where the number of words is 20 or fewer, and articles where the quantity of numbers is more than one-third. Since we are interested in the market reaction to the information contained in the news, we reassign dates in such a way that all articles appearing after the market closure correspond to the next trading day.[5]

Our main variable of interest is the type of information contained in media publications. Specifically, we want to distinguish between news that are more qualitative and which are subject to differential interpretation and news that are more quantitative and therefore less likely to cause disagreement among investors. We define a measure of *Information Intangibility* as follows. First, for each article, we calculate one minus the ratio of numbers to total words in the article. The resulting measure is low for articles that report a lot of numbers and is high for news that contains mostly verbal content. Next, we average this measure across all the articles about a company on a given day. Finally, we subtract the median of this measure calculated across all company-days in the observation year. Subtracting the median does not change the results of our main regressions, but allows us to interpret constituent coefficients in regressions with interaction effects. The *Information Intangibility* variable is only defined for days in which an article about the company appears in the news. In other words, our analysis does not focus on the news coverage in itself, but on the type of news. In Appendix 1, we describe the procedure of Factiva articles for numbers. In Appendix 2, we provide examples of articles with distinct intangibility scores.

In alternative specifications, we also consider the *Information Intangibility Dummy* that takes the value of 1 for positive *Information Intangibility* and 0 otherwise. In addition, we check the robustness of our results using *Abnormal Information Intangibility* defined as the logarithm of one minus the average fraction of numbers in all company-related articles on the day divided by its

[5] All the articles that appeared between 16:00 and 23:59 are assigned to the next trading day. The articles appearing on Saturday or Sunday are assigned to the following Monday.

mean over the past 125 trading days. This variable is set to missing if there are fewer than 5 news days within the last 125 trading days.

As a control variable, we also construct the sentiment of each article (following the methodology in Tetlock (2007) and Loughran and McDonald (2011)) by dividing the number of negative words by the total number of words. The list of negative words is provided by Loughran and McDonald (2011).

2.3. Other variables

Stock market data from CRSP, and balance sheet data and the S&P 500 index constituency data are from Compustat. In addition, we use the I/B/E/S database to construct measures of analyst following and dispersion. We define *Number of Analysts* as the logarithm of one plus the number of analysts that issued earnings forecasts for the stock in the observation period. We compute *Analyst Dispersion* as the standard deviation of the analysts' earnings forecasts scaled by the stock price at the beginning of the quarter. This variable is set to missing if the stock is covered by fewer than three analysts. We obtain data on institutional ownership from Thompson Reuters 13f filings. *Institutional Ownership* is computed as the aggregate number of shares held by institutional investors divided by the total number of shares outstanding. *Breadth of Ownership* is defined as the number of institutions holding the stock divided by the number of all reporting institutions in the period (similar to the definition used in Chen, Hong and Stein (2002)).

As a measure of liquidity, we compute *Amihud Illiquidity* using daily data from CRSP as $log\left(1 + 10^6 * \frac{|ret|}{dollar\ volume}\right)$.[6] We also consider the bid-ask spread. However, since the closing bid-ask spreads on CRSP are often driven by idiosyncrasies at the end of the trading day, we obtain

[6] In some tables, we scale up this variable by 10^3 to facilitate the interpretation of coefficients.

intraday trading and quotes data from NYSE Trade and Quote (TAQ). We split the trading day into 78 five-minute intervals and calculate the bid-ask spread at the end of each five minute interval as (*ask price – bid price*) / (0.5 * *ask price* + 0.5 * *bid price*) using the last quote of the five minute interval. Then we take an equally weighted average of the results to construct our *Bid-Ask Spread* measure at daily frequency.

In a further robustness check, we also use TAQ data to compute *Intraday Amihud Illiquidity* as $log\left(1 + 10^6 * mean_{over\ 5\ min\ intervals}\ \left(\frac{|ret_\tau|}{dollar\ volume_\tau}\right)\right)$.

To mitigate the effect of outliers, we winsorize all our continuous variables at the top and the bottom 1%.

2.4. Summary statistics

Our short selling data span the period from July 2006 to December 2008 while the media data range from January 1999 to December 2008. Accordingly, for analyses that require media data only we utilize the whole 10-year period, whereas for analyses directly related to short selling we focus on the 2006-2008 time frame. In all of our analyses, we limit our attention to days with news coverage.

In Panel A of Table 1, we report summary statistics for the 1,581 companies for which we have media data. Our sample consists of fairly big firms with an average market capitalization of $12.5 bn (median of $3.8 bn). The mean (median) number of analysts following the stock is 13 (12) and around 70% of shares are held by institutional investors. Forty percent of our companies are constituents of the S&P 500 Index. In Panel B, we report summary statistics on the media variables for the full sample of 929,181 company-news days. Conditional on there being an article on a given day, the average (median) number of articles is 4 (2). On average (median), 6.0% of the

words in an article are numbers (4.7%). About one percent of the words in an article are negative words, as defined by Loughran and McDonald (2011) – similar to the fraction they observe in 10-K documents.

In Panel C, we report summary statistics for the short selling variables based on the 263,232 company-news days of the smaller sample, for which we have short selling data. On average, 5.15% (median 2.66%) of shares outstanding are on loan at any given time, while 0.23% (median 0.11%) are newly shorted on any given day. The average (median) short sale turnover is 0.49% (0.24%). This constitutes roughly one third of the total turnover in the market, which has a mean of 1.41% and a median of 0.96%. These numbers are consistent with those reported by Diether, Lee and Werner (2009), who estimate that 24% of all trades on NYSE and 31% of all trades on NASDAQ are short sale transactions.

3. News Intangibility and Short Sellers' Trading

We start by relating the effect of news intangibility to short selling activity. In Figure 2, we display an event study analysis around days with company news releases. We classify the news-days characterized by information intangibility in the top 30% (bottom 30%) as “intangible news days” (“quantitative news days”). The figure shows the difference in short sale turnover between these two sets of days around the news event. In Panel A, we focus on the difference in mean and in Panel B we consider the difference in median. While the difference is close to zero two days after the news release, all three measures of short sellers’ trading activity peak on the day when the intangible information is released. This result suggests that short sellers are more likely to engage in trading when the information about the company is more qualitative.

Next, we examine whether this result carries over to a panel regression specification where the dependent variable is a measure of short sale turnover. For the baseline specifications, we

consider three measures: *Relative Short Sale Turnover*, *Relative Shorting*, and *Relative Closing*. The main explanatory variable of interest is *Information Intangibility Dummy*, which is equal to 1if the ratio of numbers to words in the article is below the median and 0 otherwise. The control variables include (for each firm) size, market-to-book ratio, institutional ownership, breadth of ownership, number of analyst forecasts, analyst dispersion, and the stock returns of the previous two trading days. The number of analysts and their dispersion control for the availability of public information about the company. Breadth of ownership, institutional ownership, and size proxy for the attention that the firm receives in the financial market. Trailing stock returns control for short sellers' tendency to act as contrarians (Diether, Lee and Werner (2009)). We also include the number of articles to control for the pure attention effect due to the higher press coverage as well as a control for the sentiment of the article. In the first specification, we employ firm fixed effects and quarterly fixed effects. In the second specification, we replace quarterly fixed effects with daily fixed effects. In all the regressions we double cluster the standard errors at the firm and date level.

We report the findings of our main regression in Panel A of Table 2. The evidence indicates a strong positive relationship between news intangibility and the different measures of short sellers' trading activity. The economic effect is also sizable. On days with above-median *Information Intangibility*, *Relative Short Sale Turnover* is higher by 1.20%, which corresponds to 5% relative to its unconditional median. The effect is significant for both *Relative Shorting* and *Relative Closing*.

In Panel B, we control for the contemporaneous return of the stock on the observation day to account for the direction of the news, and obtain similar results. In Panel C, we study the effect of *Abnormal Information Intangibility*, i.e. *Information Intangibility* standardized with respect to the

prior 125 trading days. The results remain significant. In Panel D, we regress our alternative measures of short sale turnover on abnormal and unstandardized *Information Intangibility*. In Panel E, we show that our results are robust to using the continuous version of *Information Intangibility* instead of its dummy variant. Finally, in Panel F, we consider different subsamples based on the type of media sources. Specifically, before we construct *Information Intangibility* and control variables, we exclude articles from newspapers (columns 1 and 2), newswires (columns 3 and 4), or press releases (columns 5 and 6). The results remain significant at the 1% level for all the considered specifications.

One potential concern is that of reverse causality: is it possible that news tangibility simply reflects certain patterns in stock performance over the last few days, such as news wire articles mentioning extreme stock returns or trading volume? To account for this confounding effect, we perform the following analysis. We parse the text of all articles searching for words "volume", "turnover", and "return" (the search is not case-sensitive). On average, about 7% of all articles contains at least one of these words. To the extent that an article is published *as a reaction* to an unusual return or volume pattern in a stock, it is likely to contain these words. Therefore, we eliminate these articles from our analysis, recompute our intangibility measure on the reduced subsample, and re-estimate our regressions.[7] The results are reported in Panel G of Table 1. They are almost identical, both in statistical and economic significance, to those from the main specification.

Overall, we find strong evidence that short sellers trade more in both directions (shorting and closing) on days when the news about the company is less quantitative. So far, this result is consistent with both an information hypothesis and a liquidity hypothesis. In the following

[7] Such an elimination is fairly conservative because some articles that mention "turnover" or "volume" do not refer to the trading data but rather to some fundamentals (e.g., "sales volume" or "managerial turnover").

sections, we investigate the causes of this relationship and examine whether it is driven by improved liquidity conditions on days with intangible news (*liquidity hypothesis*) or whether short sellers obtain an informational advantage on such days (*information hypothesis*).

4. News Intangibility and Market Liquidity

We now investigate the conjecture that intangible information induces noise trading and stimulates stock liquidity. We proceed in two steps. First, we show that more intangible news has a lower informational content. Second, we show that the trading associated with such non-informational media events increases stock liquidity in the sense of Kyle (1985).

4.1 News intangibility and stock price informativeness

We begin by focusing on the informativeness of intangible news. Standard theory (e.g., Campbell, Grossman and Wang (1993), Llorente, Michaely, Saar and Wang (2002), Tetlock (2010)) suggests that prices tend to mean-revert more strongly in the presence of noise shocks and tend to mean revert less when the released information is fundamental. We therefore test whether a release of intangible news is associated with a more persistent or a more transient price shock than a release of quantitative news. If the event-day return is a function of noise trading rather than investors' rational reaction to information, we should detect stronger reversals in the days following the news day.

To relate the degree of return reversion to news intangibility, we regress future stock returns on the interaction between *Information Intangibility* and the contemporaneous return. Following the standards of the literature, we employ the Fama-Macbeth (1973) regression specification with the Newey-West (1987) correction for autocorrelation. The sample for this regression includes all news days from January 1999 to December 2008.

We consider different horizon lengths (10, 20, and 30 days) and run the regressions for both raw and market-adjusted returns calculated net of the CRSP value-weighted index. Table 3 presents the results of this analysis. When *Information Intangibility* is at its median – i.e. equal to 0 by construction – we observe a consistent reversal effect as evidenced by the negative coefficient in front of the return variable. Most of the reversal occurs in the 10 trading days after the news event day when about 5.2% of the event-day return is eliminated. Importantly, the coefficient for the interaction of return and *Information Intangibility* is significantly negative, suggesting that reversals are stronger when the news day is characterized by qualitative information. An increase in *Information Intangibility* by 0.05 increases the 10-day reversal effect from 5.2 to 7.9 percentage points – i.e. the reversal increases by 50%.[8] The results are similar for raw and market-adjusted returns as well as for 20 and 30 day horizons.

These findings suggest that less fundamental information gets permanently incorporated into prices on days with intangible news. In other words, price swings on such days tend to be temporary, consistent with the conjecture that qualitative news has a lower informational content and attracts the attention of noise traders rather than investors who are able to evaluate the information accurately.

An alternative approach to assess the informational content of intangible news is simply to study its stock price impact. In Panels B and C of Table 3, we present panel regressions of contemporaneous absolute returns and squared returns on information intangibility. We find that the price impact of intangible news is significantly lower than that of quantitative news. An increase in *Information Intangibility* by 0.05 decreases the absolute return by 10 basis points or 8.3% relative to its median.[9] Also, squared returns are significantly lower on news days with higher

[8] 0.5317*0.05+0.052=7.9
[9] 0.021*0.05/0.0126=8.3%

information intangibility. This finding is robust to the inclusion of firm and daily fixed effects and suggests that intangible information is perceived as less important by the market.

