# Does short seller informativeness extend to trading halts?

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**ABSTRACT**:

This research builds upon previous findings regarding the impact of trading halts on market quality and the informativeness of short sellers. Short selling activity surrounding trading halts is examined to determine whether informed short sellers alter their trading patterns prior to and/or following a trading halt by changing the number, size, and/or total volume of short transactions they execute on halted stocks.

Results indicate that short sellers significantly modify their behavior surrounding trading halts, as most metrics used to measure short selling demonstrate substantial increases on the event day, upon the resumption of trading. In addition, average trade size, number of trades and volume for short transactions, short interest ratio and abnormal short selling all decrease markedly in the post-event period.

This investigation contributes to microstructure literature by addressing the impact of short sales and trading halts together. Trading halts occur frequently in current financial markets. Documenting the presence and the impact of short selling surrounding interruptions in trading has important implications for individuals and institutions trading in the markets and for those providing regulatory oversight.

Keywords: trading halts, short selling, market quality, informativeness, asymmetric information

## INTRODUCTION

This study examines short selling activity surrounding trading halts to determine whether informed short sellers alter their trading patterns prior to and/or following a trading halt by changing the number, size, and/or total volume of short transactions they execute on halted stocks.

This investigation contributes to microstructure literature by addressing the impact of short sales and trading halts together. Its intent is to determine how these two trading mechanisms interact and whether short sellers appreciably contribute to the impact on security prices for firms experiencing a trading halt. Trading halts occur frequently in current financial markets. Documenting the presence and the impact of short selling surrounding interruptions in trading has important implications for individuals and institutions trading in the markets and for those providing regulatory oversight.

## TRADING INTERRUPTIONS

Major financial markets throughout the world have regulations that suspend trading under specific, pre-specified circumstances. Kim and Yang (2004) categorize these trading interruptions as either 1) price limits, which are triggered when security prices impede upon boundaries established by market regulators, 2) firm-specific trading halts that are implemented to stop trading on an individual security for a predetermined period or 3) market-wide circuit breakers that halt trading on the entire market when a designated index breaches a pre-specified level.

Firm specific trading halts are further classified according to their underlying cause; they can be either news-related or they can occur due to order imbalances. An order imbalance trading halt is instigated when an exchange specialist observes a large imbalance between buy and sell orders. Exchange officials trigger a news-related trading halt when an information release is expected to have or demonstrates a significant impact on security prices.

News-related trading halts, the focus of this investigation, are implemented to ensure that new information is disseminated equally among market participants and to allow participants the time necessary to gauge the impact of the news.[1] Hauser, Kedar-Levy, Pilo, and Shurki (2006 page 83) state, “Trading halts are aimed at reducing information asymmetry by granting investors the opportunity to reassess trades upon arrival of new, substantial information.”

The foundation of this investigation into the interaction between short-selling and news-related trading halts relies on previous research findings. These include the informativeness of short sales, the presence of asymmetric information surrounding the declaration of trading halts, and the increase in trading activity by investors prior to interruptions in trading (the magnet effect).

## INFORMATIVENESS OF SHORT SELLERS

Research shows that short sellers are informed, and it demonstrates that they have the

[1] Trading halt discussion condensed from information contained on NASDAQ website at http://www.nasdaq.com/about/marketwatch_faq.stm and SEC website at http://www.sec.gov/answers/tradinghalt.htm

ability to earn abnormal returns in environments with elevated levels of information asymmetry.[2] The foundation for this view rests upon the work of Miller (1977). He purports that in the presence of short sale constraints, security prices tend to reflect a more optimistic valuation than the average opinion of potential investors and thus prices tend to be biased upward. It follows from Miller's work that short sellers possess superior private information if their absence in the market or their restricted ability to trade leads to overvalued security prices.

The rationale that short sellers are informed can also be justified by the heightened risk-return profile of a short position (potentially unlimited losses) and the additional transaction costs associated with shorting. For instance, Geczy, Musto, and Reed (2002 page 242) state, "… short positions can be expensive or impossible and can be involuntarily terminated." Dechow, Hutton, Meulbroek, and Sloan (2001) purport that short sellers will trade only if they anticipate that their superior knowledge will lead to gains that will compensate them for bearing elevated risk and costs.

Short sellers are cross-sectionally more informed; this allows them to earn abnormal returns by identifying and then short selling overpriced stocks and covering their position when the prices on these securities drop. We suggest that the informational advantage of short sellers extends to trading halts; our research intent is to determine whether short sellers use this advantage to profit in the marketplace surrounding interruptions in trading.

Three empirical studies have particular significance for our investigation of short seller behavior surrounding trading halts. In the first, Cohen, Diether, and Malloy (2007), examine the relation between changes in the supply and demand for shorting and stock prices and find that shorting demand is an important predictor of future stock returns. Particularly important for our examination of shorting in markets with high asymmetric information, their results are stronger in trading environments with impeded public information flow.

In the second, Christophe, Ferri, and Angel (2004), investigate short-selling activity prior to earnings announcements to determine if it differs from short selling during periods without an imminent announcement. They find evidence of short seller informativeness through a significant negative relation between pre-announcement short selling and post-announcement stock prices. Additionally, they find that short selling does not increase across all firms, which implies that short sellers are acting on firm-specific information. This result is essential to our research – if short sellers' superior information pertains to specific firms, we can link short seller behavior to firm-specific trading halts.

In the third, Angel, Christophe, and Ferri (2003) provide a connection between short seller behavior and volatile trading environments when they find that short selling is highest for high volatility stocks and that as volatility decreases short selling declines monotonically. These researchers suggest that public revelation of the negative information short sellers possess leads to an eventual drop in stock price; high levels of short selling therefore precede future price declines and increased volatility. This research also provides additional support for the notion that short sellers target specific firms during selected intervals when it finds that short sales are concentrated in a relatively small number of stocks on a subset of trading days.

## TRADING HALTS AND ASYMMETRIC INFORMATION

Researchers purport that trading halts customarily occur in environments with high levels

[2] Senchack and Starks (1993); b, Arnold, Butler, Crack, and Zhang (2005); Chang, Cheng, and Yu (2007); Boehmer, Jones, and Zhang (2008); and Diether, Lee, and Werner (2009) provide specific examples.

of asymmetric information. For example, Spiegel and Subrahmanyam (2000) suggest that trading interruptions are more probable in environments with considerable uncertainty regarding the volatility of future price movements. Hopewell and Schwartz (1978 page 1355) examine price behavior prior to and following firm-specific trading halts on the New York Stock Exchange (NYSE). They state, "In essence, a temporary trading suspension is a signal by the Exchange that a temporary disequilibrium in the market for a security either currently exists or may exist in the near future." They demonstrate that price adjustments occur prior to news-related suspensions and attribute the market's reaction to information leakages and insider trading. They also determine that these price adjustments are firm specific.

The presence of asymmetric information prior to trading halts is substantiated by other researchers. For instance, Ferris, Kumar, and Wolfe (1992); and Kryzanowski and Nemiroff (1998) find that informational asymmetries in trading activity, price volatility, and abnormal returns occur prior to trading halts. Similarly, Wong, Chang, and Tu (2009) find that trading volume and volatility increases in the Taiwan Stock Exchange for short intervals immediately prior to trading halts that are triggered by price limit hits.

Kryzanowski and Nemiroff (2001 page 116) purport that trading halts are an attempt to discover and correct a state of asymmetric information between investors, and assert, "An imbalance of buy and sell orders unaccompanied by public information on that security suggests that uninformed traders and specialists have a larger informational disadvantage than under normal trading conditions." We suggest that this environment of elevated information asymmetry surrounding trading halts provides the conditions essential for short sellers to exploit their informational advantages.

