Naked Short Selling: Is it Information-Based Trading?

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Abstract: Citing a widely held belief that naked short selling is not based on company fundamentals, the SEC (2008) has substantially tightened Reg. SHO close-out regulations in an effort to eliminate naked short selling. Contrary to accepted belief, we find that accounting fundamentals are highly significant in explaining naked short sales. Further, naked short sales contain incremental information about future stock prices: Abnormal returns from a long/short trading strategy that buys (sells short) shares with low (high) short interest are more than seven times larger using naked and covered short interest, compared to returns using only covered short interest (15.2 percent vs. 2.1 percent annualized). Our findings show that recent actions by regulators to eliminate naked short sales are likely to impede informed arbitrage and reduce market efficiency.

Keywords: short selling; accounting fundamentals; arbitrage; trading strategies; naked short selling

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1. Introduction

Naked short selling is widely alleged to cause price declines that are not supported by company fundamentals. This belief is held by the SEC (2008) and even by many Wall Street professionals involved in short selling.[1] Importantly, this belief underlies the SEC (2009) statement that, during the recent financial crisis, naked short sellers "may be responsible for the sudden and unexplained price declines of many equity securities." This led the SEC and regulators in other countries to institute bans on naked and/or covered short selling during the 2008-2009 worldwide financial crisis.[2] Despite the widespread criticism and regulatory actions, prior research does not provide evidence on whether naked short sales are information-based. The purpose of this study is to investigate two related research questions. First, we investigate whether naked short sales are based on accounting fundamentals. Second, we investigate whether naked short interest contains information about future returns that is incremental to covered short interest.

"Naked short selling" occurs when shares are sold without borrowing the securities needed for delivery to the buyer. It differs from "covered short selling" in which shares are borrowed and delivered to the buyer on the settlement date, which is generally three days after the trade date. Naked short sales exist because the clearing system allows a sale transaction to occur before the shares are delivered. Putniņš (2010) reports that between 1.5% and 5% of

[1] Before we presented this paper at the Securities Financing Forum in NYC, May 22, 2012, Matt Miller of Bloomberg TV asked the audience whether they believed naked short selling was information-based. Using clickers, a majority said no. The audience comprised representatives of prime brokers, hedge funds and information vendors involved in short selling. This negative response is especially noteworthy because this audience is knowledgeable and supportive of short selling.

[2] Beber and Pagano (2012) separate the short selling bans into naked and/or covered for 20 countries: eight countries banned only naked short selling, six bans affected only covered short selling, and six bans included both naked and covered short selling (see their Figure 2). The bans covered 80 percent of the world's stock capitalization over the eight months beginning with November 2008 (see their Figure 2). Boehmer et al. (2013) also study the bans.

average trading volume on the main U.S. exchanges between 2004 and 2009 involved failures-to-deliver (FTD). An intriguing aspect of naked short selling is that the shares traded do not exist (Christian et al. 2006). Selling "phantom" (paper) shares artificially increases the supply of shares in circulation, allegedly causing a decline in share price (Drummond 2006; SEC 2009). For this reason, naked short selling is commonly labeled as "abusive" by its critics. [3] Plaintiff's lawyers view naked short selling as the "Holy Grail" in that it could provide damage awards "bigger than Tobacco" if proved (Wherry 2003). They claim that naked short selling has caused a thousand companies to lose at least $100 billion in the stock market (Wherry 2003).

The recent financial crises prompted the SEC (2009) to significantly strengthen the "close-out" requirement of Reg. SHO in an effort to eliminate naked short selling. The new rule requires brokers to close-out a short position on the day after the settlement date (commonly referred to as *t+4*, where *t* is the trade date) if the short seller has not borrowed shares for delivery to the buyer. Previously, brokers were not required to close-out a fail-to-deliver position until day *t+13*. The SEC also issued Rule 10b-21 (SEC 2008c), the "Naked" Short Selling Antifraud Rule, which works in conjunction with the new close-out rule by increasing the legal liability of naked short sellers if they deceive brokers about their ability to deliver shares.

To help enforce the new rules and reduce abusive naked short selling, the SEC created an enforcement unit that investigates potential cases of market abuse by short sellers and other investors (SEC 2010). In 2013, the SEC's market abuse unit litigated its first case involving naked short sales and levied significant penalties against an investor that allegedly engaged in abusive naked short sales (Patterson 2013). In addition, the SEC fined the investor's broker and

[3] Patrick Byrne, CEO of Overstock.com is a vocal critic of naked short selling and one of the founders of The National Coalition Against Naked Short Selling. He is quoted by Bethany McLean (2005) as comparing naked short sellers to al Quaeda: "There's no office, no headquarters; it's a splintered group that has learned to operate together." See http://www.overstock.com/naked-short-selling.html for additional comments on naked short selling by Byrne.

the exchange where the trades took place as a penalty for allowing the naked short sales to take place (Patterson 2013).

The belief that naked short sales are not based on company fundamentals contrasts with empirical studies that show *total* short interest is based on fundamentals (Dechow et al. 2001; Drake et al. 2011). An important caveat is that naked short interest comprises only a small portion of total short interest, so prior research effectively studies *covered* short interest. Our study fills a gap in extant research by testing whether naked short selling is based on company fundamentals. We use fail-to-deliver data from 2005 to 2008, collected by the stock exchanges and provided by the SEC under the Freedom of Information Act, to decompose total short interest into naked and covered components. We accomplish this by aligning naked and total short interest in time and calculating covered short interest by subtracting naked short interest from total short interest. Our study is the first to separate total short interest into naked and covered components.

There are several reasons why naked short sales may not be based on accounting fundamentals, even if covered short selling is fundamentals-based. Diamond and Verrecchia (1987) predict that the proportion of uninformed traders increases as the cost of short selling decreases. Naked short sellers have lower costs than covered short sellers because they receive an (involuntary) zero-fee, zero-rebate equity loan from the buyer (Putniņš 2010). The logic of Diamond and Verrecchia (1987) suggests that naked short sellers are potentially less informed than covered short sellers and, thereby, less likely to trade on accounting fundamentals.[4] Second,

[4] Diamond and Verrecchia (1987) develop a rational expectations model to consider the case where a change in short sale constraints increases the costs of borrowing shares. Their model shows that higher costs increase the proportion of relatively informed short sellers within the mix of short sellers. We are using their cost rationale to compare naked short selling, with its relatively low costs, to covered short selling with its higher costs. Although Diamond and Verrecchia's (1987) intuition applies to our analysis, we acknowledge that we are not testing their theory in the context in which it was developed. Kolasinki et al. (2012) have done so and their empirical evidence is generally supportive. (Also note that, in our setting, the higher risk of a forced close-out could offset the advantage

fundamentals-based short sellers could be reluctant to trade naked because they may be unable to hold their positions long enough for financial statement information to be incorporated into share prices. A naked short position is profitable only if the anticipated price decline occurs before the broker closes out the naked position by buying shares in the open market, in order to comply with SEC regulations or due to a short squeeze.[5] Third, naked short interest includes short selling by market makers, primarily for thinly traded stocks. Market makers sell short to provide liquidity rather than because they believe the stock is overvalued based on fundamentals. Finally, as discussed above, regulators believe that naked short selling is not based on company fundamentals. In fact, the SEC strengthened the "close-out" requirement of Reg. SHO, in part, because it believed that naked short selling created a crisis of confidence "even without a fundamental underlying basis" (SEC 2009). For these reasons, the role of company fundamentals in explaining naked short selling is ultimately an empirical question.

To examine whether naked short sales are based on company fundamentals, we regress naked short interest on financial statement fundamentals (and a set of control variables) to determine whether naked short sellers use those data. We use three measures of accounting fundamentals calculated from current and prior period financial statements: the F-Score of Piotroski (2000),[6] capital expenditures and sales growth (Beneish et al. 2001). Control variables are dividend yield, consensus earnings forecast revision, price momentum, and firm size. We

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of the zero-fee, zero-rebate equity loan.)

[5] A broker may buy without client consent in both situations. A short squeeze occurs when buy orders from other investors push up share prices rapidly, forcing short sellers to either put up additional collateral or cover their positions by buying stock (which would further increase prices). As discussed by SEC specialist Jickling (2005), stocks on the "threshold list" (due to a large "fail-to-deliver" position) are vulnerable to a short squeeze. Foust (2005) describes instances where traders have reportedly made large purchases of stocks on the list to trigger a short squeeze. Note that we obtain naked short interest from the "threshold list."