4.2 News intangibility and stock liquidity

We now study whether intangible news – now ascertained to have a lower informational content – increases stock liquidity more than tangible news.

In Table 4, we show the effect of *Information Intangibility* on (intraday) *Amihud Illiquidity* (Panel A) and *Bid-Ask Spread* (Panel B). The sample period for these regressions includes all news days from January 1999 to December 2008. We consider specifications with either firm and quarter or firm and day fixed effects and cluster the standard errors at the firm and date level. We also control for lagged liquidity to account for the serial persistence in the liquidity variable.

Our findings indicate a robust and strong positive relationship between stock liquidity and qualitative media content. In other words, liquidity tends to improve on days when the information is less tangible. An increase in the fraction of non-numerical words in news articles by five percentage points (about one standard deviation) results in a decrease of *Amihud Illiquidity* by 21% and a decrease of the *Bid-Ask Spread* by 2.3% relative to their median.[10] The results are robust to the inclusion of firm fixed effects and lags of dependent variables.

As in the previous section, we also repeat our analysis for the reduced sub-sample which is likely free from potential reverse causality issues. In Panel C (Panel D) of Table 4, we report the effect of *Information Intangibility* on *Amihud Illiquidity* (*Bid-Ask Spread*) in the sub-sample of articles that do not contain words "volume", "turnover", or "return". Our results remain robustly significant and consistent across the specifications.

[10] 0.0008*0.05/0.00019=21% and 0.0015*0.05/0.0032=2.3%

On the whole, this evidence strongly suggests that liquidity rises on the arrival of intangible news. One of the plausible explanations of the observed relationship between news intangibility and liquidity is an increase in public attention toward the company combined with a high dispersion of interpretations of the content of the media articles. The more people are attracted to the stock, the higher the liquidity, provided that a significant fraction of the investors trade in opposite directions. We can therefore argue that, from the point of view of an informed investor, the behavior of the market on days with intangible news is akin to an influx of noise traders.

We also note that the evidence in this section plays an important part in our argument because it is essential to distinguish between liquidity and turnover. For an informed investor looking to disguise trades, an increase in the stock's trading volume is not a sufficient condition – he still needs to know *what causes* the increase in turnover. For example, turnover does go up when there is extra uninformed attention to the stock but it can also go up when informed investors start to trade more actively (Karpoff (1986), Admati and Pfleiderer (1988), Foster and Viswanathan (1990)). The latter effect is observed during the release of quantitative information when a large number of market participants receive the same signal and rush to execute their orders, thereby competing for a limited amount of liquidity.

4.3 Summer Olympic Games as a natural experiment

The previous results suggest that intangible information causes an increase in noise trading and liquidity. If this is the case, we would expect that the effect of intangible news on liquidity is reduced at times when the attention of potential noise traders, such as uninformed household investors, is diverted elsewhere. More specifically, noise traders will be less likely to respond to company-specific news if their attention is drawn to a big external event, preferably not related to

financial markets. Following Eisensee and Strömberg (2007), we use the Summer Olympic Games as an exogenous and lasting event commanding significant public attention.

Using the Summer Olympic Games as our natural experiment has three important advantages. First, the Summer Olympic Games is the single most important sport event to Americans. It commands more attention and media coverage than the Super Bowl or the NBA play-offs (Eisensee and Strömberg (2007)). Second, other major news events such as wars, catastrophes and elections often have large economic implications and thus might be related to stock liquidity directly. The Olympic Games, on the other hand, is a pure sport event, whose outcomes have no real economic effects (except, potentially, for companies manufacturing sport-related items). Third, the Olympic Games play out over a clearly defined time frame; thus, we do not need to make assumptions about the attention span of a stand-alone event. For these reasons, the Summer Olympic Games provide a good natural experiment to test our hypotheses.

We rerun our liquidity regressions interacting *Information Intangibility* with a dummy that takes the value of 1 if the news day falls in the three-week period of the Summer Olympic Games, and 0 otherwise. Table 5 contains the results of this analysis. In Panel A, we report the effect on Amihud Illiquidity, while in Panel B, we report the effect on the bid-ask spread. The interaction between *Information Intangibility* and the Olympic Games dummy is always positive, suggesting that the relationship between news intangibility and liquidity is significantly reduced during the Olympic Games. This result is consistent across all specifications and measures of liquidity and is statistically significant. The interaction coefficient is larger in absolute terms than the coefficient on *Information Intangibility*, indicating that the effect of intangible news on liquidity is completely eliminated during the Olympic Games.

One potential concern in using the Olympic Games as a natural experiment is that they always take place in the summer. Accordingly, our results might reflect a seasonality effect. To address this issue, we include four dummy variables for the quarters in our regression and interact these dummy variables with *Information Intangibility*. This way, we control for the possibility that information intangibility might have a different effect on liquidity in different quarters. Our results remain significant in this conservative set-up, suggesting that the Summer Olympic Games reduce the effect of information intangibility also in comparison to days within the same quarter. Overall, these results show that if potential noise traders are distracted by the Olympic Games, the effect of information intangibility on liquidity disappears, confirming the role of attention and noise trading in generating excess liquidity on intangible news days.

5. Drivers of Short Sellers' Trading

The results in the previous section document a link between news intangibility and noise trading and liquidity. We now investigate the nature of short sellers' reaction to intangible news and try to differentiate between the information hypothesis and the liquidity hypothesis.

5.1 Profitability of short sellers' trades

We start by examining the alternative that short sellers trade on intangible news for information rather than liquidity reasons. Engelberg, Reed and Ringgenberg (2012) show that short sellers' trades are more profitable on news days suggesting that they have an advantage in processing public news. We replicate their findings within our sample, confirming that short sellers are indeed better able to process public information in general (the results are reported in Appendix 3). Then, we zoom in on the type of news and ask whether short sellers have a *relative* advantage in interpreting intangible news compared to tangible news. Such a relative advantage in interpreting intangible news would be necessary to explain why short sellers trade more actively on qualitative

compared to quantitative news. Informationally-motivated trades would imply that short sellers are able to establish more profitable positions after qualitative news. Accordingly, we study whether short sellers' actions anticipate the future stock price movement better on intangible news days than on tangible news days.

We employ a set of Fama-Macbeth specifications whereby we regress future stock returns at different horizons relative to the news day on our directional measures of short sellers' trading and their interaction with the news intangibility variable. We consider two measures of short sellers' trading: *Shorting Dummy*, equal to 1 if the percentage of shares outstanding newly shorted on the day is above the median, and *Relative Shorting Dummy*, equal to 1 if the percentage of total turnover on the day due to the new short positions is above the median.

The results are reported in Table 6. First, we observe that both measures of short selling are strongly associated with negative future returns when *Information Intangibility* assumes its median value (0 by construction). This result is consistent with those found in earlier studies that document a negative relationship between short selling and future returns (Engelberg, Reed and Ringgenberg (2012), Cohen, Diether and Malloy (2007), Diether, Lee and Werner (2009)). However, we cannot detect any evidence that *Information Intangibility* either dampens or enhances this effect since the interaction coefficients lack both statistical and economic significance. Many of the interaction coefficients are actually positive, indicating a (insignificantly) lower profitability on days with intangible information. The result remains insignificant when we consider forward-looking return windows of 10, 20, and 30 trading days. Overall, we do not find evidence that short sellers possess a greater advantage in interpreting intangible news relative to tangible news.

Importantly, besides improving liquidity, qualitative news also serves as an *observable signal* to the short seller. Without such a signal, even if a short seller were somehow able to disentangle

trading data, such as turnover, into noise-driven and information-driven, it is unlikely that he would be able to do so in time to place his trades. By the time he observes a spike in turnover and conducts a reliable analysis that reveals an influx of noise traders (e.g., Amihud illiquidity is not estimated instantaneously but over a sample of observations), it might be too late to execute a viable trading strategy. However, after observing qualitative news, the short seller is aware that the increase in turnover that is about to follow will likely be noise-driven and therefore suitable for trade concealment.[11]

5.2 Two natural experiments

We now focus on the liquidity hypothesis directly. We consider two natural experiments: the Olympic Games and the addition of a stock to the S&P 500 index.

We start with the Olympic Games. In Section 4.3, we have shown that intangible news does not increase liquidity if the attention of noise traders is diverted by the external event of a sporting nature. Therefore, if the increased trading of short sellers on qualitative news days is driven by liquidity, we would expect this relationship to break down during the Olympic Games as well. Because our shorter sample of short selling data includes only one occurrence of the Olympic Games, we cannot construct an independently strong test. Instead, we simply split the sample into days during the Olympic Games and all the other days. The results are reported in Table 7. The indicate that, while there is a positive effect of information intangibility on all three measures of short selling activity in the overall sample, this effect disappears during the Olympic Games. In this time period, short sellers' trading is not significantly related to *Information Intangibility* (all coefficients are actually insignificantly negative).[12] This finding is consistent with the liquidity

[11] It is important to remember that in our sample of articles the news that comes out after the NYSE trading hours is matched to the next trading day.

[12] Because we have only one occurrence of the Olympic Games, (time-varying) firm-specific controls are collinear with firm fixed effects in the Olympic Games sample and are thus omitted.

hypothesis, because it highlights the role of attention and noise trading in increasing short sellers' activity on qualitative news days.

Another prediction of the liquidity hypothesis is that the relationship between information intangibility and short sellers' trading should be stronger for stocks that are *ex ante* less liquid and require an intangible news event to boost liquidity. To test this prediction, we consider a measure of stock liquidity based on its association with a market index that is actively traded by index funds and other institutions who track the index. Specifically, we define a dummy variable equal to 1 if the stock is a member of the S&P 500 index on the day of the news and 0 otherwise. We re-estimate our main regression, interacting *Information Intangibility* with *S&P 500 Dummy*. The sample period for this analysis ranges from July 2006 to December 2008. Since we include firm fixed effects in all the regressions, we effectively study the events of additions and deletions from the S&P 500 index. Our sample includes 82 instances of such addition/deletion events.

We report our results in Table 8. They show that the effect of information intangibility on short sale trading is smaller for stocks that are members of the S&P 500 Index. The coefficients on the interaction variable are consistently negative and are significant across all the specifications at 5% or better. Overall, these findings suggest that liquidity considerations play an important part in causing short sellers to intensify trading on days with qualitative news.

6. Robustness Checks

We now consider several robustness checks. One may be concerned that our results are mainly driven by earnings releases as they are important and usually contain a lot of numerical information. While this effect would still be in accordance with our hypothesis, it is important to understand whether our results are driven exclusively by the earnings announcements. We therefore re-estimate our four main specifications on the effects of intangible news on short sellers'

trading, mean reversion, absolute returns, and Amihud Illiquidity adding a dummy variable for the week around a firm's quarterly earnings announcement (taken from Compustat). We report the results in Table 9, Panel A. All four test are robust to the direct control for the presence of an earnings announcement, suggesting that our findings are not driven exclusively by such disclosure events.

Next, in Panel B of Table 9, we consider alternative measures of intangibility. We re-estimate our four main specifications replacing *Information Intangibility* with *Information Intangibility Digit-Based*, which is constructed as the number of digits in the article divided by the number of symbols (instead of the number of numbers divided by the number of words). The results remain significant at the 5% level.

In Panel C of Table 9, we re-estimate the main specifications of Table 4 using an alternative measure of Amihud illiquidity based on 5-minute intervals within the day as defined in Section 2.3. As before, we observe a significant decrease in illiquidity on intangible news days.

Conclusion

We investigate trading activity of short sellers in both establishing and covering short positions in the presence of noisy trading in the market. We focus on days when qualitative information, measured as the ratio of non-numerical words to the total number of words in a news article, is released to the market through the media.

We document that short sellers' trading activity increases on these days. We argue that an improvement in liquidity around intangible-news events causes an increase in short sellers' trading. As more noise traders are attracted to the stock, short sellers are able to better disguise their transactions and minimize their impact on the market. In line with this hypothesis, we find that liquidity increases and that returns mean-revert more after the release of intangible information. In addition, we find that the relationship between information intangibility and short selling is stronger for stocks that are ex ante more illiquid. During the Olympic Games, when potential noise traders' attention is diverted, the effect of intangible information on both liquidity and short selling disappears. On the other hand, we do not find evidence that short sellers possess superior ability to interpret intangible news or trade as a function of information contained in the media articles.

Overall, our findings suggest that short sellers exploit noise trading generated by the release of qualitative news to minimize the market impact of their trades. This finding is important as it shows a strategic response of informed investors to exogenous variations in liquidity.