## INVESTOR BEHAVIOR PRIOR TO TRADING HALTS

Previous research explores the effect of trading halts on investor behavior and finds that as the probability of an interruption in trading increases, market participants accelerate the timing of their trades, even if these transactions are not part of an optimal trading strategy. Subrahmanyam (1994) identifies this phenomenon, termed the magnet effect, and he develops a theoretical model that examines the ex-ante effects of mandated trading halts. In this model, large traders prefer to utilize smaller trade sizes to minimize the price impact of their trades. However, if the costs associated with the inability to trade are greater than the costs of submitting large orders, these traders will advance their trades and subsequently increase price volatility.

Ackert, Church, and Jayaraman (2001) use experimental markets to analyze the impact of trading halts on price behavior, trading volume, and profitability. Providing support for Subrahmanyam's model, they find that trading activity is affected by trading halts: market participants advance trades when a halt is imminent. Du, Liu, and Ree (2005) investigate price limits in the Korean Stock Exchange and find evidence, prior to limit hits, of the magnet effect in returns, trading volume, and volatility. Similarly, Goldstein and Kavajecz (2004) provide empirical evidence in support of the magnet effect when they examine the trading strategy of NYSE market participants during the market turbulence of October 1997. They find that as the probability of a circuit breaker increases, market participants want to avoid being constrained not to trade, and subsequently accelerate the timing of their trades.

In summary, previous research suggests that 1) short sellers possess superior information regarding specific firms and that they use this informational advantage to accurately forecast an

impending trading halt, 2) trading halts occur in conditions of heightened information asymmetry and volatility; an environment that is conducive for short sellers, and 3) the 'magnet effect', which is characterized by a firm-specific increase in trading volume and increased price volatility immediately prior to a trading suspension, provides a signal to short sellers and prompts them to alter their trading patterns to exploit their informational advantage.

## HYPOTHESES (TRADING METRICS)

This research questions if short sellers take advantage of their superior information by modifying their trading patterns surrounding interruptions in trading. To document short seller behavior, several trading metrics are examined that may alter prior to and/or following a trading halt, including the number of short sales executed, the short sale trade size, and the level of short interest on halted firms.

### Number of Short Transactions

The relation between trading volume and stock prices is explored extensively in the literature, and a consensus has emerged that a positive correlation between price volatility and trading volume exists.[3] Trading volume is dependent on both the number and the size of trades. Some researchers suggest that the number of transactions is the more appropriate metric to gauge the impact of trading activity on market prices. For example, Jones, Kaul, and Lipson (1994) examine whether the number of transactions or the transaction size generates price volatility. Their findings suggest that the positive relation between volatility and volume simply reflects the positive relation between volatility and the number of transactions. McInish and Wood (1991), extricate the two components of volume, trade size and the number of trades, to determine the influence of each on returns. They find that the impact of the number of trades on returns supersedes the effect of trade size. Specifically concerning trading halts, Kryzanowski and Nemiroff (1998), in their examination of the price discovery process, find that the number of trades accurately gauges the level of informed trading prior to halts.

### Short Trade Size

There is disagreement in the literature concerning the order-size preference of informed investors. Jones et al. (1994) describe two opposing theories: strategic and competitive models. With strategic models, monopolistic traders submit multiple smaller trades in an effort to camouflage their trading activity. Kyle (1985) develops a strategic model that examines the value of private information. He purports that informed traders have an incentive to conceal their privileged information by engaging in a number of comparatively small trades rather than a solitary large trade so that private information is gradually incorporated into security prices. Providing empirical support for this notion, Barclay, Michael, and Warner (1993) examine the impact of trade size on cumulative price change. Based on their findings, they introduce the stealth-trading hypothesis, which states that price movements are caused primarily by the private information of informed traders and that informed traders utilize medium-sized orders.

In competitive models, the size of the trade is positively related to the precision of

[3] Karpoff (1987) provides a review of the price volume relation and finds that volume is positively related to the degree of price changes.

information held by informed traders. Easley and O'Hara (1987) study the effect of trade size on security prices. They demonstrate that trade size biases create an adverse selection problem: informed traders favor larger transactions while uniformed traders do not have a trade-size preference. Large trade sizes are therefore interpreted as a signal of informed trading and thus modify the market's perception of an asset's value. Similarly, Seppi (1990) develops a theoretical model of information-based block trades in which strategic traders, by utilizing large trades, reveal private information.

Further supporting the positive relation between transaction size and subsequent price impact, Hasbrouck (1991) finds that price impact is a positive function of trade size, and Spiegel and Subrahmanyam (2000) find that price volatility subsequent to a trade is related to the size of the transaction and that price variance increases in trade size. Koski and Michaely (2000) provide an examination of trade size in environments with various information asymmetries. Their results suggest a significant relation between price and liquidity effects and information content as measured by trade size.

The intent of short sellers when submitting their trades diverges from other types of strategic traders, those that would prefer stealth transactions to mask the informational content of their transactions. Short sellers, in line with the competitive model of order preferencing, can benefit from market recognition of their activity – they profit if the revelation of their private information through trading results in downward price movement. Empirically, the advantage gained by placing large, short orders is demonstrated by Boehmer et al. (2008), who find that the largest short sale orders are the most informed – they have the most predictive power for future price movements. Similarly, the findings of Angel et al. (2003) suggest that the average short sale has a greater number of shares than nonshort sales.

**Short Volume**

Short selling is prevalent in financial markets. Boehmer et al. (2008) find that shorting represents almost 13 percent of 2000–2004 NYSE electronically submitted orders, while Deither et al. (2009) report that during 2005, short selling comprises 24 percent of NYSE and 31 percent of National Association of Securities Dealers (NASDAQ) share volume.

Research further demonstrates that short selling increases prior to informational events. For example, Safieddine and Wilhelm (1996) find that seasoned equity offerings often have high levels of short selling, and that this short selling activity is related to lower proceeds from share issuance. Aitken, Frino, McCorry, and Swan (1998) find that it is more likely that short transactions that execute the day prior to an informational event are informationally motivated. Christophe, Ferri, and Hsieh (2010) examine short selling prior to the public release of analyst downgrades for a sample of NASDAQ stocks. Their results demonstrate abnormal levels of short selling in the three trading days prior to an analyst announcement and a significant price reaction associated with the downgrade. Karpoff and Lou (2010) investigate short sellers' role in identifying publicly traded firms that misrepresent their financial statements. They find evidence of increases in abnormal short interest in the 19 months preceding the public revelation of fiscal misconduct. They also demonstrate that levels of short selling increase according to the severity of the misrepresentation.

Trading halts represent a type of informational event. As such, short sellers will increase activity prior to the trading halt in an attempt to exploit their informational advantage and increase the price impact of their trades. Thus, short sellers can be expected to execute a larger

number of short transactions and they will utilize a larger transaction size, leading to an increase in short volume prior to interruptions in trading:

$H_1$: Prior to a trading halt, halted stocks will experience a substantial increase in the number of short transactions, short sellers will utilize larger trade sizes and halted stocks will experience a substantial increase in their short interest ratio, relative short selling, and abnormal short selling measures.

**Post-Halt Short Transaction Metrics**

Although a significant amount of research regarding short seller behavior exists, a much smaller body of research is available that focuses on the activities of short sellers surrounding informational events, particularly in describing their post-event behavior. For instance, Safieddine and Wilhelm (1996) examine short selling around seasoned equity offerings. However, their focus is on short selling pre and post adoption of Rule 10b-21 (which prohibits an investor from covering a short position with shares purchased at the offer price) and not on firm-specific informational events. Christophe et al. (2004) investigate short selling prior to earnings announcements, but their analysis does not address post-announcement short selling activity.

Christophe et al. (2010) provide a description of short seller behavior both prior to and following an informational event in their examination of analyst downgrades. They find that abnormal short selling increases prior to the downgrade announcement; peaks during the two-day period comprised of the event day and the day following the announcement, and then declines over the next nine trading days.