[6] F-Scores have been shown to be useful in predicting future abnormal returns (Piotroski 2000; Piotroski and So 2012), with higher F-Scores indicating improving fundamentals. In an untabulated test, we find that the F-Score is predictive of future returns for our time period and sample of firms.

also estimate a regression with the same independent variables but using covered short interest as the dependent variable. The rationale for each variable is discussed in section 3.

We find that naked short interest is significantly negatively associated with Piotroski's F-Score, which means that naked short positions are lower for firms with positive accounting fundamentals. Naked short interest is significantly positively associated with both capital expenditures and sales growth. Prior research shows that high capital expenditures and high sales growth tend to precede lower future returns. Naked short selling is therefore significantly associated with each of our three measures of accounting fundamentals in the direction indicating proper use of the information. When we regress covered short interest on the same set of explanatory variables, we find that covered short sellers use financial statement information in a manner quite similar to naked shorts. The coefficient on F-Score is again negative and statistically significant; and the coefficients on capital expenditures and sales growth are both positive and statistically significant.

An important finding from prior research is that short interest contains information about future returns, and investors can earn economically significant abnormal returns using a zero-investment trading strategy that mimics short sellers. An advantage of a trading strategy test is that we do not have to specify the nature of the predictive information, so information is not restricted to fundamentals calculated from financial statement information. The strategy is to buy (sell short) companies with low (high) levels of total short interest. Boehmer et al. (2010) shows that significant returns can be earned by trading in companies falling in the top and bottom one (five) percent of the distribution. We examine whether this type of trading strategy can be improved by separating total short interest into its naked and covered components. We first sort companies into quintile levels by the level of covered short interest, and within each quintile we

sort again into quintiles based on levels of naked short interest (i.e., nested sorting). We then investigate a strategy that buys firms in the lowest quintile of both covered and naked short interest and sells short firms in the highest quintile of both covered and naked short interest. The strategy earns an abnormal return of 3.61 percent over the next quarter (15.2 percent annualized), which is roughly seven times greater than the quarterly return of 0.52 percent (2.1 percent annualized) from a strategy that uses only the covered component of short interest. The substantial improvement in returns shows that naked short selling captures important predictive information that is incremental to covered short interest.[7]

Prior research suggests that naked short sales occur for a wide variety of reasons (e.g., Boni 2006). In supplemental analysis, we examine whether naked short sales are based on company fundamentals in cases where naked short sales are most likely to be abusive. Because abusive naked short selling occurs when the availability of shares for borrowing is limited, we use proprietary information to restrict our sample to firm-quarters where firms' shares were difficult to borrow. Our results suggest that naked short selling remains associated with accounting fundamentals even when the naked short sale is likely abusive. This finding is important because it indicates that naked short sales of all types are, on average, based on accounting fundamentals.

This study contributes to the accounting and finance literatures by providing new evidence about information use by short sellers. This topic is important because informed arbitrage by short sellers plays a critical role in efficient capital market theory (Shleifer 2000). Prior literature finds that *total* short interest is significantly associated with accounting

[7] This trading strategy is implementable to an investor in the sense it uses information available when they establish positions. However, the strategy may no longer be profitable due to the substantial reduction in naked short selling under SEC Rule 204 (see Figure 2). In this paper, we use the trading strategy primarily to assess whether naked short selling captures information about future returns that is incremental to that provided by covered short selling and whether that incremental information is large enough to be economically meaningful.

fundamentals shown to be useful in predicting future returns (Drake et al. 2011). Our study extends this finding to the *naked* component of total short interest. Further, by using different measures of accounting fundamentals than prior research, we show the earlier research result is quite robust. Second, prior research calculates abnormal returns from a zero-investment trading strategy to show that short interest incorporates predictive information that is economically significant, not just statistically significant. Using this approach, we find that naked short interest contains predictive information incremental to that in covered short interest.

The results in this study should be of considerable interest to regulators. While we do not attempt to refute the claim that naked short selling can be manipulative in some instances, we find consistent evidence that, on average, naked short selling is a type of information-based trading. This evidence stands in stark contrast to the stated SEC (2008) belief that naked short selling is not based on fundamentals. Hedge fund managers, prime brokers, and other defendants in ongoing litigation will also be interested in our evidence that naked short selling is a type of informed trading. The key issue in ongoing litigation is whether naked short selling constitutes market manipulation (Stokes 2009). The evidence in this study can help defendants establish that naked short selling is not inherently manipulative, as alleged in some lawsuits.

The rest of this paper proceeds as follows: Section 2 reviews SEC regulations and relevant academic literature on naked short selling. Section 3 describes the research methods. Section 4 presents descriptive statistics and the results of univariate statistical tests. Section 5 presents multivariate results. Section 6 provides a brief summary and conclusion.

2. Background and Related Research

Short selling is the sale of a stock that is not owned by the seller. Figure 1 depicts the two types of short sales, covered and naked. In a covered short sale, the short seller borrows shares

from a broker or institutional stock lender and sells the shares on day *t*. On the settlement date, day *t+3*, the short seller delivers the shares to the buyer. In a covered short sale, the short seller generally pays a fee to the lender for the right to borrow the shares and leaves the proceeds of the sale with the broker or institution that lent the stock as collateral for the borrowed shares (Putniņš 2010).[8] In contrast to covered short sales, a naked short sale occurs when the broker allows a short seller to sell shares on day *t* without actually borrowing the shares (Diether and Werner 2009). On the settlement date, day *t+3*, the short seller fails to deliver the shares to the buyer. As a result of the short seller's failure to deliver, a naked short sale involves the sale of shares that do not exist (Christian et al. 2006).

After a naked short sale occurs, the National Securities Clearing Corporation (NSCC), the entity in charge of guaranteeing the completion of broker-to-broker trades that involve equity, issues an IOU to the broker of the purchaser of the shares (Putniņš 2010), which allows the broker to credit the undelivered shares to the purchaser's account.[9] Thus, the purchaser of the shares is not aware that the shares credited to their account do not exist because their brokerage report documents an increase in shares and a related decrease in cash. Although the purchaser is unaware that the shares are not delivered, the purchaser's broker is aware of the fail to deliver and is allowed to force delivery of the shares from the short seller's broker (Evans et al. 2009). However, Boni (2006) finds that brokers rarely force delivery because almost all brokerage firms are responsible for fail to delivers in various stocks and want to maintain goodwill with other brokerage firms in the event that future fail to delivers occur. Because the purchaser of the shares is unaware that the shares have not been delivered and the purchaser's broker is not likely to

[8] The institution or broker is free to invest the proceeds of the sale and generate income. However, brokers or institutions often agree to pay the short seller interest on the proceeds left as collateral to obtain the business of short sellers (Putniņš 2010).

[9] The IOU is technically called a "fail to receive" (Putniņš 2010).

force delivery, a naked short sale creates an involuntary zero-fee, zero-rebate equity loan from the buyer to the short seller (Evans et al. 2009; Putniņš 2010). Thus, relative to a covered short sale, a naked short sale potentially results in significant savings for shares that are difficult or costly to borrow.

Naked short sales occur for a variety of reasons. Diether and Werner (2011) note that many naked short sales are caused by an unintentional error or a delay in the delivery of shares from the short seller's lender. In addition, Boni (2006) suggests that some short sales are initially covered and then fail to deliver (i.e., become naked) when the lender of the shares backs out through no fault of the short seller. However, some naked short sales are intentional. Many naked short sales occur because a security is thinly traded or difficult to borrow, leaving a naked short sale as the primary option (Evans et al. 2009). Finally, as discussed above, the popular press and regulators allege that many naked short sales are intentional and designed to manipulate a firm's stock price downward (Boni 2006).[10] The SEC alleges that naked short sales "may be responsible for the sudden and unexplained price declines of many equity securities. (SEC 2009)"

In response to concerns that naked short sales are manipulative and lack a fundamental basis, the SEC has developed a series of regulations, first to restrict, and more recently, to prohibit all naked short selling. Rule 203 of Reg. SHO (SEC 2004) incorporated the "locate" requirements of the self-regulatory organizations (SRO) into a uniform Commission rule. The compliance date is January 3, 2005, so our sample begins then. Under Rule 203, a broker-dealer is prohibited from accepting a short sale order unless the broker-dealer has (1) borrowed the security, or entered into an arrangement to borrow the security, or (2) has reasonable grounds to

[10] Anecdotal evidence suggests that brokers allow certain clients to engage in naked short sales in an effort to maintain a good business relationship with their larger clients (Weiss 2012).

believe the security can be borrowed. As interpreted in practice, the second provision has left room for naked short selling.