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Variable definitions

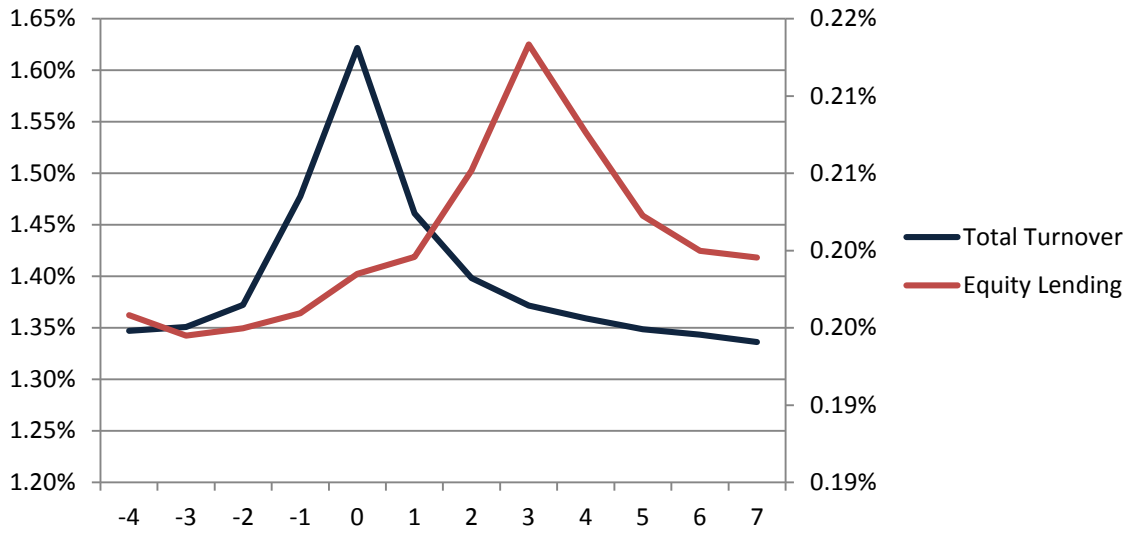
This table details the variable definitions for all variables used in the regressions. All variables are company variables on a daily basis, unless explicitly stated differently. Company and date indices are omitted for better readability. All continuous variables are winsorized at the 1% threshold. Articles are assigned to the next trading day, if they appear after 4 pm or on the weekend.

Variable Name	Definition
Size	*Log (market capitalization) at the beginning of the quarter*
Market to Book	*Market capitalization divided by book value of equity at the beginning of the fiscal year*
Breadth of Ownership	*Number of institutions holding the stock at the beginning of the year divided by total number of reporting institutions at that time*
Institutional Ownership	*Percentage of shares held by institutions at the beginning of the year*
Number of Analysts	*Log (1+ number of analysts on IBES making an earnings forecasts for the stock at the beginning of the quarter)*
Analyst Dispersion	$\frac{StD(analysts'\ earnings\ forecast)}{Stock\ price}$ *at the beginning of the quarter* *It is set to missing if there are less than 3 analysts covering the stock.*
Market adjusted Return	$Return -$ value weighted average return on CRSP
Number of Articles	$Log(1 + number\ of\ articles)$
Article Sentiment	$mean_{all\ articles\ of\ company\ i\ on\ day\ t}\left(-\frac{Number\ of\ negative\ words\ (Loughran\ and\ McDonald,2011)}{Number\ of\ words}\right)$
News Coverage	*Dummy variable equal to 1 if there is a news article for the company on that day.*
Information Intangibility	$Mean_{all\ articles\ of\ company\ i\ on\ day\ t}\left(1-\frac{number\ of\ numbers}{number\ of\ words}\right) - median_{all\ articles\ in\ the\ year}\left(1-\frac{number\ of\ numbers}{number\ of\ words}\right)$
Abnormal Information Intangibility	$Log\left(\frac{mean_{all\ articles\ of\ company\ i\ on\ day\ t}\left(1-\frac{number\ of\ numbers}{number\ of\ words}\right)}{mean_{all\ articles\ of\ company\ i\ on\ day\ t-125\ to\ t-1}\left(1-\frac{number\ of\ numbers}{number\ of\ words}\right)}\right)$ *It is set to missing if there are less than 5 news days within the last 125 trading days*
Amihud Illiquidity	$Amihud\ Illiquidity\ = 10^3 log\left(1 + 10^6 * \frac{\lvert ret\ \rvert}{dollar\ volume}\right)$
Intraday Amihud Illiquidity	*To calculate intraday Amihud Illiquidity, we split the trading day into 78 five-minute intervals. For each five-minute interval, we divide the absolute return by the dollar trading volume. Then we take the log of the daily mean to compute Intraday Amihud Illiquidity :* $Log\left(1 + 10^6 * mean_{over\ 5\ min\ intervals}\left(\frac{\lvert ret_\tau \rvert}{dollar\ volume_\tau}\right)\right)$
Bid-Ask Spread	$Mean_{over\ 5\ min\ intervals}\left(\frac{ask_\tau - bid_\tau}{0.5 * ask_\tau + 0.5 * bid_\tau}\right)$
Olympic Games Dummy	*Dummy variable equal to 1 during the Olympic Games (opening to closing ceremony)*
Shorting	$Number\ of\ shares\ newly\ lent\ out/number\ of\ shares\ outstanding$
Closing	$Number\ of\ shares\ returned\ to\ lenders/number\ of\ shares\ outstanding$
Short Sale Turnover	*Shorting + Closing*
Total Turnover	$Trading\ volume/Shares\ outstanding$
Relative Shorting	$Shorting/Total\ Turnover$
Relative Closing	$Closing/Total\ Turnover$
Relative Short Sale Turnover	*Relative Shorting + Relative Closing*
Relative Change in Short Interest	*Relative Shorting - Relative Closing*
Abnormal Relative Short Sale Turnover	$Log\left(\frac{Relative\ Short\ Sale\ Turnover}{mean_{t-125,t-1}(Relative\ Short\ Sale\ Turnover)}\right)$
Difference in Abnormal Turnover	$Log\left(\frac{Short\ Sale\ Turnover}{mean_{t-125,t-1}(Short\ Sale\ Turnover)}\right) - log\left(\frac{Total\ Turnover}{mean_{t-125,t-1}(Total\ Turnover)}\right)$
Information Intangibility Digit-Based	$Mean_{all\ articles\ of\ company\ i\ on\ day\ t}\left(1-\frac{number\ of\ digits}{number\ of\ symbols}\right) - median_{all\ articles\ in\ the\ year}\left(1-\frac{number\ of\ digits}{number\ of\ symbols}\right)$

Figure 1: Illustration of the 3-day lag between shorting and stock lending

This figure shows stock lending and trading activity around news days with more than 3 articles covering a single company. In Panel A, we display the mean of Total Turnover (Trading Volume / Shares Outstanding) and the mean of Equity Lending (newly borrowed stocks / shares outstanding) around news event. Total Turnover is displayed with respect to the left y-axis. Equity Lending is displayed with respect to the right y-axis. The x-axis displays the days relative to the news event. In Panel B, we shift the lending data by 3 days to match the date when the stock was most probably shorted.

Panel A: Trading volume and equity lending around important news events



Panel B: Trading volume and short selling (equity lending shifted 3 days) around important news events

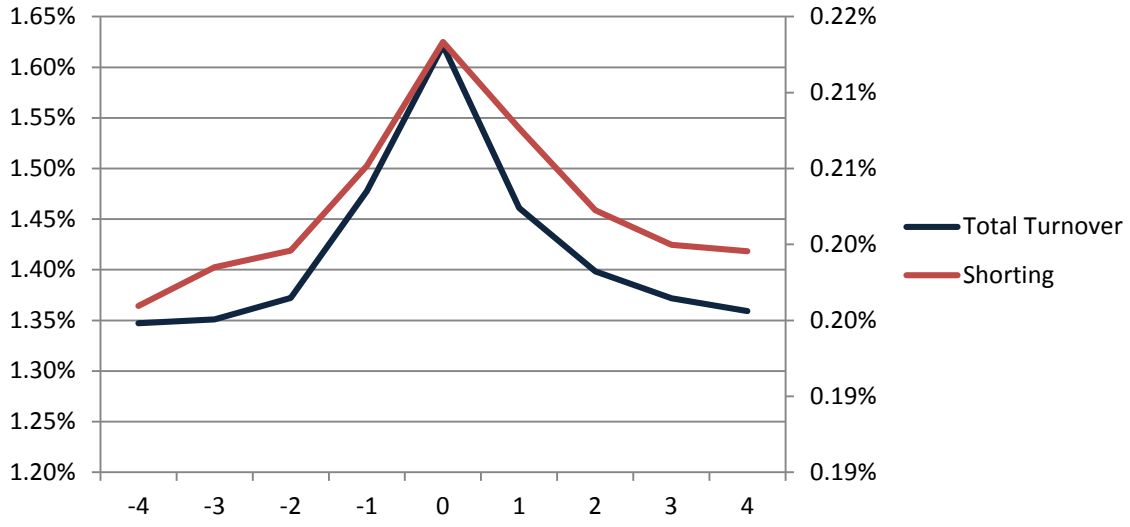
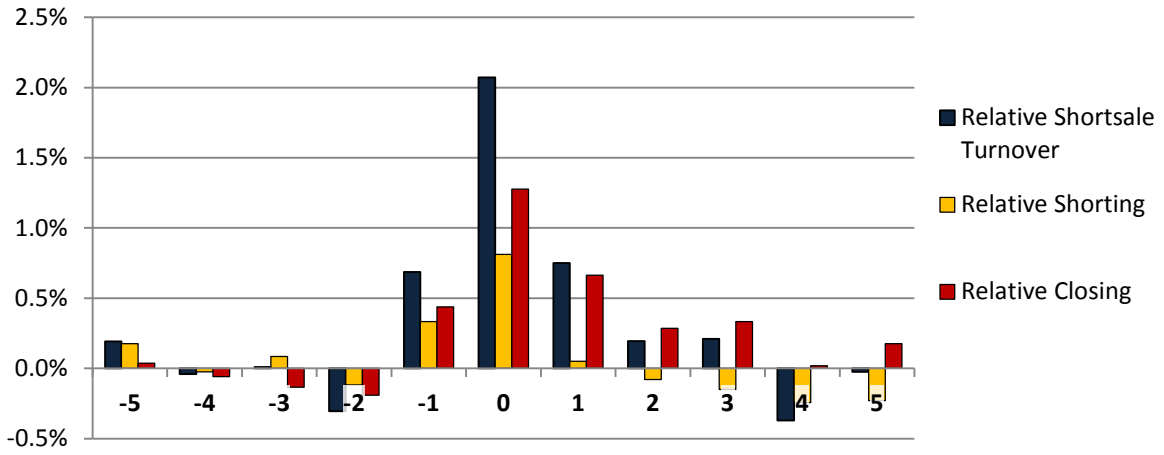


Figure 2: Information intangibility of news, event study

This figure shows short selling activity around news events. We sort companies by Information Intangibility and call the top 30% intangible information and the bottom 30% tangible information. In Panel A, we display the difference between the mean of short selling variables around days with tangible information with the mean around days with intangible information. The x-axis displays the days relative to the news event. In Panel B, we show the difference in median values.