Because the intent of a trading halt is to reduce information asymmetry by facilitating the dispersion of new information to market participants and providing the time necessary to impound new information into stock prices, short selling would be expected to decline following the resumption of trading - short sellers will execute fewer and smaller short transactions:

$H_2$: Following the resumption of trading, halted stocks will experience a substantial decrease in the number of short transactions, short sellers will utilize smaller trade sizes and halted stocks will experience a substantial decrease in their short interest ratio, relative short selling, and abnormal short selling measures.

**DATA**

The initial step in this study was to identify news-related trading halts that occur on the NYSE, NASDAQ, And AMEX stock exchanges from June 1 through December 31, 2015 by querying the NasdaqTrader.com online database for stocks with a trading halt code of T3. From this set, observations where multiple halts occur for the same stock on the same trading day and halts that occur outside normal market hours were removed from the sample.

D'Avolio (2002) finds that 16 percent of stocks in the Center for Research in Security Prices (CRSP) data are potentially difficult to sell short. Of these stocks, the majority are in the bottom size decile and the prices of over half are under five dollars. They also find approximately 10 percent of stocks are never shorted – these are primarily illiquid stocks, for which shorting may represent a limited opportunity for profit. These researchers note that institutional investors, who lend stocks for shorting, are biased towards large, liquid stocks, and

that the probability of incurring loan fees in excess of the risk-free rate is inversely related to firm size and the level of institutional ownership. Accordingly, in a manner similar to Christophe et al. (2004), trading halts for any stock whose average daily price and trading volume during 2005 – 2006 was less than five dollars and 100 shares were eliminated.

Because the research intent is to examine trading activity and market quality prior to and following trading halts, the methodology of Corwin and Lipson (2000) was followed and halts that occur before 10:00 a.m. were eliminated, as well as halts with incomplete data or halts that do not resolve on the same trading day.

Daily price, trading volume, return, and market capitalization data are obtained from the CRSP database. The Regulation SHO database, which was created in response to Rule 202T, provides trade size and time stamps for short-selling transactions. TAQ trade and quote data is used to examine intraday activity. Trade data is filtered to remove observations that occur outside of normal market hours, and transactions with a non-positive price, or a condition code other than zero. Quote data is filtered to retain observations that occur within normal market hours and have a positive bid or ask size, price, and spread.

## SUMMARY STATISTICS

After applying the previously described filters to refine our set of events, the remaining sample consists of 78 trading halts, 55 of which occur on the NYSE. Summary statistics describing these halts are presented in Table 1 (Appendix 1), Panels A through I. Firm names, trading halt mode and SIC code are listed in Appendix 3.

Of these halts, sixty percent more occur in 2005 than in 2006 (48 as compared to 30). Similar to Christophe et al. (2004), we find that trading halts in our sample occur more frequently during the middle of the week – Tuesday through Thursday. These interruptions in trading occur in 23 out of the 24 sample period months, without evidence of an obvious seasonal pattern. Sixty-eight unique firms are examined, 64 of which experience a single halt during the sample period, and 4 different firms that experience 2, 3, 4, or 5 halts each.

The halts in this study are primarily (83 percent) implemented due to pending news. The mean duration of all sample halts is just over 41 minutes. Although the duration of trading halts reported by Lee, Ready, ad Seguin (1994), Corwin and Lipson (2000), and Christie, Corwin, and Harris (2002) are greater on average and for each halt type, our findings coincide with previous research in the ranking of halt types by length: news pending halts have the longest duration and order imbalance halts, the shortest.

Summary statistics suggest a substantial variation in the size of sample firms, stock price and trading volume with higher average values in 2006 as compared to 2005. The firms in our study generally demonstrate positive returns over the two-year period examined. When the sample firms are categorized according to year-end capitalization portfolio assignments established by CRSP, similar to Christophe et al. (2004), large firms are more heavily represented in our sample – there are fewer firms in the lower market capitalization deciles. The dearth of smaller firms may be due, in part, to the data filter that eliminates trading halts for any stock whose average daily price during the sample period is less than five dollars.

Short-selling levels for sample firms during the 2005 – 2006 sample period is then examined. For each exchange, both short volume as a percentage of the total shares shorted and the number of short sale transactions as a percentage of the total number of short selling trades are reported. No short transactions for sample firms/period are reported on the National

Association of Securities Dealers Alternative Display Facility (ADF), Archipelago (ARCA) and the Chicago Stock Exchange (CHX).

In line with the findings presented by Diether et al. (2009), approximately three-fourths of short volume and short trades for our sample firms are executed on the NYSE. Approximately 14 percent of short volume and 13 percent of short trades are placed on the NASDAQ market. The average firm in our sample has 379 short transactions per trading day with an average daily short volume of just over 200,000 shares.

## RESULTS

### Daily Short Metrics

To describe the daily behavior of short sellers surrounding trading halts, the mean number of trades, trade size and volume for short transactions for our sample firms in the pre-event period (days -5 through -1), the halt day (day 0), the post-event period (days +1 through +5), and the estimation period (days -30 through -6 and +6 through +30) are tracked. The short interest ratio, relative short selling, and abnormal short selling metrics for each of these periods is also calculated. The short interest ratio is the number of shares sold short to shares outstanding (Angel et al., 2003). Relative short selling is computed by dividing the number of shares shorted by the number of shares traded (Christophe et al., 2004; and Diether et al., 2009B). Abnormal short selling is the percentage difference between the average daily shares sold short during the pre, post or event period and the average daily number of shares sold short during the estimation period (Lee et al., 1994; Corwin and Lipson, 2000; Christie et al., 2002, Christophe et al., 2004; and Christophe et al., 2010). The hypotheses concerning the behavior of short sellers surrounding trading halts are:

$H_3$: Prior to a trading halt, halted stocks will experience a substantial increase in the number of short transactions, short sellers will utilize larger trade sizes and halted stocks will experience a substantial increase in their short interest ratio, relative short selling, and abnormal short selling measures.

$H_4$: Following the resumption of trading, halted stocks will experience a substantial decrease in the number of short transactions, short sellers will utilize smaller trade sizes and halted stocks will experience a substantial decrease in their short interest ratio, relative short selling, and abnormal short selling measures.

The mean daily short number of trades, trade size and trading volume, presented in Table 2 (Appendix 1), are lower in the pre-event period than in the estimation period, indicating that short sellers do not increase their activity in the days prior to a trading halt. For example, the firms in our sample had an average of 431 trades of 430 shares each, producing a mean short volume of 255,325 shares in the pre-event period. These values are all less than the corresponding mean expected values computed for the estimation period. This finding, although in contrast to our priori, is similar to the results of Christophe et al. (2004) who demonstrate a decrease in short selling activity for firms during the five trading days preceding earnings announcements - another type of informational event.

On the event day, all three of these metrics, number, size, and total volume of short transactions, increase dramatically. The average number of trades more than doubles, from 489

trades in the estimation period to over 1000 on the halt day. Trade size increases from 457 shares to 646 and subsequently volume triples to an average of nearly one million shares sold short on the halt day.

During the post-halt period, these values demonstrate a distinct reduction, but they remain above estimation period levels. The mean number of daily short transactions falls from 1,004 to 662, which is substantially larger than estimated 489 trades; the average trade size of 477 shares remains elevated above the estimation size of 457 shares. The short interest ratio follows a similar pattern, with a low pre-halt value of 2.09, a remarkable increase on the halt day to 5.29, and a marked decline to 2.80 with higher than estimation period levels (2.27) in the five days following an interruption in trading.

The mean and median abnormal short selling values, shown in Figure 1 (Appendix 2), corroborate these findings. This figure demonstrates primarily negative abnormal short volume in trading days -5 through -1, indicating lower short selling activity in the pre-event period as compared to the estimation period. Abnormal short volume soars to levels over 200 percent of the estimation period values on the halt day. Short selling levels remain elevated on the day following the halt, and then decline from this exaggerated level during the post-halt period, with abnormal values remaining positive for the five days examined (indicating higher short selling levels in the post-halt period than in the estimation period).