Rule 203 (2004) imposes additional delivery requirements on broker-dealers for securities in which a substantial amount of failures to deliver have occurred ("threshold securities"). A "threshold" security has aggregate fails to deliver of 1) 10,000 shares or more and 2) at least one-half of one percent of the issuer's total shares outstanding. The NYSE, Amex, and NASD calculate and disseminate a list of threshold securities prior to the beginning of each trading day. To be included on the threshold list, a security must meet the requirements for five consecutive settlement days; and the security is removed only when the requirements are not met for five consecutive settlement days. The five-day requirements are designed to capture whether naked short selling is part of the usual pattern of trading in that security. The additional delivery requirement for threshold securities is that brokers and dealers must "close-out" positions (i.e., purchase securities of like kind and quantity) for any FTDs that persist for ten consecutive days after the three-day settlement period (SEC 2004). So that broker-dealers would not have to predict which securities will be on the list, the close-out requirement does not apply to FTD positions established prior to the security's inclusion on the threshold list. (For exceptions and further detail, see SEC 2004).

During the 2008 financial crisis, the SEC amended Reg. SHO in an effort to further restrict naked short selling. Rule 204 of Reg. SHO was a temporary rule issued in October 2008 (known at the time as Rule 204T) and made permanent in 2009 (SEC 2008a, 2009). Rule 204 amends the close out requirement of Reg. SHO to require brokers and dealers to close FTDs on the day after the three-day settlement period. As a result, the close-out period is reduced from ten days to one day, making it much more difficult to intentionally sell naked. The SEC also issued

Rule 10b-21, the "Naked" Short Selling Antifraud Rule in 2008, which makes it illegal for short sellers to deceive brokers and dealers about their intention and ability to deliver securities by the settlement date and then fail to deliver the given securities (SEC 2008b).

Figure 2 reports on the level of naked short interest over the period when compliance with Rule 203 was required, January 1, 2005 through 2009. Examining the time series pattern, naked short interest averages less than 0.04 percent of shares outstanding from January 1, 2005 to January 1, 2007. As the financial crisis deepens, naked short interest reaches a peak slightly above 0.08 percent in mid-2008. The SEC then issues Rule 204 and Rule 10b-21, in an effort to eliminate naked short sales. Figure 2 shows that the new rules accomplish this objective because naked short selling drops to roughly 0.006 percent throughout 2009.

The controversy over naked short selling has triggered research in finance. A key conclusion from this research is that naked short selling does not trigger stock price declines (Fotak et al. 2009; Stone 2010; Boulton and Braga-Alves 2011). In fact, Stone (2010) finds that stocks subject to naked short selling outperform other stocks on the day of the trade. And Fotak et al. (2009), in a study of financial institutions during the 2008 financial crisis, find that naked short sellers generally react to publicly available information, such as credit rating downgrades. They conclude their evidence is consistent with naked short selling reducing positive pricing errors, return volatility, and bid-ask spreads. Our research complements these studies by investigating the nature of the information used by naked short sellers.

3. Research Design

To determine whether naked short sales are based on company fundamentals, we regress naked short interest on financial statement fundamentals and a set of control variables. We use three measures of accounting fundamentals calculated from current and prior-quarter financial

statements: the F-Score of Piotroski (2000), capital expenditures, and sales growth (Beneish et al. 2001). Control variables are price momentum, dividend yield, consensus earnings forecast revision, and firm size. We also estimate the same regression using covered short interest as the dependent variable. Our model follows:

$$\begin{aligned} Short_{i,q} = {} & \alpha_1 + \beta_1 FScore_{i,q-1} + \beta_2 Capex_{i,q-1} + \beta_3 SaleGrow_{i,q-1} + \beta_4 Momentum_{i,q} \\ & + \beta_5 DivYld_{i,q-1} + \beta_6 FREV_{i,q} + \beta_7 Size_{i,q-1} + \Sigma\beta_m Industry_m \\ & + \Sigma\beta_n Year\text{-}Qtr_n + \varepsilon_{i,q} \end{aligned} \quad (1)$$

The dependent variable, *Short*, alternately represents naked short interest (*NakedShort*) and covered short interest (*CoveredShort*) using averages for the current quarter. The three measures of company fundamentals, *FScore*, *Capex*, and *SaleGrow*, are each calculated from financial statements for the preceding quarter. To allow time for short sellers to analyze the financial statement information, the calculation of averages for *NakedShort* and *CoveredShort* begins at least five trading days after the 10-Q is filed for quarter *q-1*. The averages are based on observations through the last day of the current quarter *q*. Consistent with previous studies (Fotak et al. 2009; Devos et al. 2010), we use FTD data from the threshold list and define naked short interest as the number of FTD shares on day *t*, deflated by common shares outstanding (SHROUT) on day *t*. Days within the quarter in which a firm is not on the threshold list are treated as zero. This has the effect of ignoring naked short sales that are not viewed by regulators as material in amount and might be unintentional. We estimate *CoveredShort* by deducting naked short interest from total short interest on the trade date on which total short interest was compiled.[11] We then standardize both *NakedShort* and *CoveredShort* by dividing by their respective standard deviations.[12]

[11] We obtained the settlement dates directly from FINRA, since only current dates remain publicly available.
[12] Inferences remain the same when we estimate equation (1) using the raw values of *NakedShort* and *CoveredShort*.

Our primary measure of company fundamentals is Piotroski's (2000) F-Score (*FScore*), which is designed to provide a composite measure of a firm's financial strength. *FScore* is the sum of nine indicator variables covering three aspects of a firm's financial strength that are commonly evaluated with financial statement analysis: profitability, financial leverage/liquidity, and operating efficiency. Following Piotroski (2000), each "good" signal contributes one point to the overall *FScore*, while a "bad" signal does not contribute any points to the score. As a result, the *FScore* ranges from zero to nine points, with higher values representing firms with stronger fundamentals (Piotroski 2000). Specifically, a firm is given one point for i) a positive return-on-assets (quarterly income before extraordinary items (IBQ) scaled by total assets at the end of the quarter (ATQ)); ii) an increase in return-on-assets; iii) positive operating cash flow (OANCFY scaled by ATQ); iv) negative total accruals (the difference between IBQ and operating cash flow scaled by ATQ); v) a decrease in debt (DLCQ plus DLTTQ scaled by ATQ); vi) an increase in the current ratio (current assets (ACTQ) divided by current liabilities (LCTQ)); vii) not issuing equity during the quarter; viii) an increase in gross margin (gross margin is defined as (SALEQ – COGSQ) divided by total sales (SALEQ)); and ix) an increase in asset turnover (sales (SALEQ) divided by average ATQ). If naked short selling is price manipulation without a fundamental underlying basis, the coefficient on *FScore* would be insignificant. However, to the extent that naked short selling is information-based, the coefficient on *FScore* would be negative and statistically significant.

In addition to a composite measure of accounting fundamentals (*FScore*), we also examine two additional fundamentals that are not included in *FScore*, firms' capital expenditures (*CapEx*) in quarter *q-1* and firms' sales growth (*SaleGrow*) in quarter *q-1*. These measures of fundamentals are especially important for growth firms, and thereby complement Piotroski

(2000) who developed his measure for value firms. Capital expenditures are indicative of projects with uncertain future benefits that potentially cause mispricing if the market does not weigh the future payoffs correctly (Beneish et al. 2001). Consistent with the market overweighting the expected payoffs from capital expenditures, Beneish et al. (2001) find that capital expenditures are associated with lower future returns. We define *CapEx* as the rolling sum of capital expenditures (CAPXY adjusted for each quarter) in the preceding four quarters divided by average total assets. Prior research argues that sales growth is a characteristic of firms that manipulate earnings and thus have deteriorating earnings quality (Abarbanell and Bushee 1998; Beneish 1999; Beneish, Lee, and Nichols 2012; Lev and Thiagarjan 1993). Consistent with this notion, Beneish et al. (2001) find that sales growth is associated with lower future returns. We define *SaleGrow* as the rolling sum of sales (SALEQ) for the preceding four quarters ending at fiscal quarter *q-1* divided by the rolling sum of the preceding four quarters of sales ending in quarter q-5. To the extent that naked short selling is pure price manipulation without fundamental underlying basis, we expect the coefficients on *CapEx* and *SaleGrow* to be insignificant. However, if naked short sales are based on accounting fundamentals, we expect positive and significant coefficients on *CapEx* and *SaleGrow*.