Panel A: Difference in mean short selling activity between intangible and tangible news



Panel B: Difference in median short selling activity between intangible and tangible news

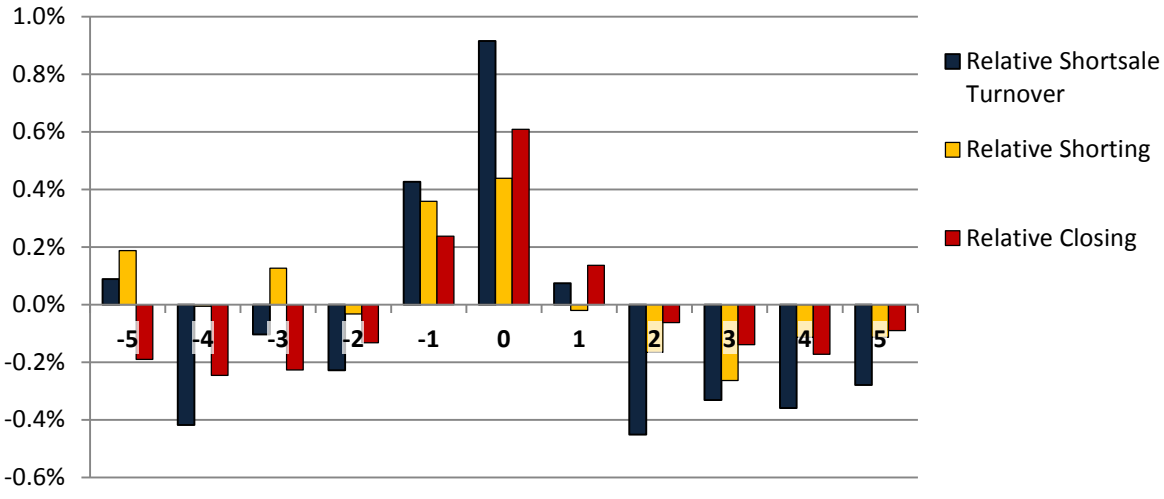


Table 1: Summary statistics

In Panel A, we list the company specific variables for the 1581 companies in our sample. Breadth of Ownership is defined as the number of institutions holding the stock at the end of the previous year divided by the total number of reporting institutions at that time. Number of Analysts is the number of analysts on IBES that issue an earnings forecast for the stock. Analyst Dispersion is the standard deviation of analysts' earnings forecasts on IBES scaled by the stock price. Institutional Ownership is the percentage of shares held by institutions. S&P 500 Dummy is an indicator variable equal to 1 if a company is an S&P 500 constituent. In Panel B, we list summary statistics for the 929,181 company-days with news in the period between January 1999 and December 2008. Information Intangibility is defined as one minus the average percentage of numbers in all company articles on the day (less one minus the median of the percentage of numbers in all articles in the year). Negative Words gives the average percentage of negative words in an article for the company on that day. Negative word selection is based on the Loughran and McDonald (2011) word list. Daily Amihud Illiquidity is defined as $\log\left(1 + 10^6 * \frac{|ret|}{dollar\ volume}\right)$ and Intraday Amihud Illiquidity is defined as $\log\left(1 + 10^6 * mean_{over\ 5\ \min intervals}\left(\frac{|ret_\tau|}{dollar\ volume_\tau}\right)\right)$. Bid-Ask Spread is defined as $mean_{over\ 5\ min\ intervals}\left(\frac{ask_\tau - bid_\tau}{0.5*ask_\tau + 0.5*bid_\tau}\right)$. Absolute return is the absolute value of the stock's daily return in %. In Panel C, we list summary statistics of short sale variables for the 263,232 company-days with news in the period between July 2006 and December 2008. Loaned Stocks is the number of stocks on loan divided by shares outstanding. Shorting is the number of shares borrowed from lenders on the day divided by shares outstanding. Closing is the number of shares returned to lenders on the day divided by shares outstanding. Short Sale Turnover is the sum of borrowed and returned shares divided by shares outstanding. Total Turnover is the number of shares traded divided by shares outstanding. Relative Shorting is Shorting divided by Total Turnover. Relative Closing is Closing divided by Total Turnover. Relative Short Sale Turnover is the sum of Relative Closing and Relative Shorting. Abnormal Relative Short Sale Turnover is the logarithm of Relative Short Sale Turnover divided by its mean over the past 125 trading days. Difference in Abnormal Turnover is defined as the difference in Abnormal Short Sale Turnover and Abnormal Total Turnover (both variables are defined as the logarithm of today's value) divided by its past 125 day average.

Panel A: Company variables

	Median	Mean	25th Percentile	75th Percentile	Standard Deviation
Market capitalization in mil. $	3797	12532	2049	9904	28459
Market to Book	2.68	3.88	1.76	4.43	3.76
Breadth of Ownership (%)	10.53	13.53	7.47	15.99	9.77
Number of Analysts	12	13	8	17	7.1
Analyst Dispersion (%)	0.11	0.25	0.05	0.25	0.45
Institutional Ownership (%)	72.8	69.2	57.5	84.5	19.8
S&P 500 Dummy	0	0.40	0	1	0.49

Panel B: Media coverage and liquidity variables (large sample)

	Median	Mean	25th Percentile	75th Percentile	Standard Deviation
Number of Numbers (%)	4.7	6.0	3.1	7.4	4.6
Information Intangibility	0.0	-0.012	-0.026	0.016	0.045
Number of Articles	2	4	1	4	6.6
Negative Words (%)	0.80	1.04	0.33	1.46	1.02
Amihud Illiquidity	0.00019	0.00068	0.000056	0.00061	0.0014
Intraday Amihud Illiquidity	0.0030	0.014	0.00099	0.010	0.032
Bid Ask Spread	0.0032	0.0044	0.0016	0.0056	0.0042
Absolute return (%)	1.26	1.97	0.55	2.57	2.11

Panel C: Short sale variables (small sample)

	Median	Mean	25th Percentile	75th Percentile	Standard Deviation
Loaned Stocks (%)	2.66	5.15	1.01	7.05	6.00
Shorting (%)	0.11	0.23	0.03	0.28	0.33
Closing (%)	0.10	0.26	0.02	0.30	0.41
Short Sale Turnover (%)	0.24	0.49	0.09	0.60	0.66
Total Turnover (%)	0.96	1.41	0.56	1.70	1.38
Relative Shorting (%)	10.34	19.79	3.87	23.13	28.17
Relative Closing (%)	10.43	22.54	2.31	27.15	34.26
Relative Short Sale Turnover (%)	23.87	40.42	10.55	50.81	46.01
Abnormal Relative Short Sale Turnover	-0.35	-0.45	-1.04	0.27	1.05
Difference in Abnormal Turnover	-0.09	-0.15	-0.92	0.69	1.24

Table 2: Short selling as a function of information intangibility

This table reports the results from daily panel regressions that examine the effect of information intangibility on short selling activity. Dependent variables are Relative Shorting, Relative Closing, and Relative Short Sale Turnover. The explanatory variable of interest is Information Intangibility Dummy, which is equal to 1 if Information Intangibility is above the yearly median and 0 otherwise. Information Intangibility is defined as one minus the average percentage of numbers in all company articles on the day. In Panel B, we use the contemporaneous stock return as an additional control variable. In Panel C, we use Abnormal Information Intangibility Dummy (Information Intangibility divided by its mean over the past 125 trading days) as an alternative explanatory variable. In Panel D, we use different measures of Short Sale Turnover: Abnormal Relative Short Sale Turnover, which is the logarithm of Relative Short Sale Turnover divided by its mean over the past 125 trading days, Difference in Abnormal Turnover, which is defined as the difference between Abnormal Short Sale Turnover and Abnormal Total Turnover where both variables are defined as the logarithm of today's value divided by its past 125 day average. In Panel E, we use the continuous version of Information Intangibility instead of the dummy variable. In Panel F, we re-estimate the main regression using Information Intangibility and controls calculated after excluding articles from newspapers (columns 1 and 2), newswires (columns 3 and 4), and press releases (columns 5 and 6). In Panel G, we re-estimate the main regression using Information Intangibility calculated after excluding articles containing words "volume", "turnover" or "return". All standard errors are double-clustered at the firm and date level. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from July 2006 to December 2008 (excluding the time of the short sale ban from September 19, 2008 to October 8, 2008).

Panel A: Information intangibility (dummy variable)

	(1) Relative Short Sale Turnover	(2) Relative Short Sale Turnover	(3) Relative Shorting	(4) Relative Shorting	(5) Relative Closing	(6) Relative Closing
Information Int. Dummy	0.0120***	0.0095***	0.0036**	0.0026**	0.0089***	0.0072***
	(4.88)	(4.25)	(2.53)	(1.96)	(5.16)	(4.71)
Size	-0.0774***	-0.0779***	-0.0367***	-0.0367***	-0.0429***	-0.0435***
	(-4.90)	(-4.91)	(-4.34)	(-4.34)	(-4.44)	(-4.48)
Market to Book	0.0019	0.0019	0.0014	0.0014	0.0004	0.0005
	(0.58)	(0.60)	(0.93)	(0.93)	(0.21)	(0.24)
Return $_{t-1}$	0.1456	0.0207	0.1958***	0.1771***	-0.0426	-0.1670***
	(1.48)	(0.39)	(4.89)	(8.17)	(-0.53)	(-3.68)
Return $_{t-2}$	0.1406	0.0669	0.1341***	0.1420***	0.0252	-0.0693
	(1.07)	(1.36)	(2.68)	(5.72)	(0.23)	(-1.61)
Number of Articles	-0.0463***	-0.0418***	-0.0210***	-0.0185***	-0.0298***	-0.0270***
	(-15.88)	(-15.91)	(-13.42)	(-12.47)	(-14.18)	(-14.74)
Article Sentiment	0.3661***	0.4188***	0.2221***	0.2544***	0.2171**	0.2541***
	(2.84)	(3.44)	(2.95)	(3.49)	(2.11)	(2.61)
Breadth of Ownership	0.0829	0.0666	-0.0237	-0.0271	0.1297	0.1149
	(0.45)	(0.36)	(-0.24)	(-0.27)	(1.20)	(1.05)
Number of Analysts	-0.0186	-0.0193	-0.0110	-0.0110	-0.0146	-0.0152
	(-1.25)	(-1.31)	(-1.27)	(-1.28)	(-1.55)	(-1.63)
Analyst Dispersion	-1.4019*	-1.4120*	-0.9742**	-0.9842***	-0.5065	-0.4981
	(-1.89)	(-1.89)	(-2.57)	(-2.58)	(-1.03)	(-1.00)
Institutional Ownership	0.1424**	0.1382*	0.0436	0.0410	0.1225***	0.1201***
	(2.01)	(1.95)	(1.09)	(1.03)	(2.76)	(2.70)
Observations	196843	196843	203815	203815	196843	196843
Adjusted R^2	0.22	0.28	0.18	0.21	0.14	0.20
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel B: Contemporaneous return as an additional control

	(1) Relative Short Sale Turnover	(2) Relative Short Sale Turnover	(3) Relative Shorting	(4) Relative Shorting	(5) Relative Closing	(6) Relative Closing
Information Int. Dummy	0.0120***	0.0096***	0.0036**	0.0026**	0.0089***	0.0073***
	(4.90)	(4.31)	(2.54)	(1.97)	(5.19)	(4.80)
Return $_{t}$	-0.0974	-0.3222***	-0.0091	-0.0160	-0.1064	-0.3531***
	(-0.87)	(-7.85)	(-0.21)	(-0.72)	(-1.22)	(-10.36)
Observations	196844	196844	203816	203816	196844	196844
Adjusted R^2	0.22	0.28	0.18	0.21	0.14	0.20
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel C: Abnormal information intangibility

	(1) Relative Short Sale Turnover	(2) Relative Short Sale Turnover	(3) Relative Shorting	(4) Relative Shorting	(5) Relative Closing	(6) Relative Closing
Abnormal Information Int. Dummy	0.0144***	0.0118***	0.0060***	0.0047***	0.0099***	0.0083***
	(6.52)	(5.75)	(4.61)	(3.83)	(6.18)	(5.68)
Observations	196204	196204	203151	203151	196204	196204
Adjusted R^2	0.22	0.28	0.17	0.21	0.14	0.20
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel D: Alternative specification of short sale turnover

	(1) Abnormal Relative Short Sale Turnover	(2) Abnormal Relative Short Sale Turnover	(3) Abnormal Relative Short Sale Turnover	(4) Abnormal Relative Short Sale Turnover	(5) Difference in Abnormal Turnover	(6) Difference in Abnormal Turnover	(7) Difference in Abnormal Turnover	(8) Difference in Abnormal Turnover
Information Int. Dummy	0.0322***	0.0246***			0.0353***	0.0246***		
	(4.82)	(4.32)			(5.00)	(4.05)		
Abnormal Information Intangibility Dummy			0.0360***	0.0292***			0.0370***	0.0275***
			(5.74)	(5.32)			(5.58)	(4.61)
Observations	193570	193570	192933	192933	164948	164948	164385	164385
Adjusted R^2	0.05	0.14	0.05	0.14	0.05	0.14	0.05	0.14
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel E: Continuous information intangibility

	(1) Relative Short Sale Turnover	(2) Relative Short Sale Turnover	(3) Abnormal Relative Short Sale Turnover	(4) Abnormal Relative Short Sale Turnover	(5) Difference in Abnormal Turnover	(6) Difference in Abnormal Turnover
Information Intangibility	0.1137***	0.1040***	0.3840***	0.3497***	0.3979***	0.3337***
	(2.72)	(2.70)	(3.59)	(3.67)	(3.45)	(3.21)
Observations	196844	196844	193570	193570	164948	164948
Adjusted R^2	0.22	0.28	0.05	0.14	0.05	0.14
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel F: Excluding different types of articles