The halt-day and post-halt results are similar to the findings of Christophe et al. (2010) who examine short selling activity surrounding analyst downgrades. They find that abnormal short selling increases substantially on the event day and then declines but remains above the normal level for the following nine days.

Relative short selling however deviates from the pattern established by the other short selling measures: relative short selling values remain consistent, ranging from 0.24 in the estimation period to 0.23 for all other periods examined. These values are similar in magnitude to the values reported by Diether et al. (2009) for NYSE stocks. This finding suggests that the increase in short volume during the halt and post-event periods are accompanied by a surge in trading volume.

A contemporary increase in trading and short volume is consistent with the findings of Karpoff (1986), who examines the impact of informational events on trading volume. This research purports that information leads to an increase in trading volume if it becomes necessary for investors to update their demand prices or if the information is not anticipated. Investor disagreement or a divergence in investor expectations can lead to increased trading volume that can persist after an informational event. Accordingly, Lee et al. (1994) report that trading volume is 230 percent higher following NYSE trading halts as compared to levels following a 'pseudo halt' and that the elevated volume persists for three days.

If informed short sellers are able to anticipate both that a firm will experience an informational event and that this event will lead to a change in firm value, then an increase in abnormal short selling to prior to interruptions in trading is expected. Using the following equation, short selling levels are examined while controlling for other variables that influence short selling levels (following Christophe et al., 2010):

$$ABSS_{(-5,-1)i} = \alpha_i + \beta_1 P_{(0i)} + \beta_2 CAR_{(-5,-1)i} + \beta_3 MOM_i + \beta_4 CAR_{(0,1)i} + \varepsilon_i \quad (1)$$

The dependent variable, $ABSS_{(-5,-1)}$ represents abnormal short-selling during the five days preceding the halt. $P_{(0)}$ is the share price of the halted firm on the halt day; this variable controls

for the positive link between a stock's price and the willingness of market participants to short the stock.[4] $CAR_{(-5,-1)}$ is the cumulative abnormal return during the five day pre-event period – the halted firm's total return over the five days preceding the halt minus the median five-day cumulative total return during the non-event period. MOM represents momentum, which controls for long-term share price movement. Momentum is calculated as the halted firm's six-month cumulative return ending 30 days before the halt minus the return on the NYSE equally weighted portfolio during the same period. $CAR_{(0,1)}$ is the halted firm's holding period return from day 0 to day 1 minus the median holding period return during the non-event period; this variable represents the market's assessment of the economic value of the news released surrounding a trading halt.

Table 3 (Appendix 1), Panel A presents the correlation matrix for the regression variables. Results indicate that the pre-halt abnormal short selling level, $ABSS_{(-5,-1)}$, is significantly negatively correlated with short-term pre-halt returns ($CAR_{(-5,-1)}$) and significantly positively correlated with long-term returns (MOM) prior to the trading halt. The correlation values indicates that pre-event short selling decreases with high contemporaneous returns but increases for stocks with higher returns in the months prior to a trading halt.

Modeling a regression using ordinary least squares assumes that the error terms have uniform variances across all observations. To ensure that this assumption holds, each input data is evaluated set using the Shapiro-Wilk test. The null hypothesis for this statistical test is that a population is distributed normally. If the test produces a p-value less than the designated alpha level, then the null hypothesis of normality can be rejected.

For this regression, the Shapiro-Wilk statistic is 0.73, with a p-value < .001, allowing the assumption of a normal distribution to be rejected. Accordingly, our regression is executed, and results reported using errors adjusted to control for heteroscedasticity and serial correlation of the residuals.

Table 3 (Appendix 1), Panel B presents the regression results. The level of abnormal short selling preceding a trading halt is demonstrated to be positively associated with post-halt returns, $CAR_{(0,1)}$, suggesting that for a stock with a 1 percent increase in post-halt returns we expect a 2 to 3 percent increase in pre-halt abnormal short selling.

Although an increase in short selling is often associated with subsequent low returns, previous research also supports a relation between short selling and positive price movements. Angel et al. (2003) discuss how, depending upon the investment period length, short sellers may use either a momentum-based strategy, which generates profits if prices continue to move in the same direction, or a contrarian strategy, where success is dependent on price reversals. When these researchers examine short selling activity on NASDAQ, they find that the highest number of short transactions occur for stocks with the highest returns – suggesting that short sellers follow a contrarian strategy. This is consistent with the research of Brent, Morse, and Stice (1990) who reported 3 to 4 percent higher monthly returns for stocks with an increase in short interest.

Following Christophe et al. (2004), an alternate regression model is used to control for pre-event trading volume and returns and focus on post-halt returns to determine if abnormal levels of short selling are informationally motivated. In this equation, $ABSS_{(-5,-1)}$ again represents

[4] Refer to D'Avolio, (2002) who shows that the majority of stocks that are impossible to short are priced less than five dollars and that the holdings of institutional investors, who lend stocks for shorting, are biased towards large, liquid stocks.

the abnormal short-selling during the five days before the halt, and $RET_{(0, +1)}$ is the stock return from closing day -1 to +1. $RET_{(-5, -1)}$ represents the movement of the stock price during the five days prior to the halt, and $ABVOL_{(-5, -1)}$ is the percentage difference between the average daily volume in the 5-day pre-event interval and the average daily volume in the estimation period.

$$ABSS_{(-5, -1)} = \beta_0 + \beta_1 RET_{(0, +1)} + \beta_2 RET_{(-5, -1)} + \beta_3 ABVOL_{(-5, -1)} + \varepsilon \quad (2)$$

$RET_{(0, +1)}$ represents the market's immediate reaction to the trading halt. A significant negative (positive) coefficient indicates that short selling increases (decreases) prior to trading halts imposed under negative (positive) circumstances. $RET_{(-5, -1)}$ controls for the possibility that changes in the stock price might affect the level of short selling in the days preceding the trading halt. $ABVOL_{(-5, -1)}$ accounts for the comovement in increased short selling activity and increased trading volume (increased volume might make a stock easier to short).

The correlation matrix of regression variables shown in Table 4 (Appendix 1) Panel A demonstrates a significant positive correlation between pre-halt abnormal short selling levels and abnormal volume in the pre-halt period, suggesting that abnormal trading volume is linked to higher short selling activity.[5] Pre-event abnormal short selling is negatively correlated with pre-halt returns – stocks with higher return in the five days preceding a trading halt have lower levels of pre-halt shorting.

For this regression, the Shapiro-Wilk statistic is 0.79, with a corresponding p-value < .001. Accordingly, the regression is executed, and results reported using errors adjusted to control for heteroscedasticity and serial correlation of the residuals.

The regression results, listed in Table 4 (Appendix 1) Panel B, produce relatively high Adjusted $R^2$ values, ranging from 31.54 to 89.03 percent depending on the model specification. A significant relation is indicated between abnormal short selling and trading volume and return in the pre-halt period: pre-halt short selling levels are affected positively by stock price declines and by increased trading volume in the days preceding a trading halt. These results indicate that a stock with a one percent decrease (increase) in pre-halt returns (trading volume) we expect approximately a (0.70) two percent increase in pre-halt abnormal short selling. However, the coefficient for return over the halt day, $RET_{(0, +1),}$ is insignificant; this result fails to provide support for the hypothesis of informed trading by short sellers prior to a trading halt.

**Intraday Short Metrics**

The significant increase in short selling metrics on the halt day evidenced in the examination of daily trading supports the further examination of short-selling behavior on the day the trading halt. To do so, the 1) average number of short transactions, 2) average size of the short transactions, 3) short interest ratio, 4) relative short selling and 5) abnormal short selling measures for the halted stocks in the eight 30-minute periods prior to a halt and following the resumption of trading are computed.