In addition to accounting fundamentals, we also control for additional firm characteristics that naked short sellers are likely to consider. We define *Momentum* as the buy-and-hold raw stock return over the six-month period ending one month prior to the end of quarter *q*. Expecting a continuation of recent price movements has been shown by prior research to be a profitable trading strategy (Jegadeesh and Titman 1993). A negative coefficient would indicate that shorts use this strategy. We also include dividend yield (*DivYld*), calculated as dividends paid per share (DVPSXQ) during quarter *q-1* divided by stock price (PRCCM) at the end of quarter *q-1*. Short

sellers on the date of record are required to pay the dividend to the owner of the shares. Covered short sellers are likely to take smaller positions in firms with a high dividend yield, resulting in a negative coefficient. However, naked shorts have a shorter investment horizon than covered short sellers, so they are more likely to close out their position before the date of record. As a result, the coefficient on *DivYld* could be insignificant or even significantly positive for naked short sales (if shorts trade naked to avoid paying the dividend).

We include analyst forecast revisions (*FREV*) to control for market-related news and changes in expectations about a firm's future performance. We define *FREV* as the change in the analyst consensus earnings forecast for the preceding six-months divided by price at the end of month *m-1*. Bernard and Thomas (1989) and many other papers find that positive analyst forecast revisions are associated with positive future returns, which would suggest a negative coefficient for short sellers. We control for firm size (*Size*) because evidence suggests that short sellers are more likely to trade in smaller firms (Drummond 2006). Size could have more explanatory power for naked short positions because shares of small firms are harder to borrow. We define *Size* as the natural log of a firm's total assets at the end of quarter *q-1*. Finally, we include industry and time fixed effects as additional controls.

4. Data and Descriptive Statistics

4.1 Sample Selection

Table 1 describes how the sample is derived. We begin with firm quarters covered by the intersection of four sources of data: Compustat, CRSP, IBES, and the FTD threshold list. We delete observations from regulated industries, primarily financial services and utilities. We delete observations with missing data that we need to calculate the independent variables, and we eliminate observations when the stock price is equal to or lower than one dollar. We also

eliminate observations with share codes (SHRCD from CRSP) other than 10 or 11. Our last filter restricts the sample period to January 2005 through October 2008, which is the period covered by Rule 203. The final sample consists of 2,710 firms and 27,887 firm-quarters.

4.2 Descriptive Statistics

Table 2 reports the descriptive statistics for the variables used in our analysis. All continuous variables are winsorized at the 1st and 99th percentiles. The quarterly mean (median) of *NakedShort* is 0.00026 (0.00002). *NakedShort* is based on the SEC's threshold list and thereby includes zeros for firm-days that do not meet the criteria for material and potentially abusive trading. Much of the controversy over naked short selling is when shares are sold short even though few, if any, shares are available for loan. Using proprietary data from DataExplorers, we therefore calculate the ratio of naked short interest to the number of shares available to be borrowed (*NakedtoAvail*).[13] We find that the mean of *NakedtoAvail* is sizable at 0.0898, while the median is 0.0037. For *CoveredShort*, we find the mean (median) is 0.0634 (0.0478). These amounts are higher than in earlier studies because short selling has increased with the proliferation of hedge funds.

The mean (median) of *FScore* is 0.0477 (0.050) over the sample period. The closeness of these two measures of central tendency and the symmetry of the quartile values indicate our primary measure of accounting fundamentals has a well-behaved distribution. The mean (median) of *CapEx* is 0.0566 (0.0344), indicating that firms invest a modest portion of their total assets on new assets. The mean (median) of *SaleGrow* is 1.1863 (1.1157), so the sample firms experience considerable growth. The mean (median) of one-quarter-ahead, characteristic-based

[13] We do not calculate the ratio of covered short interest to shares available to be borrowed because the vast majority of listed stocks are relatively easy to borrow (Boehmer et al. 2013).

benchmark returns is -0.0014 (-0.0103).[14] The descriptive statistics of the control variables are similar to prior studies.

Table 3 presents univariate correlations, with Pearson (Spearman) correlations reported above (below) the diagonal. The correlation between *NakedShort* and *CoveredShort* of 0.4737 (0.4089) is significantly positive but well below one (i.e., perfect correlation), indicating a moderate overlap of information. Consistent with naked short sellers trading based on accounting fundamentals, *NakedShort* is significantly negatively correlated with *FScore* and significantly positively correlated with *CapEx* and *SaleGrow*. Providing further (preliminary) evidence that *NakedShort* and *CoveredShort* are a type of information-based trading, each measure is significantly negatively correlated with one-quarter-ahead abnormal returns. Lastly, the correlations of *NakedShort* and *CoveredShort* with the control variables is generally in the direction expected. The coefficient is significantly negative for *Momentum*, *DivYield*, and *FREV*. However, *Size* is less stable with a negative (positive) coefficient using Pearson (Spearman) correlations.

5. Multivariate Analysis Results

5.1 Is Naked Short Interest Information-driven?

Table 4, Panel A presents the results of equation (1) on the determinants of short interest. The first column presents the results for naked short interest, with the results for covered short interest in the second column. We do not report the coefficients for industry and time fixed effects for the sake of brevity. All standard errors are clustered by firm (Gow et al. 2010; Petersen 2009).[15]

[14] Characteristic-based benchmark returns are adjusted for firm size, book-to-market ratio, and momentum. Calculation is based on Daniel, Grinblatt, Titman, and Wermers (1997) (DGTW) and Wermers (2004). The DGTW benchmarks are available via at http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm.

[15] We also conduct robustness tests by clustering on both time and firm (Gow et al. 2010; Petersen 2009), and using

The results in column (1) indicate that naked short sellers use accounting fundamentals. The coefficient on *FScore* is negative and highly significant (*t*-statistic = -7.68), indicating that naked short sellers take smaller positions in firms with strong accounting fundamentals. The coefficients on *CapEx* and *SaleGrow* are both positive and significant (*t*-statistics = 3.43 and 5.74 respectively), indicating that naked short sellers take larger positions in companies with high levels of capital expenditures and sales growth, recognizing that those firms tend to have lower abnormal returns in the future. This evidence strongly refutes the widespread belief that naked short sellers do not trade on company fundamentals.[16]

The coefficients for the control variables are generally consistent with expectations. The coefficient on *Momentum* is negative and significant (*t*-statistic = -2.67), so like long-side investors (Jegadeesh and Titman 1993, 2011), naked short sellers take positions that are profitable if a recent price trend continues. The coefficient on *Size* is also negative and highly significant (*t*-statistic = -12.40), so smaller firms are more likely to be shorted naked. This is likely explained by the greater difficulty locating and borrowing shares in small companies, especially in an over-the-counter market. Finding that *DivYld* is insignificant is also somewhat interesting. It likely indicates that naked short sellers do not intend to hold their position through the dividend record date. Finally, *FREV* has no effect on naked short selling.

To provide a point of comparison for naked short selling and a complete examination of information usage by short sellers, we examine whether covered short sellers trade on the same accounting fundamentals. The results of this analysis are presented in column (2) of Table 4, Panel A. We find that the coefficient on *FScore* is negative and significant (*t*-statistic = -4.29), while the coefficients on *CapEx* and *SaleGrow* are positive and significant (*t*-statistics = 6.65 and

indicator variables to control for industry fixed effects. Inferences remain the same.

[16] Inferences remain the same when *NakedtoAvail* is the dependent variable.

9.02, respectively). Also consistent with naked short selling, the coefficient on *Momentum* is negative and statistically significant (*t*-statistic = -3.49). Two of the control variables have a different influence on covered short sellers than on naked short sellers. First, the coefficient on *DivYld* is negative and significant (*t*-statistics = -2.47), so covered short sellers are less likely to invest in firms that pay a high dividend. Second, firm size is insignificant, so small firms with few shares available for loan are not over represented.

The results reported thus far show that both naked and covered short sales are based significantly on accounting fundamentals. We also examine the association between naked short interest and accounting fundamentals after controlling for the level of covered short interest. If naked and covered short sales are based on the same use of accounting information, the coefficients on our measures of accounting fundamentals will not be statistically significant. The results of this analysis are presented in column (3) of Table 4, Panel A. We find that the coefficient on *FScore*, our primary measure of accounting fundamentals, remains negative and significant (*t*-statistic = -6.46) after controlling for the level of covered short interest. Likewise, we find that the coefficient on *SaleGrow* remains positive and significant (*t*-statistic = 2.82). However, the coefficient on *CapEx* is no longer significant after controlling for the level of covered short interest. In combination, this evidence suggests that naked short sales are based on an interpretation of accounting fundamentals that differs, at least in part, from covered short sellers.