	Relative Short Sale Turnover					
	(1) No Newspaper	(2) No Newspaper	(3) No Newswires	(4) No Newswires	(5) No PR	(6) No PR
Information Intangibility	0.1408***	0.0916**	0.1301***	0.1027**	0.1297***	0.1225***
	(3.39)	(2.47)	(2.73)	(2.40)	(3.37)	(3.41)
Observations	157660	157660	180894	180894	141142	141142
Adjusted R^2	0.22	0.28	0.22	0.27	0.21	0.27
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel G: Excluding articles containing words "volume", "turnover" or "return"

	(1) Relative Short Sale Turnover	(2) Relative Short Sale Turnover	(3) Abnormal Relative Short Sale Turnover	(4) Abnormal Relative Short Sale Turnover	(5) Difference in Abnormal Turnover	(6) Difference in Abnormal Turnover
Information Int. Dummy	0.0144***	0.0120***	0.0048***	0.0039***	0.0108***	0.0092***
	(5.51)	(5.05)	(3.18)	(2.75)	(5.91)	(5.57)
Observations	182080	182080	188500	188500	182080	182080
Adjusted R^2	0.22	0.28	0.18	0.21	0.14	0.20
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 3: Return mean-reversion as a function of information intangibility

Panel A contains the results from daily Fama-Macbeth (1973) regressions with Newey-West (1987) correction that examine how mean reversion of returns is mediated by information intangibility. The dependent variables are returns on the 10, 20, and 30 trading days after day t. The explanatory variable of interest is the interaction between the contemporaneous return and Information Intangibility. In columns 4 to 6 we use market adjusted returns, which are calculated as actual returns minus the return on the CRSP value-weighted index. In Panel B and Panel C, we show the results of daily panel regressions that examine how Information Intangibility of news affects a stock's daily volatility. In Panel B, the dependent variables are absolute contemporaneous returns. In Panel C, the dependent variables are squared contemporaneous returns. The explanatory variable of interest is Information Intangibility, as defined in Table 2. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from January 1999 to December 2008.

Panel A: Mean reversion

	(1) Return t+1 to t+10	(2) Return t+1 to t+20	(3) Return t+1 to t+30	(4) Market adj. Return t+1 to t+10	(5) Market adj. Return t+1 to t+20	(6) Market adj. Return t+1 to t+30
Return * Information Intangibility	-0.5317***	-0.6185***	-0.6063***			
	(-4.34)	(-3.42)	(-3.12)			
Market adj. Return * Information Intangibility				-0.5268***	-0.5890***	-0.6046***
				(-4.33)	(-3.24)	(-3.12)
Return	-0.0518***	-0.0473***	-0.0551***			
	(-6.08)	(-3.43)	(-3.16)			
Market adj. Return				-0.0537***	-0.0504***	-0.0579***
				(-6.19)	(-3.55)	(-3.24)
Information Intangibility	-0.0158***	-0.0303***	-0.0351***	-0.0163***	-0.0298***	-0.0349***
	(-3.86)	(-4.20)	(-3.69)	(-4.12)	(-4.19)	(-3.68)
Size	-0.0053***	-0.0100***	-0.0143***	-0.0054***	-0.0100***	-0.0143***
	(-6.03)	(-5.50)	(-5.01)	(-6.03)	(-5.45)	(-4.99)
Market to Book	-0.0000	-0.0001	-0.0001	-0.0000	-0.0001	-0.0001
	(-0.40)	(-0.36)	(-0.25)	(-0.20)	(-0.22)	(-0.15)
Breadth of Ownership	0.0294***	0.0539***	0.0751***	0.0298***	0.0543***	0.0760***
	(3.90)	(3.42)	(3.01)	(3.86)	(3.34)	(2.93)
Number of Analysts	0.0010	0.0015	0.0024	0.0011	0.0017	0.0027
	(1.10)	(0.99)	(1.07)	(1.20)	(1.12)	(1.24)
Analyst Dispersion	-0.2938**	-0.5372**	-0.6141*	-0.3009***	-0.5466**	-0.6298*
	(-2.54)	(-2.39)	(-1.90)	(-2.61)	(-2.40)	(-1.91)
Institutional Ownership	-0.0040**	-0.0071**	-0.0106*	-0.0042**	-0.0074**	-0.0116*
	(-2.27)	(-1.99)	(-1.85)	(-2.37)	(-1.98)	(-1.89)
Number of Articles	0.0005	0.0011	0.0016	0.0005	0.0011	0.0015
	(1.25)	(1.41)	(1.47)	(1.16)	(1.40)	(1.39)
Article Sentiment	0.0312*	0.0307	0.0426	0.0300*	0.0313	0.0430
	(1.84)	(0.86)	(0.82)	(1.73)	(0.87)	(0.82)
Constant	0.1209***	0.2261***	0.3230***	0.1213***	0.2254***	0.3220***
	(6.65)	(6.00)	(5.44)	(6.66)	(5.93)	(5.36)
Observations	723449	723409	723363	723449	723409	723363
Newey-West Lags	10	20	30	10	20	30

Panel B: Absolute return

	(1) Absolute Return	(2) Absolute Return	(3) Absolute Return	(4) Absolute Return	(5) Absolute Return	(6) Absolute Return
Information Intangibility	-0.0169***	-0.0210***	-0.0237***	-0.0233***	-0.0215***	-0.0214***
	(-8.99)	(-11.91)	(-15.02)	(-17.26)	(-14.78)	(-17.55)
Size	-0.0023***	-0.0029***	-0.0011***	-0.0010***	-0.0011***	-0.0009**
	(-16.68)	(-10.44)	(-3.34)	(-2.59)	(-3.32)	(-2.52)
Market to Book	0.0005***	0.0006***	0.0004***	0.0004***	0.0004***	0.0004***
	(9.13)	(9.50)	(7.02)	(7.72)	(6.96)	(7.62)
Breadth of Ownership		-0.0127***		0.0098**		0.0099**
		(-4.07)		(2.20)		(2.24)
Number of Analysts		0.0032***		-0.0013***		-0.0013***
		(9.78)		(-3.29)		(-3.35)
Analyst Dispersion		0.3954***		0.3202***		0.3227***
		(14.13)		(8.45)		(8.49)
Institutional Ownership		0.0018*		-0.0059***		-0.0060***
		(1.90)		(-4.10)		(-4.16)
Number of Articles		0.0047***		0.0055***		0.0053***
		(22.18)		(32.97)		(32.71)
Article Sentiment		-0.0497***		-0.0749***		-0.0719***
		(-9.74)		(-18.78)		(-19.72)
Observations	833689	723488	833689	723488	833689	723488
Adjusted R^2	0.22	0.26	0.22	0.24	0.29	0.32
Daily Fixed Effects	Yes	Yes	No	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes	Yes	Yes

Panel C: Squared return

	(1) Squared Return	(2) Squared Return	(3) Squared Return	(4) Squared Return	(5) Squared Return	(6) Squared Return
Information Intangibility	-0.0016***	-0.0019***	-0.0021***	-0.0021***	-0.0019***	-0.0019***
	(-10.36)	(-13.18)	(-14.44)	(-16.39)	(-14.25)	(-16.75)
Size	-0.0002***	-0.0002***	-0.0001***	-0.0001***	-0.0001***	-0.0001**
	(-17.46)	(-10.63)	(-3.46)	(-2.62)	(-3.44)	(-2.56)
Market to Book	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(9.00)	(9.30)	(6.34)	(6.91)	(6.29)	(6.83)
Breadth of Ownership		-0.0009***		0.0008**		0.0008**
		(-3.85)		(1.96)		(1.98)
Number of Analysts		0.0002***		-0.0001***		-0.0001***
		(7.94)		(-3.03)		(-3.09)
Analyst Dispersion		0.0309***		0.0290***		0.0292***
		(11.92)		(8.31)		(8.34)
Institutional Ownership		0.0000		-0.0006***		-0.0006***
		(0.16)		(-4.88)		(-4.94)
Number of Articles		0.0004***		0.0005***		0.0005***
		(20.97)		(29.60)		(29.52)
Article Sentiment		-0.0046***		-0.0064***		-0.0061***
		(-11.10)		(-18.12)		(-18.72)
Observations	833689	723488	833689	723488	833689	723488
Adjusted R^2	0.19	0.22	0.18	0.20	0.25	0.27
Daily Fixed Effects	Yes	Yes	No	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes	Yes	Yes

Table 4: Liquidity as a function of information intangibility

This table shows the results from daily panel regressions that examine how information intangibility affects a stock's liquidity. In Panel A, the dependent variable is daily Amihud Illiquidity, which is defined as $10^3 \log\left(1 + 10^6 * \frac{|ret|}{dollar\ volume}\right)$. In Panel B, the dependent variable is Bid-Ask Spread, which is defined as $100 * mean_{over\ 5\ min\ intervals}\left(\frac{ask_\tau - bid_\tau}{0.5*ask_\tau + 0.5*bid_\tau}\right)$. Amihud Illiquidity (t-1) is Amihud Illiquidity on the prior trading day. Bid-Ask Spread (t-1) is Bid-Ask Spread on the prior trading day. The explanatory variable of interest is Information Intangibility, as defined in Table 2. In Panels C and D, we re-estimate the regression for Amihud Illiquidity and Bid-Ask Spread, respectively, using Information Intangibility calculated after excluding articles containing words "volume", "turnover" or "return". All standard errors are double-clustered at the firm and date level. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from January 1999 to December 2008.

Panel A: Amihud Illiquidity

	(1) Amihud Illiquidity	(2) Amihud Illiquidity	(3) Amihud Illiquidity	(4) Amihud Illiquidity	(5) Amihud Illiquidity
Information Intangibility	-0.8454***	-0.5649***	-0.3777***	-0.3423***	-0.2039***
	(-4.89)	(-3.92)	(-4.82)	(-4.47)	(-3.71)
Size	-0.4390***	-0.6314***	-0.6305***	-0.6303***	-0.3740***
	(-23.45)	(-21.56)	(-16.34)	(-16.37)	(-15.53)
Market to Book	-0.0148***	-0.0095***	-0.0128***	-0.0128***	-0.0074***
	(-4.30)	(-3.01)	(-2.91)	(-2.94)	(-2.75)
Breadth of Ownership		2.8242***	1.7627***	1.7712***	0.9114***
		(11.19)	(3.99)	(4.02)	(3.37)
Number of Analysts		-0.2876***	-0.1473***	-0.1461***	-0.0884***
		(-8.34)	(-3.22)	(-3.20)	(-3.04)
Analyst Dispersion		17.1653***	23.3601***	23.2743***	13.4520***
		(3.50)	(5.36)	(5.36)	(5.30)
Institutional Ownership		-1.5156***	-1.6264***	-1.6296***	-1.0053***
		(-12.91)	(-8.72)	(-8.76)	(-8.67)
Number of Articles		0.0470***	0.0140**	0.0153**	0.0024
		(4.08)	(2.10)	(2.24)	(0.55)
Article Sentiment		0.3943	-0.3957	-0.2732	0.1098
		(0.88)	(-1.63)	(-1.15)	(0.64)
Amihud Illiquidity (t-1)					0.3500***
					(44.89)
Bid-Ask Spread (t-1)					0.2461***
					(13.91)
Observations	833686	723487	723487	723487	722096
Adjusted R^2	0.26	0.33	0.43	0.44	0.52
Daily Fixed Effects	Yes	Yes	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes	Yes