This investigation reveals that the number of trades, the transaction size, the overall short volume, and the short interest ratio remain relatively stable throughout the periods leading up to the halt (Table 5 Appendix 1). The pre-halt short interest ratio varies from 0.162 to 0.313. The number of short transactions ranges from 59 to 94 per period and mean period trade size is

[5] Bris (2008) finds that short-sales ratios are affected by substantial increases in trading volume.

between 544 and 841 shares, producing short volume for the pre-halt periods ranging from 36,795 to 65,965 shares. A slight increase in pre-halt short activity, with volume breaching 60,000, is noted two periods preceding the halt.

Upon the resumption of trading, these metrics are all sharply elevated, and they remain inflated for at least three periods (seven periods for trade size) into the post-halt examination. During period +1, an average of 162 trades occurs, with a mean trade size of 1,293 shares, resulting in a short volume of over 200,000 shares - an increase by a factor of four over the average pre-halt volume. The short interest ratio peaks at 1.60 in the first post-halt period, and its value remains elevated above pre-halt levels for six periods following the resumption of trading.

Abnormal short selling, shown in Figure 2 (Appendix 2), provides equivalent findings, with low or negative mean and median values preceding the halt, a slight increase in mean values three periods before the halt is implemented, and a spike to nearly 1200 percent upon the resumption of trading. Abnormal short selling levels then decline gradually but remain positive through the eight post-halt periods examined.

The relative short selling levels, as with the daily examination, remain relatively constant throughout the halt day, ranging from 0.203 in period -7 to 0.288 in period +5. The constancy of the relative short selling ratio suggests that elevated short selling levels are accompanied by corresponding increases in trading volume. To explore further, both short selling and trading volume are plotted for sample firms across the halt day. The graphic produced, Figure 3 (Appendix 2), depicts a contemporaneous increase in both trading and short selling volume immediately preceding the halt, peaking upon the continuation of trading, and remaining elevated for several periods post-halt. This pattern coincides with significant increases in trading volume reported by Christie et al. (2002) one period preceding and several periods following the resumption of trade for a sample of NASDAQ firms experiencing a trading halt.

Solid support for Hypothesis 1 is not provided by the results of this empirical investigation. Although an increase in each of the metrics used to describe short seller behavior was anticipated during the pre-halt period, at the daily level, short selling activity did not increase substantially prior to the implementation of a trading halt. The intraday examination provides evidence of only a modest increase in short selling immediately preceding an interruption in trading.

However, it does appear that short sellers significantly modify their behavior surrounding trading halts, as each of the short metrics, with the exception of relative short selling, demonstrates substantial increases on the event day, upon the resumption of trading. Support is provided for Hypothesis 2; average trade size, number of trades and volume for short transactions, short interest ratio and abnormal short selling all decrease markedly in the post-event period.

## CONCLUSION

The intent of this research intent is to establish if short selling activity is altered surrounding trading halts and determine if short sellers noticeably impact security prices for halted firms. The priori was that short selling activity increases prior to a trading halt and decreases following the resumption of trading. It further purport that halted firms with high short selling activity, as compared to firms with lower levels of short selling, will experience a larger price decline and a more rapid adjustment in price surrounding halts, and lower price volatility and spreads after trading resumes.

Little evidence was found at the daily level to support the proposition that short sellers increase their activity prior to the implementation of a trading halt. Results did not demonstrate increases in daily short trade size, number of trades or short volume prior to the event day. However, findings do suggest that short sellers substantially modify their trading behavior surrounding halts, as shorting metrics increase markedly on the halt day. An intraday examination of shorting levels suggests a modest increase in activity in the two 30-minute periods prior to the interruption in trading and a substantial increase in short selling in the periods immediately following the reopening of trading. As anticipated, short selling values decline in the post-halt period, but they remain elevated above estimation period levels during the post-halt daily examination and for several periods following the resumption of trading on the halt day itself.

Based on previous findings, our priori is that firms simultaneously undergoing a halt and high levels of short selling will experience negative returns. However, at the daily level, when categorized according to abnormal short selling levels, firms in the highest shorting category demonstrate positive post-announcement returns. Regression results also indicate that pre-halt short selling increases for stocks with positive returns in the immediate post-halt period.

Although our empirical investigation yields findings that do not fully support our proposed hypotheses, results strongly indicate that short sellers modify their behavior surrounding exchange-mandated halts in trading. The market quality of halted firms, in terms of price, volatility and spreads, is impacted not only by the interruption in trading, but also by levels of shorting activity.

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**Appendix 1 - Tables**

**Table 1 - Descriptive Statistics**

This table contains summary statistics for trading halts that occur during 2005 – 2006 for NYSE-listed firms. Halts have been filtered to remove observations that occur outside of market hours or before 10:00 a.m., where more than one halt occurs for a sample firms on the same day, halts that do not resolve on the same trading day and multiple halts for the same firm within the 11-day event period, halts for Rule 202T pilot stocks, and observations for stocks whose average daily price and trading volume during 2005 – 2006 was less than five dollars and 100 shares.

*Panel A: Halts by Year*

| Year | Number of Halts | Unique Firms |
|---|---|---|
| 2005 | 48 | 44 |
| 2006 | 30 | 28 |
| Full Sample | 78 | 68 |

*Panel B: Number of Halts per Year*

| Number of Halts in Sample | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Number of Firms | | | | | |
| 2005 | 42 | 1 | 0 | 1 | 0 |
| 2006 | 27 | 0 | 1 | 0 | 0 |
| Full Sample | 64 | 1 | 1 | 1 | 1 |

*Panel C: Halts by Day of Week and Year*

| | Day of Week | | | | | |
|---|---|---|---|---|---|---|
| Year | Monday | Tuesday | Wednesday | Thursday | Friday | Total |
| 2005 | 2 | 10 | 13 | 18 | 5 | 48 |
| 2006 | 4 | 9 | 7 | 5 | 5 | 30 |
| Full Sample | 6 | 19 | 20 | 23 | 10 | 78 |

*Panel D: Halts by Month and Year*

| | Month | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Jan | Feb | March | April | May | June | July | Aug | Sep | Oct | Nov | Dec |
| 2005 | 4 | 2 | 5 | 7 | 8 | 5 | 4 | 5 | 1 | 3 | 2 | 2 |
| 2006 | 1 | 2 | 4 | 4 | 1 | 3 | 0 | 3 | 1 | 5 | 3 | 3 |
| Full Sample | 5 | 4 | 9 | 11 | 9 | 8 | 4 | 8 | 2 | 8 | 5 | 5 |

*Panel E: Halts and Duration by Halt Type*

| Trading Halt Type | Number of Halts | Mean Duration |
|---|---|---|
| News Dissemination (4) | 6 | 0:29:27 |
| Order Imbalance (7) | 7 | 0:17:29 |
| News Pending (11) | 65 | 0:44:46 |
| Full Sample | 78 | 0:41:08 |

*Panel F: Halt Firm Characteristics - Average Daily Values*

| | Price | Volume | Return | Market Cap |
|---|---|---|---|---|
| Year: 2005 (N =44) | | | | |
| Mean | 31.89 | 735,803 | 0.0590% | 3,880,142 |
| Max | 110.65 | 5,902,434 | 0.3331% | 65,755,430 |
| Min | 4.47 | 1099 | -0.1728% | 33,149 |
| Std | 23.90 | 1,295,571 | 0.1144% | 10,371,325 |
| Year: 2006 (N=28) | | | | |
| Mean | 33.23 | 1,408,912 | 0.0438% | 4,946,224 |
| Max | 141.33 | 7,642,372 | 0.3072% | 40,548,995 |
| Min | 6.45 | 1,187 | -0.4135% | 111,400 |
| Std | 27.81 | 1,856,984 | 0.1346% | 9,403,555 |
| Full Sample (N=72) | | | | |
| Mean | 32.41 | 997,568 | 0.0531% | 4,294,729 |
| Max | 141.33 | 7,642,372 | 0.3331% | 65,755,430 |
| Min | 4.47 | 1099 | -0.4135% | 33,149 |
| Std | 25.31 | 1,561,124 | 0.1219% | 9,952,168 |