In Panels B and C of Table 4, we examine whether our results are consistent across time periods. The year 2008 is of particular interest because Figure 2 shows that naked short selling increased considerably in this year. In addition, the financial crisis of 2008 led to passage of the much tighter Rule 204 close-out rules. Table 4, Panel B, reports the results with *NakedShort* as

the dependent variable. The annual results are very consistent with those for the aggregate test period. The coefficients on *FScore* are negative and significant each year, and the coefficients on *CapEx* and *SaleGrow* are positive and significant each year. Importantly, even in 2008, when the level of naked short interest doubled, short sellers were trading based on company fundamentals. Table 4, Panel C, presents the regression results when *CoveredShort* is the dependent variable. The coefficients on *FScore* are again negative and significant each year, and the coefficients on *CapEx* and *SaleGrow* are positive and significant in each year.

Overall, the results in Table 4 show that both naked and covered short sales are associated with financial-statement-based accounting fundamentals in a manner that is consistent with information-based trading. This finding contradicts the widely held belief by the SEC and others that naked shorts trade without a "fundamental underlying basis." The only potentially important difference between naked and covered shorts is that smaller companies have more naked short selling while covered short selling does not vary significantly by company size.

5.2 Abnormal Future Returns from a Zero-Investment Trading Strategy

Recent research suggests that total short interest contains information about future returns that investors can use in a zero-investment trading strategy to earn economically significant returns. For example, Boehmer et al. (2010) develop a strategy in which a potential investor buys (sells short) companies with extremely low (high) levels of total short interest. In addition, Drake et al. (2011) develop a zero-investment strategy where a potential investor buys (sells short) firms with sell (buy) analyst recommendations and with low (high) short interest. They sort on quintiles and condition on firms being covered by analysts, so the strategy does not rely on firms with extreme levels of short interest. Trading strategies have become accepted in academic research as a way to investigate whether or not a potential information source, such as short

interest, accruals, etc., has economic significance.

We develop a trading strategy that uses both covered and naked short interest. We first sort companies into quintile levels by the level of covered short interest. Within each quintile, we sort again into quintiles based on levels of naked short interest (nested sorting). We then investigate a zero-investment trading strategy in which a potential investor buys (sells short) firms with the lowest (highest) level of both naked and covered short interest. We compare the returns from this strategy to one that uses only covered short interest, as a way to determine if the fundamentals and other predictive information incorporated into naked short interest is economically important.

Table 5 presents the results of this strategy. The second column reports average abnormal returns when sorting only on covered short interest. The abnormal return from buying shares in the lowest covered short interest quintile is -0.027 percent. In contrast, the abnormal return from buying firms in the highest covered shorts quintile is -0.548 percent. Thus, an investor that buys (sells short) firms with covered short interest in the lowest (highest) quintile earns an average return of 0.521 percent per quarter (2.1 percent annualized). This is not a sizable abnormal return, especially considering that trading costs would further reduce the return.

The third through the fifth columns of Table 5 report abnormal returns for each of the 25 portfolios obtained by sorting on covered and naked short interest. The trading strategy would be to purchase firms in the lowest quintile of both naked and covered short interest (1.081 percent) and sell short firms in the highest quintile of both naked and covered short interest (-2.525 percent). The strategy earns an abnormal return of 3.606 percent over the next quarter (15.2 percent annualized), which is roughly seven times greater than the return of less than one percent (0.521 percent) from using only the covered component of short interest. This test shows that the

information about future returns incorporated into naked short interest is both economically sizable and statistically significant. Because more than 75 percent of the 3.606 percent return from a strategy based on both covered and naked short interest comes from the short side, most of the information in naked short selling is about which companies are overvalued.[17]

5.3 Use of Accounting Fundamentals when Naked Short Selling is Abusive

The results in Tables 4 and 5 show that (1) naked short sales are based on accounting fundamentals and (2) naked short sales provide incremental information about future returns, relative to covered short sales. However, as discussed earlier, naked short sales are sometimes unintentionally caused by errors or because the lender backs out of the agreement to loan shares. The latter includes instances when the lender recalls previously loaned securities. Consequently, a portion of naked short sales can be viewed as a variation of covered short sales with an unintentional fail-to-deliver. We therefore replicate our main analysis on two subsamples, referred to simply as "less abusive" and "more abusive." To obtain subsamples, we use proprietary data on the number shares available for borrowing from DataExplorers to calculate the ratio of naked short interest to the number of shares available for borrowing (*NakedtoAvail*).[18] Because naked short selling is most likely to be abusive when shares are difficult to borrow, we designate firm quarters as "more abusive" when the firm is in the top quintile of *NakedtoAvail* in a given year-quarter. All other firm quarters are considered to be "less abusive." This test is quite conservative since only trading considered to be abusive is

[17] We also examined returns from a strategy that sorts first on the level of naked short and then on the level of covered short interest. The abnormal return from short selling firms in the highest quintile of naked short interest and buying firms in the lowest quintile of naked short interest is 2.23 percent per quarter. By comparison, the abnormal return from buying (short selling) firms in the lowest (highest) quintile of both naked and covered short interest is 2.76 percent for the quarter. Although this supplemental analysis provides confirming evidence, using naked short interest as the second sorting factor, as in Table 5, is more consistent with regulator efforts to eliminate naked short selling.

[18] Due to differences in coverage between DataExplorers and Compustat, our sample decreases from 27,887 year-quarter observations to 14,239 year-quarter observations. Previously reported inferences remain the same using this reduced sample.

reported on the SEC threshold list.

Table 6 presents the results of this analysis. Columns (1) and (2) show the results for naked and covered short sales during firm-quarters in which naked short sales are less abusive. Consistent with our main analysis, we find that both naked and covered short sales are associated with accounting fundamentals in a manner that suggests proper use of information. Column (3) presents the results for naked short sales during firm-quarters where the naked short sales are most likely to be abusive. The coefficient on *FScore* remains negative and significant while the coefficients on *CapEx* and *SaleGrow* remain positive and significant. In addition, the coefficients on the accounting fundamental measures are much larger in the more abuse sample relative to the less abuse sample. Next, we use only the covered short interest for firm-quarters in the more abusive subsample. Importantly, the coefficient on *FScore*, our primary measure of fundamentals, is not statistically significant. The coefficients on *CapEx* and *SaleGrow* remain positive and significant. Thus, for short selling to completely reflect accounting fundamentals, naked short selling is needed. In sum, analyses of a subsample chosen to increase expected abuse provides especially strong evidence that naked short sales are based on accounting fundamentals.

5.4 Days a Firm Appears on the Threshold List

An alternative measure of which stocks are subjected to potentially abusive naked short selling is the number of days that the firm appears on the threshold list. In Table 7, we use the number of days (*Onlist*) as the dependent variable in a truncated negative binomial regression. The objective is to determine if company fundamentals explain the length of time a firm has substantial naked short selling. The explanatory variables are from equation (1) and have been previously used in Table 4 to explain the magnitude of naked short interest. Consistent with the Table 4 results, we find strong evidence confirming the use of company fundamentals by naked

short sellers. The coefficient on *FScore* is highly significant (*z*-statistic = -6.70), with the negative coefficient indicating that firms with strong accounting fundamentals appear on the list for fewer days. The coefficients on *CapEx* and *SaleGrow* are both positive and significant (*z*-statistics = 2.98 and 3.05 respectively), indicating that companies with high levels of capital expenditures and sales growth appear on the list for a longer time. The control variables, *Momentum* and *Size*, are both significantly negative as in Table 4. The only difference is that a revision in the consensus analyst earnings forecast over the preceding six months is now statistically significant. The sign is negative, so companies remain on the threshold list longer when analysts revise downward their earnings forecast. To summarize, the results reported on Table 7 provide additional evidence refuting the widespread belief that naked short sellers do not trade on company fundamentals.

5.5 Robustness Tests

The time series presentation of naked short interest in Figure 2 shows that naked short selling increased dramatically in 2008. While Table 4, Panel B, reports that results for 2008 are very similar to the aggregate test period, as an additional test we replicate our analysis using firm-quarters from 2005 to 2007. Inferences remain the same.

The threshold list reports naked short interest that exceeds 10,000 shares and one-half of one percent of the issuer's total shares outstanding. To examine the effect of raising the standard to provide additional assurance that naked short interest is primarily intentional, we estimate equation (1) with a cut-off of 20,000 shares, and the results are very similar to those reported on Table 4.