Panel B: Bid-Ask Spread

	(1) Bid-Ask Spread	(2) Bid-Ask Spread	(3) Bid-Ask Spread	(4) Bid-Ask Spread	(5) Bid-Ask Spread
Information Intangibility	-0.1531***	-0.1349***	-0.0941***	-0.0583*	-0.0580***
	(-3.00)	(-3.14)	(-2.99)	(-1.89)	(-4.85)
Size	-0.0841***	-0.0994***	-0.1325***	-0.1323***	-0.0351***
	(-22.17)	(-10.74)	(-10.73)	(-10.74)	(-9.28)
Market to Book	-0.0076***	-0.0069***	-0.0032*	-0.0032*	-0.0009
	(-5.60)	(-5.02)	(-1.87)	(-1.87)	(-1.61)
Breadth of Ownership		0.3860***	0.9742***	0.9768***	0.2893***
		(4.02)	(5.64)	(5.66)	(5.40)
Number of Analysts		-0.0753***	-0.0169	-0.0166	-0.0031
		(-5.76)	(-1.19)	(-1.18)	(-0.70)
Analyst Dispersion		7.4839***	6.5629***	6.5852***	1.8121***
		(5.41)	(4.96)	(5.00)	(4.68)
Institutional Ownership		-0.0962***	-0.1801***	-0.1823***	-0.0427***
		(-2.99)	(-3.55)	(-3.60)	(-2.69)
Number of Articles		0.0104**	0.0226***	0.0264***	0.0136***
		(2.51)	(8.56)	(11.04)	(14.39)
Article Sentiment		-0.9769***	-0.7550***	-0.5646***	-0.1923***
		(-5.77)	(-8.08)	(-6.42)	(-5.16)
Amihud Illiquidity (t-1)					0.0104***
					(12.71)
Bid-Ask Spread (t-1)					0.6824***
					(88.88)
Observations	788702	722445	722445	722445	721316
Adjusted R^2	0.32	0.34	0.45	0.49	0.73
Daily Fixed Effects	Yes	Yes	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes	Yes

Panel C: Amihud Illiquidity (excluding articles containing words "volume", "turnover" or "return")

	(1) Amihud Illiquidity	(2) Amihud Illiquidity	(3) Amihud Illiquidity	(4) Amihud Illiquidity	(5) Amihud Illiquidity
Information Intangibility	-0.7619***	-0.5362***	-0.3909***	-0.3533***	-0.2127***
	(-4.63)	(-3.84)	(-5.14)	(-4.73)	(-3.99)
Observations	766106	665735	665735	665735	664456
Adjusted R^2	0.26	0.33	0.43	0.45	0.52
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Daily Fixed Effects	Yes	Yes	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes	Yes

Panel D: Bid-Ask Spread (excluding articles containing words "volume", "turnover" or "return")

	(1) Bid-Ask Spread	(2) Bid-Ask Spread	(3) Bid-Ask Spread	(4) Bid-Ask Spread	(5) Bid-Ask Spread
Information Intangibility	-0.1357***	-0.1231***	-0.0935***	-0.0612*	-0.0591***
	(-2.69)	(-2.98)	(-2.94)	(-1.96)	(-4.87)
Observations	725029	664875	664875	664875	663775
Adjusted R^2	0.32	0.34	0.45	0.49	0.73
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A	As in Panel A
Daily Fixed Effects	Yes	Yes	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes	No	No
Firm Fixed Effects	No	No	Yes	Yes	Yes

Table 5: Effect of Olympic Games on the relationship between illiquidity and information intangibility

This table shows the results from daily panel regressions that examine how the relationship between liquidity and information intangibility changes during the Olympic Games. In Panel A, the dependent variable is daily Amihud Illiquidity. In Panel, B the dependent variable is Bid-Ask Spread. The explanatory variable of interest is Information Intangibility interacted with a dummy variable equal to 1 during the Olympic Games. In column 4, we add four fixed effects for the quarters within a year and interact them with Information Intangibility. All standard errors are double-clustered at the firm and date level. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from January 1999 to December 2008.

Panel A: Amihud Illiquidity

	(1) Amihud Illiquidity	(2) Amihud Illiquidity	(3) Amihud Illiquidity	(4) Amihud Illiquidity
Olympic Games Dummy * Information Intangibility	0.5235**	0.6429***	0.4694*	0.4167*
	(2.27)	(2.69)	(1.80)	(1.71)
Information Intangibility	-0.4541***	-0.3891***	-0.3507***	
	(-5.12)	(-4.95)	(-4.57)	
Olympic Games Dummy	0.0033	0.0189	28.5859	0.0151
	(0.13)	(0.72)	(0.00)	(0.57)
Size	-0.6438***	-0.6304***	-0.6302***	-0.6296***
	(-18.05)	(-16.34)	(-16.36)	(-16.32)
Market to Book	-0.0152***	-0.0128***	-0.0128***	-0.0128***
	(-3.71)	(-2.91)	(-2.94)	(-2.91)
Breadth of Ownership		1.7623***	1.7709***	1.7555***
		(3.99)	(4.02)	(3.98)
Number of Analysts		-0.1473***	-0.1461***	-0.1470***
		(-3.22)	(-3.20)	(-3.21)
Analyst Dispersion		23.3606***	23.2746***	23.3713***
		(5.36)	(5.36)	(5.36)
Institutional Ownership		-1.6266***	-1.6298***	-1.6270***
		(-8.72)	(-8.76)	(-8.72)
Number of Articles		0.0140**	0.0152**	0.0139**
		(2.10)	(2.24)	(2.08)
Article Sentiment		-0.3943	-0.2723	-0.3918
		(-1.62)	(-1.14)	(-1.61)
Observations	833686	723487	723487	723487
Adjusted R^2	0.43	0.43	0.44	0.43
Quarter Fixed Effects	Yes	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Daily Fixed Effects	No	No	Yes	No
Calendar Quarter Fixed Effects * Information Intangibility	No	No	No	Yes

Panel B: Bid-Ask Spread

	(1) Bid-Ask Spread	(2) Bid-Ask Spread	(3) Bid-Ask Spread	(4) Bid-Ask Spread
Olympic Games Dummy * Information Intangibility	0.2575***	0.2664***	0.2181***	0.2765***
	(3.79)	(3.95)	(3.23)	(3.77)
Information Intangibility	-0.0544	-0.0990***	-0.0622***	
	(-1.47)	(-3.15)	(-6.80)	
Olympic Games Dummy	-0.0428***	-0.0398***	-0.3404	-0.0396***
	(-4.98)	(-4.79)	(-0.00)	(-4.75)
Size	-0.1059***	-0.1325***	-0.1323***	-0.1324***
	(-9.68)	(-10.73)	(-10.74)	(-10.71)
Market to Book	-0.0030	-0.0032*	-0.0032*	-0.0032*
	(-1.56)	(-1.87)	(-1.83)	(-1.87)
Breadth of Ownership		0.9741***	0.9767***	0.9731***
		(5.64)	(5.66)	(5.63)
Number of Analysts		-0.0169	-0.0166	-0.0168
		(-1.19)	(-1.17)	(-1.19)
Analyst Dispersion		6.5642***	6.5853***	6.5673***
		(4.96)	(5.00)	(4.96)
Institutional Ownership		-0.1802***	-0.1824***	-0.1802***
		(-3.55)	(-3.60)	(-3.55)
Number of Articles		0.0225***	0.0264***	0.0225***
		(8.53)	(8.62)	(8.51)
Article Sentiment		-0.7553***	-0.5642***	-0.7547***
		(-8.08)	(-6.41)	(-8.07)
Observations	788702	722445	722445	722445
Adjusted R^2	0.44	0.45	0.49	0.45
Quarter Fixed Effects	Yes	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Daily Fixed Effects	No	No	Yes	No
Calendar Quarter Fixed Effects * Information Intangibility	No	No	No	Yes

Table 6: Profitability as a function of information intangibility

This table contains the results from daily Fama-Macbeth (1973) regressions with Newey-West (1987) adjustments that examine how short sellers' profitability is mediated by information intangibility. We regress future returns on Information Intangibility interacted with the Shorting Dummy, which is equal to one if the percentage of shares outstanding newly shorted is above the median and the Relative Shorting Dummy, which is equal to one if the percentage of total turnover due to new short positions is above the median. In columns 1 and 2 we use raw returns. In columns 3 to 4 we repeat the analysis for market adjusted returns, which are raw returns minus the return on the CRSP value-weighted index. In Panel A (Panel B, Panel C), we use a 20-trading-day horizon (10-trading-day and 30-trading-day horizon). T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from July 2006 to December 2008 (excluding the time of the short sale ban from September 19, 2008 to October 8, 2008).

Panel A: 20-day horizon

	(1) Return t+1 to t+20	(2) Return t+1 to t+20	(3) Market adj. Return t+1 to t+20	(4) Market adj. Return t+1 to t+20
Shorting Dummy * Information Intangibility	0.0077		0.0063	
	(0.48)		(0.38)	
Relative Shorting Dummy * Information Intangibility		-0.0036		-0.0040
		(-0.27)		(-0.30)
Shorting Dummy	-0.0036***		-0.0033**	
	(-2.70)		(-2.34)	
Relative Shorting Dummy		-0.0029**		-0.0028**
		(-2.40)		(-2.27)
Information Intangibility	-0.0172	-0.0070	-0.0189	-0.0092
	(-1.55)	(-0.60)	(-1.64)	(-0.77)
Size	-0.0098***	-0.0096***	-0.0099***	-0.0097***
	(-3.50)	(-3.39)	(-3.49)	(-3.39)
Market to Book	0.0005*	0.0004	0.0004	0.0004
	(1.68)	(1.56)	(1.54)	(1.43)
Return $_{t-1}$	-0.0297	-0.0303	-0.0300	-0.0308
	(-1.06)	(-1.08)	(-1.04)	(-1.06)
Return $_{t-2}$	-0.0185	-0.0188	-0.0191	-0.0194
	(-0.61)	(-0.62)	(-0.60)	(-0.61)
Breadth of Ownership	0.0880***	0.0884***	0.0902***	0.0904***
	(2.94)	(2.97)	(2.93)	(2.96)
Number of Analysts	0.0021	0.0016	0.0021	0.0017
	(0.80)	(0.60)	(0.82)	(0.64)
Analyst Dispersion	-0.2806	-0.3116	-0.2355	-0.2648
	(-0.82)	(-0.90)	(-0.67)	(-0.75)
Inst. Ownership	-0.0046	-0.0055	-0.0068	-0.0077
	(-0.46)	(-0.56)	(-0.62)	(-0.72)
Number of Articles	-0.0013	-0.0014	-0.0013	-0.0015
	(-1.00)	(-1.13)	(-1.04)	(-1.17)
Article Sentiment	0.0355	0.0388	0.0290	0.0319
	(0.50)	(0.55)	(0.40)	(0.44)
Constant	0.2116***	0.2075***	0.2186***	0.2151***
	(3.63)	(3.56)	(3.58)	(3.53)
Observations	203778	203778	203778	203778
Newey-West Lags	20	20	20	20

Panel B: 10-day horizon

	(1) Return t+1 to t+10	(2) Return t+1 to t+10	(3) Market adj. Return t+1 to t+10	(4) Market adj. Return t+1 to t+10
Shorting Dummy* Information Intangibility	0.0086		0.0079	
	(0.97)		(0.89)	
Relative Shorting Dummy * Information Intangibility		-0.0040		-0.0038
		(-0.45)		(-0.43)
Shorting Dummy	-0.0016**		-0.0016*	
	(-1.99)		(-1.84)	
Relative Shorting Dummy		-0.0017**		-0.0017**
		(-2.51)		(-2.54)
Information Intangibility	-0.0078	0.0015	-0.0082	0.0007
	(-1.00)	(0.18)	(-1.05)	(0.08)
Observations	243323	243323	243323	243323
Newey-West Lags	10	10	10	10
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A

Panel C: 30-day horizon

	(1) Return t+1 to t+30	(2) Return t+1 to t+30	(3) Market adj. Return t+1 to t+30	(4) Market adj. Return t+1 to t+30
Shorting Dummy* Information Intangibility	0.0177		0.0180	
	(0.81)		(0.81)	
Relative Shorting Dummy * Information Intangibility		-0.0027		-0.0014
		(-0.16)		(-0.08)
Shorting Dummy	-0.0052***		-0.0046**	
	(-2.93)		(-2.52)	
Relative Shorting Dummy		-0.0042**		-0.0041**
		(-2.27)		(-2.07)
Information Intangibility	-0.0219	-0.0085	-0.0265	-0.0133
	(-1.46)	(-0.57)	(-1.60)	(-0.84)
Observations	203755	203755	203755	203755
Newey-West Lags	30	30	30	30
Controls	As in Panel A	As in Panel A	As in Panel A	As in Panel A

Table 7: Short selling as a function of information intangibility, effect of Olympic Games

This table contains the results from daily panel regressions that examine how the relation between information intangibility and short sellers' trading changes during the Olympic Games. In columns 1 and 3, the regression is run only on the subsample of days during the Olympic Games. In columns 2 and 4, the regression is run on the subsample of days when the Olympic Games are not held. In Panel A (Panel B, Panel C), the dependent variable is Relative Short Sale Turnover (Relative Shorting, Relative Closing). All standard errors are double-clustered at the firm and date level. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from July 2006 to December 2008.