*Panel G: CRSP Capitalization-Based Decile*

| Decile | 2005 | 2006 | Full Sample |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 2 | 0 | 2 |
| 3 | 4 | 2 | 6 |
| 4 | 4 | 1 | 5 |
| 5 | 5 | 2 | 7 |
| 6 | 6 | 8 | 14 |
| 7 | 2 | 3 | 5 |
| 8 | 9 | 4 | 13 |
| 9 | 4 | 3 | 7 |
| 10 | 8 | 5 | 13 |
| Total | 44 | 28 | 72 |

*Panel H: Short-sale Trading Activity Across Exchanges (2005 – 2006)*

| | ADF | AMEX | ARCA | BSE | CHX | NASDAQ | NSX | NYSE | PHLX |
|---|---|---|---|---|---|---|---|---|---|
| Mean Shares Sold Short (%) | 0.00 | 2.94 | 0.00 | 0.53 | 0.00 | 14.19 | 5.67 | 76.38 | 0.29 |
| Mean Short-sale Trades (%) | 0.00 | 3.73 | 0.00 | 0.64 | 0.00 | 12.77 | 6.77 | 76.07 | 0.03 |

*Panel I: Short-selling Summary Statistics per Stock*

| | Mean | Median | Std Dev | Minimum | Maximum |
|---|---|---|---|---|---|
| Short Sale Daily Volume | 201,427 | 192,125 | 72,895 | 67,124 | 1,285,773 |
| Number of Daily Short Trades | 379 | 349 | 149 | 128 | 2,727 |

Table 2

**Average Daily Short Metrics**

This table contains indicators of daily short selling behavior during the estimation (days -30 thru -6 and +6 thru +30), pre-event (days -5 thru -1), event (day 0) and post-event (days +1 thru +5) period surrounding interruptions in trading. The short interest ratio is the number of shares sold short to shares outstanding, and relative short selling is computed by dividing the number of shares shorted by the number of shares traded.

N = 78 Trading Halts

| Period | Number of Trades | Trade Size | Volume | Short Interest Ratio | Relative Short Selling |
|---|---|---|---|---|---|
| Estimation | 489 | 457 | 303,873 | 2.27 | 0.24 |
| Pre-Event | 431 | 430 | 255,325 | 2.09 | 0.23 |
| Halt | 1,004 | 646 | 982,050 | 5.29 | 0.23 |
| Post-Event | 662 | 477 | 489,637 | 2.80 | 0.23 |

Table 3

**Abnormal Short Selling Regression**

This table contains the correlation matrix for regression variables (Panel A) with corresponding p-values in parentheses. Regression coefficients and associated t-values are listed in Panel B. In the model: $ABSS_{(-5,\,-1)} = \alpha + \beta_1 * Price_0 + \beta_2 * CAR_{(-5,\,-1)} + \beta_3 * MOM + \beta_4 * CAR_{(0,\,1)} + \epsilon$ , $ABSS_{(-5,-1)}$ represents abnormal short-selling during the five days preceding the halt, $P_{(0)}$ is the share price of the halted firm on the halt day, $CAR_{(-5,-1)}$ is the cumulative abnormal return during the five day pre-event period, MOM represents momentum, and $CAR_{(0,1)}$ is the halted firm's excess holding period return from day 0 to day . Regression results are reported using errors adjusted to control for heteroscedasticity and serial correlation of the residuals.

N = 75 Halts

*Panel A: Correlation Matrix of Regression Variables*

| | $ABSS_{(-5,\,-1)}$ | $Price_{(0)}$ | $CAR_{(-5,-1)}$ | MOM | $CAR_{(0,1)}$ |
|---|---|---|---|---|---|
| $ABSS_{(-5,\,-1)}$ | 1 | 0.0588 | -0.3058 | 0.2347 | 0.1897 |
| | | (0.6161) | (0.0076) *** | (0.0427) ** | (0.1031) |
| $Price_{(0)}$ | | 1 | 0.1911 | -0.0238 | 0.0216 |
| | | | (0.1005) | (0.8394) | (0.8544) |
| $CAR_{(-5,-1)}$ | | | 1 | -0.2015 | -0.10281 |
| | | | | (0.0831) * | (0.3801) |
| MOM | | | | 1 | 0.04217 |
| | | | | | (0.7194) |
| $CAR_{(0,1)}$ | | | | | 1 |

*Panel B: OLS Regression Results*

| | [1] | [2] | [3] | [4] |
|---|---|---|---|---|
| Intercept | 0.0054 (0.07) | 0.0218 (0.25) | -0.0019 (-0.02) | -0.1203 (-0.91) |
| $CAR_{(-5,-1)}$ | -3.7378 (-1.22) | -3.5368 (-1.26) | -3.1058 (-1.27) | -3.3786 (-1.39) |
| $CAR_{(0,1)}$ | | 3.0178 (1.78) * | 2.9454 (1.88) * | 2.8576 (1.89) * |
| MOM | | | 68.6249 (1.66) | 67.9963 (1.67) * |
| $Price_{(0)}$ | | | | 0.0037 (1.12) |
| $R^2$ | 0.0935 | 0.1188 | 0.1488 | 0.1610 |
| Adjusted $R^2$ | 0.0811 | 0.0943 | 0.1129 | 0.1131 |
| F-Value | 7.53 *** | 4.85 ** | 4.14 *** | 3.36 ** |

***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.10 level respectively.

Table 4

**Abnormal Short Selling Regression**

This table contains the correlation matrix for regression variables (Panel A) with corresponding p-values in parentheses. Regression coefficients and associated t-values are listed in Panel B. In the model: $ABSS_{(-5,\ -1)} = \alpha + \beta_1 RET_{(0,\ +1)} + \beta_2\ RET_{(-5,\ -1)} + \beta_3 ABVOL_{(-5,\ -1)} + \varepsilon$, $ABSS_{(-5,-1)}$ represents the abnormal short-selling during the five days before the halt, and $RET_{(0,\ +1)}$ is the stock return from closing day -1 to +1. $RET_{(-5,\ -1)}$ represents the movement of the stock price during the five days prior to the halt, and $ABVOL_{(-5,\ -1)}$ is the percentage difference between the average daily volume in the 5-day pre-event interval and the average daily volume in the estimation period. Regression results are reported using errors adjusted to control for heteroscedasticity and serial correlation of the residuals.

N = 77 Halts

*Panel A: Correlation Matrix of Regression Variables*

| | $ABSS_{(-5,\ -1)}$ | $ABVOL_{(-5,\ -1)}$ | $RET_{(0,\ +1)}$ | $RET_{(-5,\ -1)}$ |
|---|---|---|---|---|
| $ABSS_{(-5,\ -1)}$ | 1 | 0.73674 (< .0001) *** | -0.06004 (0.6039) | -0.28236 (0.0128) ** |
| $ABVOL_{(-5,\ -1)}$ | | 1 | -0.03914 (0.7354) | -0.18791 (0.1017) |
| $RET_{(0,\ +1)}$ | | | 1 | 0.31322 (0.0055) *** |
| $RET_{(-5,\ -1)}$ | | | | 1 |

*Panel B: OLS Regression Results*

| | [1] | [2] | [3] |
|---|---|---|---|
| Intercept | -0.17194 (-3.45) *** | -0.17303 (-3.47) *** | -0.17288 (-3.44) *** |
| $ABVOL_{(-5,\ -1)}$ | 0.74815 (7.76) *** | 0.71968 (10.97) *** | 0.71935 (11.08) *** |
| $RET_{(-5,\ -1)}$ | | -2.27965 (-2.26) ** | -2.35715 (-2.00) ** |
| $RET_{(0,\ +1)}$ | | | 0.10841 (0.24) |
| $R^2$ | 0.5428 | 0.5643 | 0.5645 |
| Adjusted $R^2$ | 0.5367 | 0.5525 | 0.5466 |
| F-Value | 89.03 *** | 47.91 *** | 31.54 *** |