NakedShort and *CoveredShort* are both calculated as the average short interest for the period from five business days after the last 10-K and 10-Q filing to the end of the current

quarter. This measure allows time for short sellers to analyze the financial statements. However, it assumes that short sellers do not obtain information about operations in the current (ongoing) quarter before firms file their financial reports. Because it is possible that naked and covered short sellers obtain some information while the quarter is ongoing, we construct two alternative specifications of naked and covered short interest. In the first, we measure naked (covered) short interest as the average naked (covered) short interest over the last month of the quarter, rather than after the quarter's results are reported. Inferences remain the same. The second specification measures naked (covered) short interest as the average naked (covered) short interest over the entirety of the quarter. This specification assumes that short sellers obtain information from management forecasts, analyst forecasts and recommendation revisions. Inferences remain the same.

Our final test ranks the naked and covered short interest data by deciles, and then uses decile ranks as the dependent variable. Inferences do not change, except that both dividend yield and momentum are no longer significant in the naked short interest regression.

6. Conclusion

In response to concerns that naked short selling manipulates stock prices without a fundamental underlying basis, the SEC issued Rule 204 to ban naked short selling (with enforcement beginning in 2009). This study investigates whether naked short sales prior to the ban, from 2005 to 2008, are based on accounting fundamentals. We use fail-to-deliver data made available by the SEC to decompose total short interest into naked and covered components. To our knowledge, we are the first to use this decomposition.

Our findings indicate that accounting fundamentals are highly influential in naked short selling. Specifically, we find that naked short interest is significantly associated with each of our

three measures of accounting fundamentals (Piotroski's F-Score, capital expenditures, and sales growth) in the direction indicating proper use of the information. We also find that naked short sellers are able to identify firms that will experience poor stock returns in the next quarter. This evidence is obtained from a zero-investment trading strategy that buys (sells short) shares with low (high) levels of both covered and naked short interest. The abnormal returns are about seven times larger than using only covered short interest.

While we do not attempt to refute the claim that naked short selling can be manipulative in some instances, we find consistent evidence across a range of tests that, on average, naked short selling is a type of information-based trading. This evidence is in stark contrast to the stated assumptions underlying the SEC's passage of Rule 204, which requires that brokers close-out any naked positions immediately after the settlement date. By showing that naked short selling is not inherently abusive (on average), the evidence could also be important to hedge fund managers, prime brokers, and other defendants in ongoing litigation alleging that naked short selling constitutes market manipulation (Stokes 2009). Lastly, the widespread belief that naked short selling is not information-based trading led to short selling bans in several countries (Beber and Pagano 2012). Our sample consists entirely of U.S. companies, so one direction for future research would be to provide similar analyses of naked short selling in other countries.

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FIGURE 1

Covered Short Selling vs. Naked Short Selling

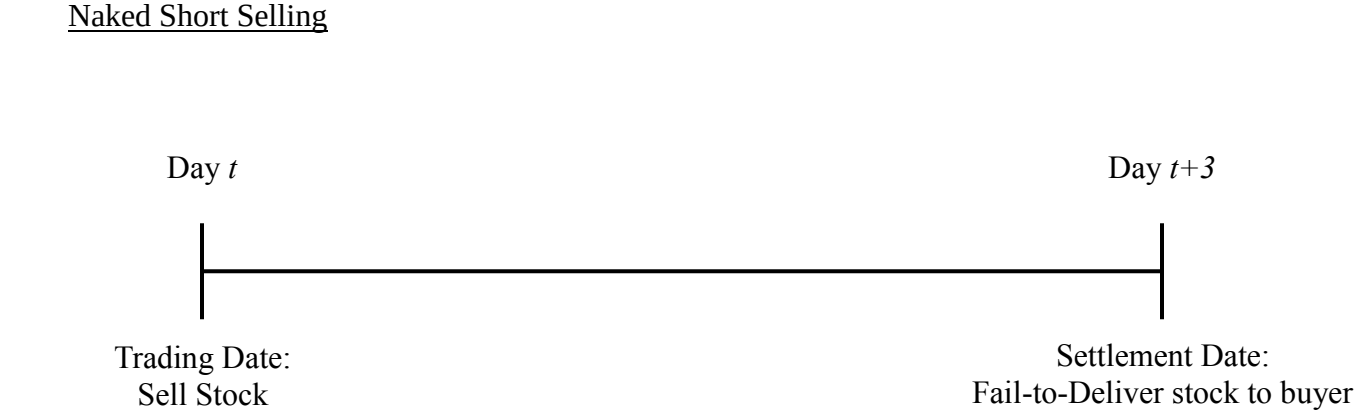

FIGURE 2
Time Series for Naked Short Selling

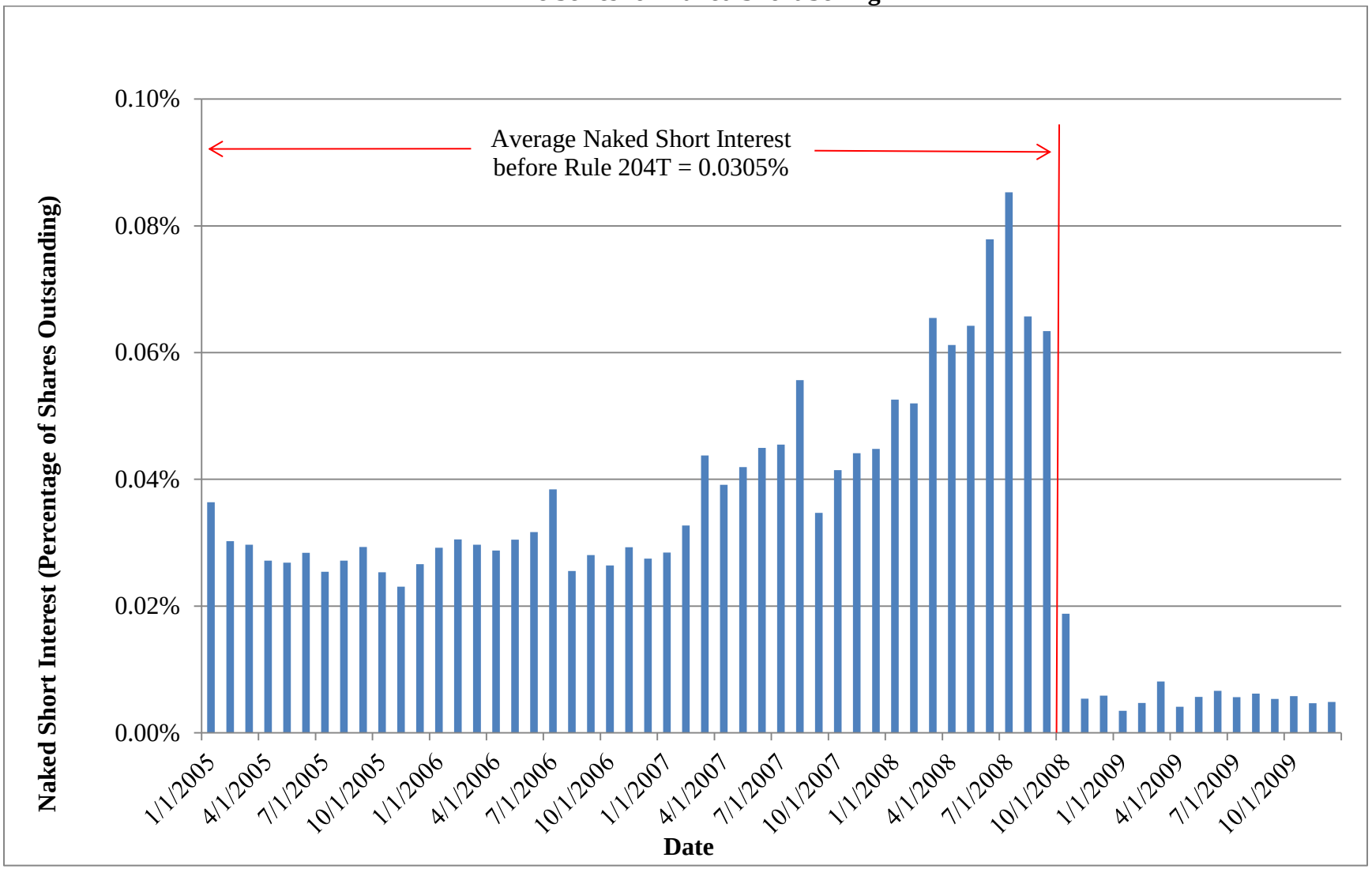

TABLE 1
Sample Selection

	Number of Firms	Number of Firm-Quarter Observations
Firm-quarters with data from Compustat/CRSP/IBES/Threshold List	13,604	173,856
Less: Observations in the financial services industry and other regulated industries	(3,292)	(47,526)
Less: Observations missing variables needed for analysis	(7,035)	(69,863)
Less: Observations with stock price less than or equal to $1.00	(45)	(1,207)
Less: Observations before January 2005 and after October 2008	(522)	(27,373)
Final sample	2,710	27,887