Panel A: Relative Short Sale Turnover

	(1) Olympic Games	(2) No Olympic Games	(3) Olympic Games	(4) No Olympic Games
Information Intangibility Dummy	-0.0006	0.0121***	-0.0041	0.0094***
	(-0.04)	(4.87)	(-0.25)	(4.20)
Return $_{t-1}$	0.8876***	0.1323	0.4745**	0.0079
	(3.11)	(1.32)	(2.41)	(0.15)
Return $_{t-2}$	0.0702	0.1377	-0.2146	0.0632
	(0.20)	(1.03)	(-0.95)	(1.26)
Number of Articles	-0.0360***	-0.0462***	-0.0348***	-0.0417***
	(-3.39)	(-15.69)	(-3.78)	(-15.77)
Article Sentiment	0.4260	0.3732***	0.4946	0.4315***
	(0.69)	(2.85)	(0.81)	(3.49)
Size		-0.0773***		-0.0778***
		(-4.86)		(-4.87)
Market to Book		0.0019		0.0019
		(0.61)		(0.62)
Breadth of Ownership		0.0582		0.0425
		(0.32)		(0.23)
Number of Analysts		-0.0181		-0.0189
		(-1.23)		(-1.29)
Analyst Dispersion		-1.4016*		-1.4100*
		(-1.89)		(-1.88)
Institutional Ownership		0.1430**		0.1399**
		(2.02)		(1.97)
Observations	4120	193664	4120	193664
Adjusted R^2	0.36	0.22	0.37	0.28
Quarterly Fixed Effects	Yes	Yes	No	No
Daily Fixed Effects	No	No	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes

Panel B: Relative Shorting

	(1) Olympic Games	(2) No Olympic Games	(3) Olympic Games	(4) No Olympic Games
Information Intangibility Dummy	-0.0007	0.0037**	-0.0018	0.0027**
	(-0.07)	(2.57)	(-0.18)	(1.97)
Return $_{t-1}$	0.3160*	0.1934***	0.1808	0.1752***
	(1.65)	(4.78)	(1.09)	(7.99)
Return $_{t-2}$	0.0993	0.1319***	-0.0572	0.1399***
	(0.73)	(2.60)	(-0.33)	(5.57)
Number of Articles	-0.0223***	-0.0210***	-0.0227***	-0.0185***
	(-3.17)	(-13.30)	(-3.53)	(-12.38)
Article Sentiment	-0.0432	0.2280***	-0.0383	0.2629***
	(-0.10)	(3.02)	(-0.08)	(3.59)
Size		-0.0367***		-0.0367***
		(-4.31)		(-4.31)
Market to Book		0.0014		0.0014
		(0.93)		(0.93)
Breadth of Ownership		-0.0294		-0.0321
		(-0.29)		(-0.32)
Number of Analysts		-0.0109		-0.0109
		(-1.27)		(-1.28)
Analyst Dispersion		-0.9787**		-0.9872***
		(-2.57)		(-2.58)
Institutional Ownership		0.0456		0.0435
		(1.14)		(1.09)
Observations	4121	200636	4121	200636
Adjusted R^2	0.24	0.18	0.25	0.21
Quarterly Fixed Effects	Yes	Yes	No	No
Daily Fixed Effects	No	No	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes

Panel C: Relative Closing

	(1) Olympic Games	(2) No Olympic Games	(3) Olympic Games	(4) No Olympic Games
Information Intangibility Dummy	-0.0015	0.0089***	-0.0041	0.0071***
	(-0.13)	(5.09)	(-0.37)	(4.59)
Return $_{t-1}$	0.6736**	-0.0547	0.3568*	-0.1791***
	(2.55)	(-0.67)	(1.74)	(-3.90)
Return $_{t-2}$	-0.0525	0.0247	-0.1990	-0.0720*
	(-0.15)	(0.22)	(-0.76)	(-1.65)
Number of Articles	-0.0116	-0.0298***	-0.0105	-0.0271***
	(-1.48)	(-14.05)	(-1.41)	(-14.66)
Article Sentiment	0.5347	0.2207**	0.6098	0.2612***
	(0.94)	(2.10)	(1.07)	(2.62)
Size		-0.0429***		-0.0436***
		(-4.41)		(-4.46)
Market to Book		0.0005		0.0005
		(0.23)		(0.26)
Breadth of Ownership		0.1068		0.0921
		(0.96)		(0.82)
Number of Analysts		-0.0141		-0.0148
		(-1.50)		(-1.59)
Analyst Dispersion		-0.4852		-0.4765
		(-0.98)		(-0.95)
Institutional Ownership		0.1212***		0.1195***
		(2.71)		(2.67)
Observations	4120	193664	4120	193664
Adjusted R^2	0.27	0.14	0.29	0.20
Quarterly Fixed Effects	Yes	Yes	No	No
Daily Fixed Effects	No	No	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes

Table 8: Short selling as a function of information intangibility, effect of S&P 500 addition / deletion

This table contains the results from daily panel regressions that examine how the relationship between information intangibility and short sellers' trading changes after a company is added to / removed from the S&P 500 index. Dependent variables are Relative Short Sale Turnover, Relative Shorting, and Relative Closing, as defined in Table 2. The explanatory variable of interest is Information Intangibility interacted with an indicator variable which is 1 whenever a company is a constituent of the S&P 500 index. All standard errors are double-clustered at the firm and date level. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from July 2006 to December 2008 (excluding the time of the short sale ban from September 19, 2008 to October 8, 2008).

	(1) Relative Short Sale Turnover	(2) Relative Short Sale Turnover	(3) Relative Shorting	(4) Relative Shorting	(5) Relative Closing	(6) Relative Closing
S&P 500 Dummy* Information Int.	-0.2391***	-0.1938**	-0.1256***	-0.1096**	-0.1423**	-0.1071**
	(-2.94)	(-2.49)	(-2.72)	(-2.42)	(-2.49)	(-2.02)
S&P 500 Dummy	-0.0249	-0.0258	-0.0135	-0.0153	-0.0090	-0.0086
	(-0.78)	(-0.80)	(-0.80)	(-0.89)	(-0.52)	(-0.51)
Information Intangibility	0.2669***	0.2279***	0.1089***	0.0933**	0.1864***	0.1617***
	(4.00)	(3.67)	(2.86)	(2.54)	(3.78)	(3.60)
Size	-0.0761***	-0.0765***	-0.0360***	-0.0359***	-0.0424***	-0.0430***
	(-4.79)	(-4.79)	(-4.26)	(-4.24)	(-4.32)	(-4.37)
Market to Book	0.0017	0.0018	0.0013	0.0013	0.0004	0.0004
	(0.54)	(0.55)	(0.87)	(0.87)	(0.18)	(0.21)
Return $_{t-1}$	0.1462	0.0212	0.1962***	0.1773***	-0.0422	-0.1667***
	(1.48)	(0.40)	(4.90)	(8.19)	(-0.53)	(-3.68)
Return $_{t-2}$	0.1400	0.0670	0.1336***	0.1417***	0.0250	-0.0690
	(1.06)	(1.36)	(2.67)	(5.71)	(0.23)	(-1.60)
Article Sentiment	0.3346**	0.4046***	0.2037***	0.2416***	0.2048*	0.2575***
	(2.52)	(3.27)	(2.65)	(3.27)	(1.93)	(2.59)
Breadth of Ownership	0.1087	0.0929	-0.0098	-0.0116	0.1391	0.1236
	(0.59)	(0.50)	(-0.10)	(-0.11)	(1.28)	(1.12)
Number of Analysts	-0.0184	-0.0191	-0.0108	-0.0108	-0.0146	-0.0152
	(-1.23)	(-1.29)	(-1.25)	(-1.25)	(-1.55)	(-1.63)
Analyst Dispersion	-1.3591*	-1.3692*	-0.9541**	-0.9622**	-0.4869	-0.4795
	(-1.84)	(-1.84)	(-2.51)	(-2.52)	(-0.99)	(-0.97)
Institutional Ownership	0.1410**	0.1369*	0.0426	0.0400	0.1222***	0.1200***
	(1.99)	(1.93)	(1.07)	(1.00)	(2.75)	(2.69)
Number of Articles	-0.0472***	-0.0424***	-0.0213***	-0.0187***	-0.0304***	-0.0274***
	(-16.23)	(-16.31)	(-13.61)	(-12.70)	(-14.54)	(-15.13)
Observations	196844	196844	203816	203816	196844	196844
Adjusted R^2	0.22	0.28	0.18	0.21	0.14	0.20
Quarterly Fixed Effects	Yes	No	Yes	No	Yes	No
Daily Fixed Effects	No	Yes	No	Yes	No	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 9: Robustness checks

This table contains robustness checks for our main analyses. In Panel A, we re-estimate our four main regressions adding a dummy variable for the week around a firm's quarterly earnings announcement (as reported in Compustat). In Panel B, we re-estimate our four main regressions replacing Information Intangibility with Information Intangibility Digit-Based, which is based on the number of digits divided by number of symbols instead of the number of numbers divided by the number of words. In Panel C, we run a robustness check for Table 4, replacing Amihud Illiquidity with Intraday Amihud Illiquidity, which is based on 5-minute intervals within the day. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for all regressions consists of news days from January 1999 to December 2008, except for regression 1 in Panel A and Panel B, where the sample consists of news days from July 2006 to December 2008 (excluding the time of the short sale ban from September 19, 2008 to October 8, 2008).

Panel A: Controlling for earning announcement weeks

	(1) Relative Short Sale Turnover	(2) Return t+1 to t+10	(3) Absolute Return	(4) Amihud Illiqudity
Information Intangibility Dummy	0.0073***			
	(3.05)			
Return * Information Intangibility		-0.5036***		
		(-4.09)		
Information Intangibility		-0.0126***	-0.0188***	-0.3774***
		(-3.14)	(-14.62)	(-4.75)
Return		-0.0525***		
		(-6.16)		
Earning Announcement Dummy	-0.0702***	0.0055***	0.0043***	0.0003
	(-11.46)	(4.86)	(23.12)	(0.04)
Return $_{t-1}$	0.1577			
	(1.61)			
Return $_{t-2}$	0.1477			
	(1.13)			
Number of Articles	-0.0375***	0.0002	0.0050***	0.0140**
	(-13.60)	(0.58)	(31.14)	(1.98)
Article Sentiment	0.2835**	0.0348**	-0.0706***	-0.3955
	(2.22)	(2.10)	(-18.09)	(-1.63)
Size	-0.0777***	-0.0053***	-0.0009**	-0.6305***
	(-4.93)	(-6.04)	(-2.45)	(-16.35)
Market to Book	0.0018	-0.0000	0.0004***	-0.0128***
	(0.57)	(-0.41)	(7.68)	(-2.91)
Breadth of Ownership	0.0815	0.0303***	0.0098**	1.7627***
	(0.44)	(4.01)	(2.21)	(3.99)
Number of Analysts	-0.0187	0.0009	-0.0013***	-0.1473***
	(-1.26)	(1.08)	(-3.40)	(-3.22)
Analyst Dispersion	-1.4597**	-0.2858**	0.3247***	23.3604***
	(-1.97)	(-2.49)	(8.53)	(5.36)
Institutional Ownership	0.1416**	-0.0041**	-0.0060***	-1.6264***
	(2.00)	(-2.35)	(-4.18)	(-8.72)
Observations	196844	723449	723488	723487
Adjusted R^2	0.22		0.25	0.43
Regression Method	OLS	Fama-Macbeth + Newey-West (30 lags)	OLS	OLS
Quarterly Fixed Effects	Yes	No	Yes	Yes
Firm Fixed Effects	Yes	No	Yes	Yes