*** and ** indicate statistical significance at the 0.01 and 0.05 level respectively.

Table 5

**Average Intraday Short Metrics**

Mean values, which are computed for eight 30-minute periods prior to trading halts and following the resumption of trading, are on a per halt basis; they are adjusted for the number of halts with short transactions each period. The short interest ratio is the number of shares sold short to shares outstanding, and relative short selling is computed by dividing the number of shares shorted by the number of shares traded.

| Period | Number of Halts | Number of Trades | Trade Size | Volume | Short Interest Ratio | Relative Short Selling |
|---|---|---|---|---|---|---|
| -8 | 21 | 94 | 692 | 65,338 | 0.313 | 0.259 |
| -7 | 25 | 83 | 544 | 45,241 | 0.163 | 0.203 |
| -6 | 32 | 59 | 628 | 36,795 | 0.185 | 0.240 |
| -5 | 43 | 81 | 704 | 56,985 | 0.311 | 0.242 |
| -4 | 49 | 63 | 613 | 38,790 | 0.162 | 0.220 |
| -3 | 50 | 66 | 792 | 52,046 | 0.294 | 0.242 |
| -2 | 55 | 73 | 841 | 61,604 | 0.207 | 0.247 |
| -1 | 61 | 87 | 757 | 65,965 | 0.220 | 0.245 |
| Halt | | | | | | |
| 1 | 68 | 162 | 1,293 | 209,182 | 1.601 | 0.238 |
| 2 | 56 | 120 | 1,126 | 135,328 | 0.777 | 0.223 |
| 3 | 53 | 99 | 855 | 84,429 | 0.611 | 0.253 |
| 4 | 43 | 63 | 998 | 63,200 | 0.472 | 0.286 |
| 5 | 38 | 76 | 1,011 | 77,129 | 0.560 | 0.288 |
| 6 | 32 | 81 | 1,145 | 92,495 | 0.479 | 0.266 |
| 7 | 25 | 93 | 1,191 | 111,295 | 0.363 | 0.266 |
| 8 | 14 | 31 | 339 | 10,470 | 0.236 | 0.245 |

## APPENDIX 2 – FIGURES

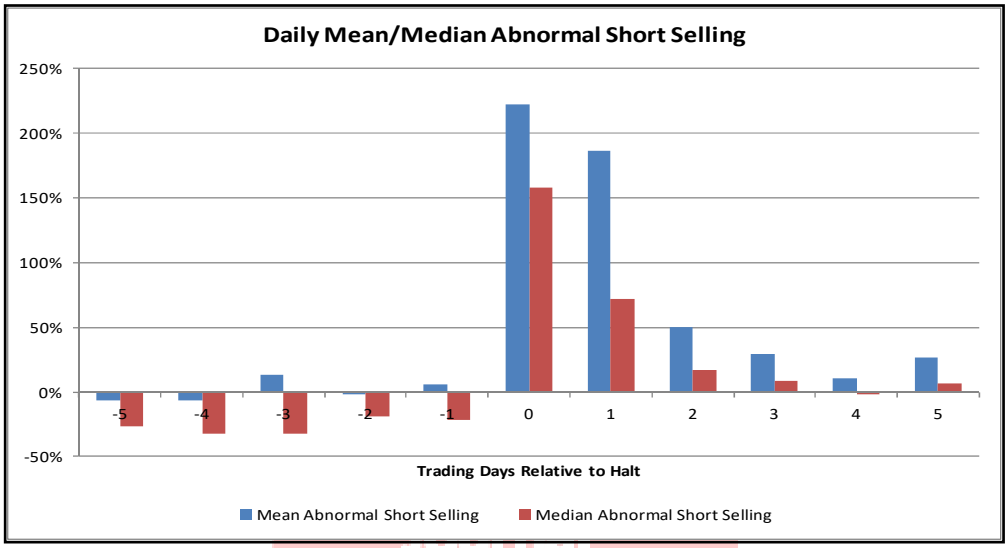


Figure 1

**Daily Abnormal Short Selling**

Abnormal short selling is the percentage difference between the average daily shares sold short during the pre, post or event period and the average daily number of shares sold short during the estimation period

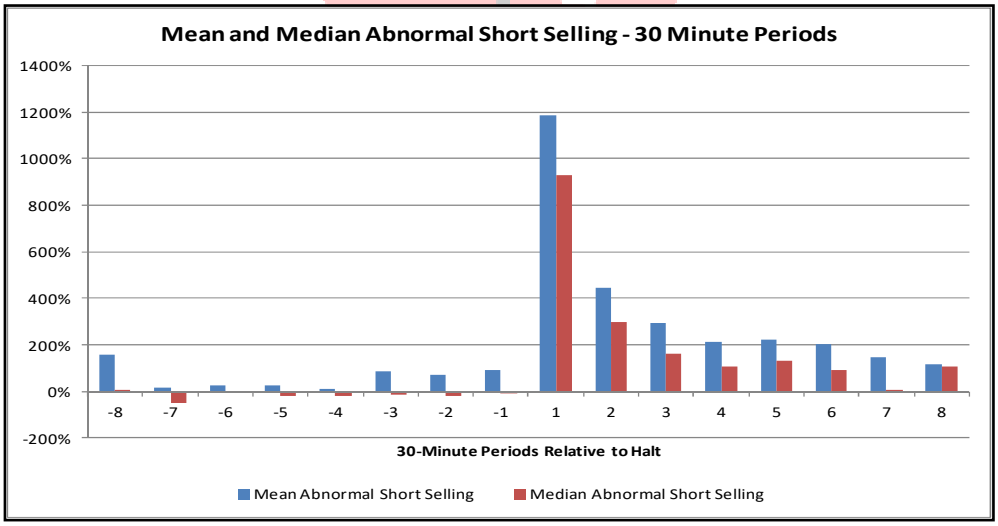


Figure 2

**Intraday Abnormal Short Selling**

Abnormal short selling is the percentage difference between the average daily shares sold short during 30-minute pre, post and event periods and the average daily number of shares sold short during the estimation period