TABLE 2
Descriptive Statistics

			Percentiles		
Variable	**Observations**	**Mean**	**25th**	**50th**	**75th**
$NakedShort_q$	27,887	0.00026	0.00000	0.00002	0.00012
$NakedtoAvail_q$	14,239	0.08982	0.00121	0.00372	0.01488
$CoveredShort_q$	27,887	0.06341	0.02076	0.04783	0.08739
$FScore_{q-1}$	27,887	0.04772	0.04000	0.05000	0.06000
$CapEx_{q-1}$	27,887	0.05658	0.01846	0.03430	0.06501
$SaleGrow_{q-1}$	27,887	1.18631	1.03054	1.11570	1.24649
$Momentum_q$	27,887	0.04237	-0.13689	0.02469	0.18938
$DivYld_{q-1}$	27,887	0.00142	0.00000	0.00000	0.00191
$FREV_q$	27,887	-0.01192	-0.01217	-0.00090	0.00322
$Size_{q-1}$	27,887	6.47955	5.21829	6.39751	7.58974
$AbReturn_{q+1}$	26,726	-0.00140	-0.12120	-0.01030	0.10430

*We winsorize (reset) all variables at the 1st and 99th percentile.
$NakedShort_q$ = Average daily naked short interest for the time period from five business days after a company files its 10K or 10Q to the end of the next quarter. Naked short interest is calculated as the number of failed-to-deliver (FTD) shares deflated by shares outstanding (SHROUT). FTD shares data are acquired from the SEC based on the Freedom of Information Act.
$NakedtoAvail_q$ = Ratio of failed-to-deliver (FTD) shares to shares available for borrowing. The data on shares available to be borrowed is from DataExplorers.
$CoveredShort_q$ = Average covered short interest for the time period from five business days after a company files its 10K or 10Q to the end of the next quarter. It is estimated by subtracting naked short interest from total short interest. Total short interest is the short interest ratio, calculated as short interest (SHORTINT) divided by common shares outstanding (SHROUT).
$FScore_{q-1}$ = Piotroski's (2000) F-Score calculated for fiscal quarter t-1 deflated by 100. FScore is a composite measure of nine variables, where each variable is converted to a zero or one: Return-on-Assets (ROA), Change in ROA, Operating Cash Flow (OANCFY) scaled by total assets (ATQ), Total Accrual scaled by ATQ, Change in Debt (DLCQ+DLTTQ scaled by ATQ), Change in Liquidity (Current Ratio), Equity Offer (a binary variable, equal to 1 if the firm does not issue new stock during the quarter and 0 otherwise), Change in Gross Margin Ratio, and Change in Asset Turnover Ratio.
$CapEx_{q-1}$ = Capital expenditures, calculated as the rolling sum of capital expenditures (CAPXY) for the preceding four quarters ending at fiscal quarter *q-1* divided by average total assets.
$SaleGrow_{q-1}$ = Sales growth, calculated as the rolling sum of sales (SALEQ) for the preceding four quarters ending at fiscal quarter *q-1* divided by the rolling sum of sales for the preceding four quarters ending on quarter *q-5*.
$DivYld_{q-1}$ = Dividend yield, equal to dividends per share (DVPSXQ) for quarter *q-1*, divided by stock price (PRCCM) at the end of quarter *q-1*.
$FREV_q$ = Forecast revision, calculated as the change in the analyst consensus earnings forecast for the preceding six-months divided by price at the end of month *m-1*.
$Momentum_q$ = Stock momentum, equal to the buy-and-hold raw stock return for the six-month period ending one month prior to the end of quarter *q*.
Size = Natural log of total assets (ATQ) at the end of quarter *q-1*.
$AbReturn_{q+1}$ = Characteristic-based, benchmark-adjusted, buy-and-hold returns for quarter *q+1*, calculated based on Daniel et al. (1997) and Wermers (2004).

TABLE 3
Pearson and Spearman Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) $NakedShort_{q}$		**0.4737**	**-0.1233**	**0.0627**	**0.1071**	**-0.0675**	**-0.0238**	**-0.0524**	**-0.1655**	**-0.0281**
(2) $CoveredShort_{q}$	**0.4089**		**-0.0677**	**0.1082**	**0.1071**	**-0.0735**	**-0.0476**	**-0.0321**	**-0.0523**	**-0.0266**
(3) $FScore_{q-1}$	**-0.0625**	**-0.0466**		**0.0478**	**-0.0277**	**0.1949**	**0.0821**	**0.1786**	**0.2531**	**0.0202**
(4) $CapEx_{q-1}$	**0.0655**	**0.0914**	**0.0905**		**0.0929**	**0.0201**	**-0.0422**	0.0095	**0.0699**	0.0001
(5) $SaleGrow_{q-1}$	**0.0935**	**0.1199**	**0.0543**	**0.0857**		**0.0547**	**-0.1237**	**0.0510**	**-0.1109**	-0.0110
(6) $Momentum_{q}$	**-0.0241**	**-0.0630**	**0.2107**	**0.0304**	**0.1124**		**-0.0350**	**0.2611**	**0.0404**	**0.0319**
(7) $DivYld_{q-1}$	**-0.0577**	**-0.1038**	**0.1338**	**0.1112**	**-0.1442**	**0.0328**		**0.0284**	**0.3115**	0.0000
(8) $FREV_{q}$	**-0.0349**	**-0.0659**	**0.2360**	-0.0106	**0.1967**	**0.4694**	**0.0595**		**0.1152**	**0.0692**
(9) $Size_{q-1}$	**0.0190**	**0.0275**	**0.2529**	**0.1746**	**-0.0465**	**0.0905**	**0.4455**	**0.1484**		**0.0245**
(10) $AbReturn_{q+1}$	**-0.0213**	**-0.0235**	**0.0233**	**0.0156**	0.0116	**0.0332**	**0.0294**	**0.0416**	**0.0527**	

*Pearson (Spearman) coefficients are above (below) the diagonal
*Bolded coefficients are significant at $p < 0.05$ (two-tailed test)
*Variables are defined in Table 2.

TABLE 4
The Effect of Accounting and Market Information on Naked Short Interest and Covered Short Interest

Panel A: Full Sample

Variable[a]	Predicted Sign	(1) $NakedShort_q$ Coefficient (*t*-statistic)[b]	(2) $CoveredShort_q$ Coefficient (*t*-statistic)[b]	(3) $NakedShort_q$ Coefficient (*t*-statistic)[b]
Intercept	?	0.269‡	1.163*	0.131‡
		(4.62)	*(1.70)*	*(3.35)*
Accounting Fundamentals				
$FScore_{q-1}$	?	-0.920‡	-1.966‡	-0.688‡
		(-7.68)	*(-4.29)*	*(-6.46)*
$CapEx_{q-1}$	?	0.351‡	2.306‡	0.079
		(3.43)	*(6.65)*	*(0.88)*
$SaleGrow_{q-1}$	?	0.068‡	0.309‡	0.032‡
		(5.74)	*(9.02)*	*(2.82)*
Control Variables				
$Momentum_q$	-	-0.025‡	-0.097‡	-0.014
		(-2.67)	*(-3.49)*	*(-1.62)*
$DivYld_{q-1}$	-	1.403	-12.571†	2.891‡
		(1.22)	*(-2.47)*	*(3.01)*
$FREV_q$	-	-0.035	-0.118	-0.021
		(-0.59)	*(-0.54)*	*(-0.36)*
$Size_{q-1}$	-	-0.025‡	-0.015	-0.023‡
		(-12.40)	*(-1.48)*	*(-12.85)*
$CoveredShort_q$				0.118‡
				(19.29)
Industry Fixed Effects		YES	YES	YES
Year-Quarter Fixed Effects		YES	YES	YES
Observations		27,887	27,887	27,887
Adj. R^2		0.069	0.074	0.238

*, †, and ‡ indicates statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tailed test.

[a] $NakedShort_q$ and $CoveredShort_q$ are normalized by dividing each variable by its own standard deviation. All other variables are defined in Table 2.

[b] Standard errors are clustered by firm (Gow et al. 2010; Petersen 2009).