Panel B: Alternative measure of information intangibility

	(1) Relative Short Sale Turnover	(2) Return t+1 to t+10	(3) Absolute Return	(4) Amihud Illiqudity
Return * Information Intangibility Digit-Based		-1.2781***		
		(-5.09)		
Information Intangibility Digit-Based	0.1716**	-0.0277***	-0.0433***	-0.8154***
	(2.20)	(-3.42)	(-15.15)	(-5.24)
Return		-0.0530***		
		(-6.26)		
Return $_{t-1}$	0.1462			
	(1.48)			
Return $_{t-2}$	0.1404			
	(1.06)			
Number of Articles	-0.0475***	0.0005	0.0055***	0.0137**
	(-16.31)	(1.27)	(33.04)	(2.05)
Article Sentiment	0.3306**	0.0343**	-0.0727***	-0.4107*
	(2.48)	(1.98)	(-18.27)	(-1.69)
Size	-0.0774***	-0.0054***	-0.0009**	-0.6303***
	(-4.90)	(-6.07)	(-2.54)	(-16.34)
Market to Book	0.0019	-0.0000	0.0004***	-0.0127***
	(0.58)	(-0.38)	(7.73)	(-2.91)
Breadth of Ownership	0.0855	0.0293***	0.0094**	1.7604***
	(0.47)	(3.90)	(2.13)	(3.99)
Number of Analysts	-0.0188	0.0009	-0.0013***	-0.1474***
	(-1.27)	(1.06)	(-3.35)	(-3.23)
Analyst Dispersion	-1.3917*	-0.2984***	0.3201***	23.3585***
	(-1.88)	(-2.58)	(8.43)	(5.36)
Institutional Ownership	0.1430**	-0.0040**	-0.0059***	-1.6270***
	(2.02)	(-2.28)	(-4.11)	(-8.72)
Observations	196840	723417	723456	723455
Adjusted R^2	0.22		0.24	0.43
Regression Method	OLS	Fama-Macbeth + Newey-West (30 lags)	OLS	OLS
Quarterly Fixed Effects	Yes	No	Yes	Yes
Firm Fixed Effects	Yes	No	Yes	Yes

Panel C: Intraday Amihud Illiquidity

	(1) Intraday Amihud Illiquidity	(2) Intraday Amihud Illiquidity	(3) Intraday Amihud Illiquidity	(4) Intraday Amihud Illiquidity
Information Intangibility	-0.0186***	-0.0114***	-0.0055**	-0.0045*
	(-3.75)	(-2.69)	(-2.25)	(-1.86)
Size	-0.0094***	-0.0139***	-0.0153***	-0.0153***
	(-20.25)	(-17.78)	(-13.51)	(-13.54)
Market to Book	-0.0005***	-0.0004***	-0.0006***	-0.0006***
	(-4.98)	(-4.04)	(-3.86)	(-3.86)
Breadth of Ownership		0.0610***	0.0364***	0.0365***
		(9.18)	(2.71)	(2.73)
Number of Analysts		-0.0055***	-0.0034**	-0.0033**
		(-5.83)	(-2.36)	(-2.35)
Analyst Dispersion		0.5055***	0.5961***	0.5945***
		(3.56)	(5.03)	(5.04)
Institutional Ownership		-0.0382***	-0.0485***	-0.0486***
		(-12.40)	(-8.83)	(-8.87)
Number of Articles		0.0007**	-0.0003	-0.0001
		(2.20)	(-1.22)	(-0.64)
Article Sentiment		0.0262*	0.0115*	0.0158**
		(1.96)	(1.66)	(2.29)
Observations	789071	722646	722646	722646
Adjusted R^2	0.28	0.36	0.52	0.53
Daily Fixed Effects	Yes	Yes	No	Yes
Quarter Fixed Effects	No	No	Yes	No
Firm Fixed Effects	No	No	Yes	Yes

Appendix 1: Construction of tangibility measures.

We construct two measures of the tangibility of news content. Our main measure, *Information Intangibility*, is based on the ratio of the number of numeric sequences in the article to the number of words in the article as reported by Factiva.[13] A numeric sequence is defined as a sequence of symbols 0-9 (that can also contain . or , inside) bordered by any non-alphanumeric symbol (e.g., /\-?!-%$&*@()[]<>) or a space. In a robustness check, we use a second measure, which counts the ratio of the number of numeric symbols to the total number of symbols in the article. The total number of symbols includes punctuation marks but excludes spaces and tabs.

The following article featuring IBM illustrates the application of our approach to measuring news tangibility. Separate numeric sequences are highlighted.

"*International Business Machines Corp. was again the top winner of patents in the United States in 1998, while six Japanese firms crowded the top 10 list, a U.S. patent research firm reported Sunday. IBM patented 2,682 cases, up 54% from the previous year, to maintain the top notch for the sixth year on end. Software-related technology accounted for more than half, IFI/Plenum Data Corp. said. Canon Inc. ranked second with an outdistanced 1,934 cases, followed by NEC Corp. with 1,632 cases.*

The total number of patents granted in the year surged 32.8% to hit an all-time high of 151,024 cases, IFI/Plenum Data said. Notable was Samsung Electronics Co. of South Korea's giant leap to sixth from 16th place with 1,306 cases, a 2.2-fold increase. Motorola Inc. was fourth with 1,428 cases, followed by Sony Corp. with 1,321 cases. Fujitsu Ltd. ranked seventh with 1,205, leading Toshiba Corp. with 1,194, Eastman Kodak Co. with 1,125 and Mitsubishi Electric Corp. with 1,120. "

This articles has:
Number of numeric symbols = 61
Total number of symbols = 816
Number of numeric sequences = 16
Number of words as reported by Factiva = 199
Tangibility ratio 1 = 61 / 816 = 7.48%
Tangibility ratio 2 = 16 / 199 = 8.04%

[13] We find that Factiva generally overstates the number of words in an article relative to a conventional count (e.g., as given by MS Word). It appears that Factiva also counts words featuring in the header, source, and title description, which we separate from the main text. This bias is consistent across all articles and our results are unchanged if we count words as sequences of characters.

Appendix 2: Examples of articles with distinct tangibility scores

Following are the examples of three articles about the General Motors Corporation of about equal size appearing in the same month (January 1999) and the same source (Reuters Newswires) that fall in the top, middle, and bottom tercile, respectively, by both measures of news tangibility.

Article 1:
Time and date: 12:06, 01/06/1999
Source: Reuters News
Title: GM U.S. December sales post 3.1% gain.

"*General Motors Corp. on Wednesday reported a 3.1 percent increase in total U.S. sales to 407,487 for December, better than analysts expected, but still closed out the year down 3.3 percent.*

GM, Detroit's No. 1 automaker, said monthly car sales, including those of its Saab affiliate, were up 1.9 percent to 216,318. Total truck sales, including medium-duty trucks, were up a surprisingly strong 4.5 percent to 191,169. Analysts had forecast a total decline of as much as 5 percent for December.

GM said its December truck sales, and the 2,150,076 trucks it sold in all of 1998, were both record numbers. Trucks include pickup trucks, sport utilities and minivans. Car sales for the whole year fell 8.6 percent to 2,458,688, in part reflecting two labour strikes in the summer.

Earlier, Toyota Motor Corp., Japan's largest automaker, said its December U.S. vehicle sales jumped 19 percent to 138,720. Sales for all of 1998 hit a record 1,361,025, an increase of 10.6 percent. Toyota's Camry sedan had total 1998 sales of 429,575, making it the best-selling car in the U.S. for the second year in a row.

Honda Motor Co. Ltd. reported a December U.S. vehicle sales gain of 6.3 percent to 83,936. Sales for the year rose 7.4 percent to 1,009,600 units.

On Tuesday, Ford Motor Co. reported light vehicle sales increased 6.8 percent to 320,290. DaimlerChrysler AG said sales for all brands except Mercedes-Benz rose 6.9 percent to 203,325."

This article has:
Tangibility ratio 1 = 112 / 1195 = 9.37%
Tangibility ratio 2 = 28 / 293 = 9.56%

Article 2:

Time and date: 10:35, 01/19/1999

Source: Reuters News

Title: Russian AvtoVAZ carmaker still in talks with GM.

"Russia's largest carmaker AvtoVAZ said Tuesday that revised plans for joint production with General Motors Corp. were still being hammered out since Russia's severe economic crisis took hold last August.

AvtoVAZ's chief engineer Vladimir Presipkinsky told journalists that negotiations were under way on a proposal to organise joint production of the Opel-Astra T3000 in Russia. He said GM subsidiary Adam Opel had proposed that the vehicles be produced using equipment that is to be eliminated from U.S. and European assembly lines by 2005.

Presipkinsky said initial plans called for production of about 150,000 vehicles with output gradually changing over to a Russian model. He said such a joint venture would require equal investments from GM and AvtoVAZ but that a decision on the deal could not be made until a business plan had been completed. "The financial viability of producing such a vehicle in Russia will be the deciding factor," Presipkinsky said.

AvtoVAZ and GM had previously planned kit assembly of Opel vehicles but the start of the crisis last August prompted both parties to rethink the deal, AvtoVAZ officials said. AvtoVAZ is Russia's largest carmaker, but last year saw company output fall from a planned 747,000 units to just 598,000 with 90,000 cars unsold by year's end. Company officials said that in 1999 AvtoVAZ had set its production target at 657,400 cars, including 118,000 for export. Its main marques are the Niva four-wheel drive and the Samara saloon car. "

This article has:

Tangibility ratio 1 = 47 / 1253 = 3.75%

Tangibility ratio 2 = 8 / 268 = 2.99%

Article 3:

Time and date: 18:16, 01/22/1999

Source: Reuters News

Title: GM will introduce parking technology on 2000 DeVille.

"General Motors Corp. said on Friday that it will offer a new type of parking technology on its 2000 model-year Cadillac DeVille cars to help drivers avoid stray shopping carts or other parking hazards.

The ultrasonic rear park assist technology is designed to help drivers park their vehicles while in reverse, using both audio and visual cues that convey the closeness of objects behind the vehicle, GM said in a press release. The visual display uses three light-emitting diodes, working in concert with an audio chime system to alert the driver to potential hazards. It is the second new technology GM will offer on its next-generation full-size Cadillac sedan, following a thermal-imaging night-vision system. "Whereas Night Vision will help drivers see farther ahead than they ever could see with just their headlights, our new Ultrasonic Rear Parking Assist will allow them to 'see' potential obstacles behind them during parking manoeuvres, such as a sign post or a shopping cart," Cadillac general manager John F. Smith said. The parking technology, developed by German electrical engineering group Robert Bosch GmbH , uses four sensors on the car's rear fascia that send out ultrasonic waves when the car is in reverse. The sensors pick up the echo of a signal when it bounces off an object and determines distance to the object. The system only operates at up to three miles an hour."

This article has:

Tangibility ratio 1 = 4 / 1147 = 0.35%

Tangibility ratio 2 = 1 / 257 = 0.39%

Appendix 3: Short sale profitability and news

This table contains the results from daily Fama-Macbeth (1973) regressions with Newey-West (1987) correction that examine how short selling profitability is affected by news coverage. It is mainly meant to replicate the results by Engelberg, Reed and Ringgenberg (2012) with our dataset. The dependent variables are returns on the following 20 and 30 trading days. The explanatory variable of interest is the interaction between Relative Shorting and News Coverage, with is a dummy variable equal to 1 if there was an article for the company on the day. In columns 2 to 4 we use market-adjusted returns, which are raw returns minus the return on the CRSP value-weighted index. T-statistics are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% level, respectively. The sample for this regression consists of news days from January 1999 to December 2008.

	(1) Return t+1 to t+20	(2) Market adj. Return t+1 to t+20	(3) Return t+1 to t+30	(4) Market adj. Return t+1 to t+30
News Coverage * Relative Shorting	-0.0086*	-0.0090*	-0.0098**	-0.0103**
	(-1.81)	(-1.80)	(-2.35)	(-2.29)
News Coverage	0.0005	0.0004	0.0007	0.0005
	(0.37)	(0.29)	(0.45)	(0.29)
Relative Shorting	0.0040	0.0029	0.0132	0.0113
	(0.75)	(0.59)	(1.10)	(1.04)
Size	-0.0139***	-0.0141***	-0.0226***	-0.0227***
	(-4.02)	(-4.02)	(-3.59)	(-3.67)
Market to Book	0.0005	0.0005	0.0006	0.0006
	(1.18)	(1.14)	(0.90)	(0.87)
Return $_{t-1}$	-0.0638*	-0.0654*	-0.0928	-0.0902
	(-1.71)	(-1.72)	(-1.52)	(-1.55)
Return $_{t-2}$	-0.0354	-0.0355	-0.0437	-0.0436
	(-0.94)	(-0.94)	(-0.92)	(-0.95)
Breadth of Ownership	0.1118***	0.1157***	0.1660***	0.1744***
	(3.06)	(3.09)	(2.85)	(2.80)
Number of Analysts	0.0083*	0.0086*	0.0104	0.0108
	(1.72)	(1.69)	(1.53)	(1.51)
Analyst Dispersion	-0.0367	-0.0057	0.3226	0.3892
	(-0.05)	(-0.01)	(0.34)	(0.42)
Institutional Ownership	-0.0112	-0.0122	-0.0231	-0.0245
	(-0.67)	(-0.71)	(-1.01)	(-1.05)
Observations	465144	465144	465114	465114
Newey-West Lags	20	20	30	30