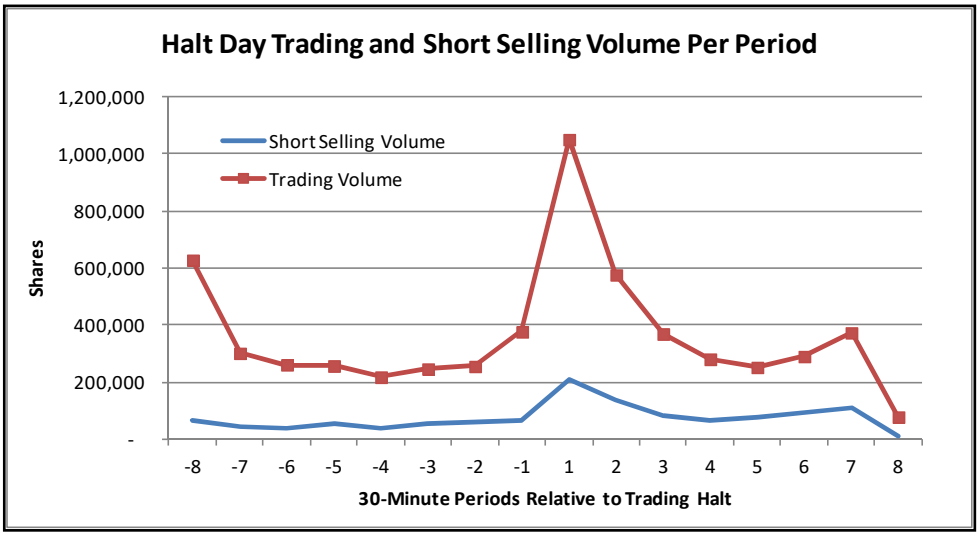


Figure 3
**Halt Day Trading and Short Selling Volume per 30-Minute Period**

**Appendix 3 – List of Halted Companies**

| Firm | Symbol | Mode | SIC |
|---|---|---|---|
| AMERICREDIT CORP | ACF | 4 | Personal Credit Institutions |
| ADAMS RESOURCES & ENERGY INC | AE | 7 | Crude Petroleum & Natural Gas |
| UNITED CAPITAL CORP | AFP | 11 | Electronic Coils, Transformers & Other Inductors |
| AGRIUM INC | AGU | 11 | Agricultural Chemicals |
| AMERICAN ISRAELI PAPER MLS LTD | AIP | 11 | Paper Mills |
| ALPHARMA INC | ALO | 11 | Pharmaceutical Preparations |
| BLAIR CORP | BL | 4 | Retail-Catalog & Mail-Order Houses |
| BAUSCH & LOMB INC | BOL | 11 | Retail-Building Materials, Hardware, Garden Supply |
| CONAGRA INC | CAG | 11 | Meat Packing Plants |
| CAMBREX CORP | CBM | 11 | Services-Engineering, Accounting, Research, Management |
| CAMECO CORP | CCJ | 11 | Miscellaneous Metal Ores |
| CORUS ENTERTAINMENT INC | CJR | 11 | Radio Broadcasting Stations |
| CORUS ENTERTAINMENT INC | CJR | 11 | Radio Broadcasting Stations |
| CORUS ENTERTAINMENT INC | CJR | 11 | Radio Broadcasting Stations |
| CANTEL MEDICAL CORP | CMN | 11 | Services-Commercial Physical & Biological Research |
| CAREMARK RX INC | CMX | 11 | Services-Home Health Care Services |
| CANADIAN NATIONAL RAILWAY CO | CNI | 11 | Railroads, Line-Haul Operating |
| COMSTOCK RESOURCES INC | CRK | 11 | Crude Petroleum & Natural Gas |
| CONTINENTAL MATERIALS CORP | CUO | 11 | Concrete, Gypsum & Plaster Products |
| C V S CORP | CVS | 11 | Retail-Drug Stores and Proprietary Stores |
| DELUXE CORP | DLX | 11 | Blankbooks, Looseleaf Binders & Bookbindg & Related Work |
| DOMTAR INC | DTC | 11 | Paper Mills |
| DYNEGY INC NEW | DYN | 11 | Natural Gas Transmission |
| ENCANA CORP | ECA | 11 | Crude Petroleum & Natural Gas |
| ELKCORP | ELK | 11 | Asphalt Paving & Roofing Materials |
| ENERGY PARTNERS LTD | EPL | 11 | Crude Petroleum & Natural Gas |
| EMPIRE RESOURCES INC DEL | ERS | 7 | Wholesale-Metals Service Centers & of fices |
| FAIRCHILD SEMICONDUCTOR INTL INC | FCS | 11 | Semiconductors & Related Devices |
| FORDING CANADIAN COAL TRUST | FDG | 11 | Trust Services |
| FAMILY DOLLAR STORES INC | FDO | 11 | Retail-Variety Stores |
| HALLWOOD GROUP INC | HWG | 11 | Broadwoven Fabric Mills, Man Made Fiber & Silk |

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| IAMGOLD CORP | IAG | 11 | Gold and Silver Ores |
| IRWIN FINANCIAL CORP | IFC | 4 | State Commercial Banks |
| IMERGENT INC | IIG | 7 | Services-Computer Integrated Systems Design |
| QUEBECOR WORLD INC | IQW | 11 | Commercial Printing |
| INTERTAPE POLYMER GROUP INC | ITP | 11 | Converted Paper & Paperboard Prods (No Containers/Boxes) |
| J E D OIL INC | JDO | 11 | Crude Petroleum & Natural Gas |
| JONES APPAREL GROUP INC | JNY | 11 | Apparel & Other Finished Prods of Fabrics & Similar Matl |
| KADANT INC | KAI | 11 | Special Industry Machinery (No Metalworking Machinery) |
| LEVITT CORP FLA | LEV | 11 | Land Subdividers & Developers (No Cemeteries) |
| LIONS GATE ENTERTAINMENT CORP | LGF | 11 | Services-Motion Picture & Video Tape Production |
| MINERALS TECHNOLOGIES INC | MTX | 11 | Industrial Inorganic Chemicals |
| NAVISTAR INTERNATIONAL CORP | NAV | 11 | Truck & Bus Bodies |
| NAVISTAR INTERNATIONAL CORP | NAV | 11 | Truck & Bus Bodies |
| NACCO INDUSTRIES INC | NC | 11 | Industrial Trucks, Tractors, Trailers & Stackers |
| NOVAGOLD RESOURCES INC | NG | 11 | Gold and Silver Ores |
| NUVEEN MASS DIV ADV MUNI FD | NMB | 7 | Trust Services |
| NATIONAL SEMICONDUCTOR CORP | NSM | 11 | Semiconductors & Related Devices |
| NATIONAL SEMICONDUCTOR CORP | NSM | 11 | Semiconductors & Related Devices |
| NATIONAL SEMICONDUCTOR CORP | NSM | 11 | Semiconductors & Related Devices |
| NATIONAL SEMICONDUCTOR CORP | NSM | 11 | Semiconductors & Related Devices |
| NATIONAL SEMICONDUCTOR CORP | NSM | 11 | Semiconductors & Related Devices |
| QUANEX CORP | NX | 11 | Steel Works, Blast Furnaces & Rolling Mills (Coke Ovens) |
| ONE LIBERTY PROPERTIES INC | OLP | 11 | Real Estate Investment Trusts |
| PIONEER DRILLING CO | PDC | 7 | Drilling Oil & Gas Wells |
| PARK NATIONAL CORP | PRK | 7 | National Commercial Banks |
| RIVIERA HOLDINGS CORP | RIV | 11 | Services-Miscellaneous Amusement & Recreation |
| RETAIL HOLDRS TRUST | RTH | 4 | Trust Services |
| BOSTON BEER INC | SAM | 11 | Malt Beverages |

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| SCHWAB CHARLES CORP NEW | SCH | 11 | Security Brokers, Dealers & Flotation Companies |
| SHAW GROUP INC | SGR | 11 | Miscellaneous Fabricated Metal Products |
| STONE ENERGY CORP | SGY | 11 | Crude Petroleum & Natural Gas |
| SIGNET GROUP PLC | SIG | 11 | Retail-Jewelry Stores |
| SUNLINK HEALTH SYSTEMS INC | SSY | 11 | Services-Commercial Physical & Biological Research |
| TELEPHONE & DATA SYSTEMS INC | TDS | 4 | Radiotelephone Communications |
| TEKTRONIX INC | TEK | 11 | Instruments For Meas & Testing of Electricity & Elec Signals |
| TENET HEALTHCARE CORP | THC | 11 | Services-General Medical & Surgical Hospitals, NEC |
| TODCO | THE | 11 | Drilling Oil & Gas Wells |
| TECHNICAL OLYMPIC U S A INC | TOA | 11 | General Bldg Contractors - Residential Bldgs |
| TELUS CORP | TU | 11 | Radiotelephone Communications |
| UNITEDHEALTH GROUP INC | UNH | 11 | Hospital & Medical Service Plans |
| UNISOURCE ENERGY CORP | UNS | 11 | Electric Services |
| UNITED STATES CELLULAR CORP | USM | 4 | Radiotelephone Communications |
| WESTMORELAND COAL CO | WLB | 7 | Bituminous Coal & Lignite Mining |
| WELLSFORD REAL PROPERTIES INC | WRP | 11 | Real Estate Investment Trusts |