Panel B: Influence of Accounting Fundamentals on Naked Short Interest on an Annual Basis

Variable[a]	Predicted Sign	2005 Coefficient (*t*-statistic)[b]	2006 Coefficient (*t*-statistic)[b]	2007 Coefficient (*t*-statistic)[b]	2008 Coefficient (*t*-statistic)[b]
$FScore_{q-1}$	?	-0.889‡	-0.745‡	-1.040‡	-0.881‡
		(-3.85)	*(-4.53)*	*(-5.37)*	*(-3.71)*
$CapEx_{q-1}$	?	0.338†	0.272†	0.307†	0.539‡
		(2.22)	*(2.30)*	*(2.48)*	*(3.21)*
$SaleGrow_{q-1}$	?	0.076‡	0.058‡	0.063‡	0.088‡
		(3.57)	*(3.15)*	*(3.18)*	*(4.08)*
Control Variables		YES	YES	YES	YES
Industry Fixed Effects		YES	YES	YES	YES
Year-Quarter Fixed Effects		YES	YES	YES	YES
Observations		6,546	7,885	7,818	5,638
Adj. R^2		0.078	0.077	0.071	0.084

*, †, and ‡ indicates statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tailed test.
[a] $NakedShort_q$ (the dependent variable) is normalized by dividing by its own standard deviation. All other variables are defined in Table 2.
[b] Standard errors are clustered by firm (Gow et al. 2010; Petersen 2009).

Panel C: Influence of Accounting Fundamentals on Covered Short Interest on an Annual Basis

Variable[a]	Predicted Sign	2005 Coefficient (*t*-statistic)[b]	2006 Coefficient (*t*-statistic)[b]	2007 Coefficient (*t*-statistic)[b]	2008 Coefficient (*t*-statistic)[b]
$FScore_{q-1}$	?	-1.664†	-1.488†	-2.079‡	-2.416‡
		(-2.23)	*(-2.23)*	*(-2.94)*	*(-3.13)*
$CapEx_{q-1}$	?	2.374‡	2.765‡	2.326‡	1.859‡
		(4.71)	*(5.90)*	*(5.61)*	*(4.18)*
$SaleGrow_{q-1}$	?	0.331‡	0.402‡	0.259‡	0.233‡
		(5.64)	*(7.43)*	*(4.68)*	*(4.01)*
Control Variables		YES	YES	YES	YES
Industry Fixed Effects		YES	YES	YES	YES
Year-Quarter Fixed Effects		YES	YES	YES	YES
Observations		6,546	7,885	7,818	5,638
Adj. R^2		0.079	0.090	0.074	0.070

*, †, and ‡ indicates statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tailed test.
[a] $CoveredShort_q$ (the dependent variable) is normalized by dividing by its own standard deviation. All other variables are defined in Table 2.
[b] Standard errors are clustered by firm (Gow et al. 2010; Petersen 2009).

TABLE 5
One-Quarter Ahead Abnormal Returns Based on Zero-Investment Trading Strategy

		Using Naked Short Interest to Sort Each Covered Short Interest Quintile into Finder Quintiles (i.e., Nested Sorting)				
Covered Short Interest Quintiles	**Sorting by Covered Short Interest**	**Lowest Quintile**	**2nd Quintile**	**3rd Quintile**	**4th Quintile**	**Highest Quintile**
Lowest Quintile	-0.027% *(3,499)*	1.081%† *(722)*	0.951%* *(716)*	-0.042% *(708)*	-0.173% *(693)*	-2.130%† *(660)*
2nd Quintile	0.530%* *(3,520)*	0.719% *(719)*	1.590%† *(716)*	0.220% *(713)*	0.210% *(703)*	-0.140% *(669)*
3rd Quintile	-0.141% *(3,514)*	0.334% *(706)*	1.556%† *(707)*	0.415% *(718)*	-0.614% *(703)*	-2.496%‡ *(680)*
4th Quintile	-0.003% *(3,474)*	0.194% *(715)*	0.652% *(708)*	-0.418% *(692)*	-0.198% *(692)*	-0.276% *(667)*
Highest Quintile	-0.548% *(3,485)*	0.817% *(699)*	-0.382% *(703)*	-0.370% *(696)*	-0.203% *(666)*	-2.525%‡ *(721)*

Quarterly Trading Returns from Buying Companies in Lowest Short Interest Quintile and Short Selling Companies in Highest Short Interest Quintile

Using Covered Short Interest	Using Covered and Naked Short Interest
-0.027% - (-0.548%) = 0.521%	1.081% - (-2.525%) = 3.606%‡

*, †, and ‡ indicates statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tailed test. Number of observations is reported in parentheses and italics.
All variables are defined in Table 2.

TABLE 6
Effect of Accounting Fundamentals When
Naked Short Selling is More Abusive

		Less Abuse Subsample[a]		More Abuse Subsample[a]	
Variable[b]	**Predicted Sign**	**(1) $NakedShort_q$ Coefficient (*t*-statistic)[c]**	**(2) $CoveredShort_q$ Coefficient (*t*-statistic)[c]**	**(3) $NakedShort_q$ Coefficient (*t*-statistic)[c]**	**(4) $CoveredShort_q$ Coefficient (*t*-statistic)[c]**
Intercept	?	0.217‡	2.152‡	0.385‡	1.337‡
		(4.30)	*(3.92)*	*(3.16)*	*(2.62)*
Accounting Fundamentals					
$FScore_{q-1}$	?	-0.266‡	-1.962‡	-1.825‡	-0.658
		(-4.31)	*(-3.61)*	*(-2.90)*	*(-0.39)*
$CapEx_{q-1}$	?	0.090†	1.814‡	0.782†	2.499‡
		(2.46)	*(4.32)*	*(2.22)*	*(3.50)*
$SaleGrow_{q-1}$	?	0.025‡	0.290‡	0.063†	0.137†
		(3.69)	*(5.68)*	*(2.06)*	*(2.01)*
Control Variables					
$Momentum_q$	-	-0.006	-0.066*	-0.039	-0.276‡
		(-1.10)	*(-1.70)*	*(-1.24)*	*(-3.61)*
$DivYld_{q-1}$	-	-0.218	-15.263‡	4.888	-3.717
		(-0.51)	*(-2.93)*	*(1.06)*	*(-0.21)*
$FREV_q$	-	-0.178‡	-0.367	-0.194	0.745
		(-3.26)	*(-0.71)*	*(-0.82)*	*(1.55)*
$Size_{q-1}$	-	-0.014‡	-0.163‡	-0.014	0.178‡
		(-15.46)	*(-14.93)*	*(-1.32)*	*(4.27)*
Industry Fixed Effects		YES	YES	YES	YES
Year-Quarter Fixed Effects		YES	YES	YES	YES
Observations		11,468	11,468	2,861	2,861
Adj. R^2		0.124	0.187	0.104	0.149

*, †, and ‡ indicates statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tailed test.

[a] Naked short sales are classified as more abusive when *NakedtoAvail* falls within the top quintile for a given year-quarter combination. All other firm-quarters are classified as less abusive. We use the expression "abusive" for both subsamples because naked short sales are reported on the threshold list only when it meets SEC criteria for potentially abusive short selling.

[b] $NakedShort_q$ and $CoveredShort_q$ are normalized by dividing each variable by its own standard deviation. All other variables are defined in Table 2.

[c] Standard errors are clustered by firm (Gow et al. 2010; Petersen 2009).

TABLE 7
Using Number of Days a Firm Appears on the Threshold List
As Measure of Naked Short Selling

Variable[a]	Predicted Sign	Onlist Coefficient (*z*-statistic)[b]
Intercept	?	4.011‡
		(10.51)
$FScore_{q-1}$	?	-3.373‡
		(-6.70)
$CapEx_{q-1}$	?	0.656‡
		(2.98)
$SaleGrow_{q-1}$	?	0.067‡
		(3.05)
$Momentum_{q}$	?	-0.128‡
		(-4.83)
$DivYld_{q-1}$	?	2.84
		(0.63)
$Frev_{q}$	?	-0.759‡
		(-3.87)
$Size_{q-1}$	?	-0.104‡
		(-11.42)
Industry Fixed Effects		Yes
Year-Quarter Fixed Effects		Yes
Observations		8,340

The statistical model is a truncated negative binominal regression. *, †, and ‡ indicates statistical significance at the 10%, 5% and 1% levels, respectively, using a two-tailed test.

[a] *Onlist*, is the number of days during the quarter on the threshold list of firms with substantial fails-to-deliver. All other variables are defined in Table 2.

[b] Standard errors are clustered by firm (Gow et al. 2010; Petersen 2009).