Predictors of naked short selling: Analyzing delivery failures in U.S. stock markets

Paul Ziegler
Anderson University

Terry Truitt
Anderson University

ABSTRACT

There have been significant regulatory changes by the U.S. Securities and Exchange Commission (SEC) in recent years to curb abusive naked short selling. A 2009 study by the U.S. Government Accounting Office suggested that abusive naked shorting has been reduced by the new regulations and suggested certain factors which might characterize firms targeted by naked short sellers. The purpose of this study is to determine if these factors are in fact useful in predicting naked short selling and to what extent they might have analytical power. Historical daily delivery failure data, a prime indicator of naked short selling, was gathered along with firm and stock trading characteristics. A combined data set for the first half of 2011 was created for over five thousand stocks from the AMEX, NASDAQ and NYSE exchanges. The results showed that trading volume, market capitalization, institutional ownership, insider ownership, listed options, and short interest are significant in the prediction of delivery failures. This study indicates that naked shorting is not a random effect in the market and can be predicted by easily observable variables, implying that further regulatory action might be required.

Keywords: Naked Short Selling, Delivery Failures

INTRODUCTION

This study concerns the predictive power of certain stock trading characteristics and their correlation with post-transaction delivery failures. A *failure to deliver*, or FTD, occurs when the seller of a security does not deliver the security to the purchaser within a set period of time; current U.S. regulation requires settlement within three days. A FTD can occur due to a number of reasons, including computer breakdown or miscommunications between the brokers and the clearing agency. In a paper explaining the reasons for FTD's published by the U.S. Federal Reserve Bank of New York (Fleming & Garbade, 2005) stated that the main reasons for FTD's was "daisy chain of cascading fails," where a single FTD can cause a large number of FTD's. This occurs when brokers assume a previous trade of a given stock will settle and thereby rely upon that stock for subsequent trades. If the trade does not settle, hence a delivery failure, all trades relying upon those shares will also fail to be delivered. However, several other studies (Fotak, Raman, & Yadav, 2009; Boulton & Braga-Alves, 2010; Stone, 2010) contend that the primary cause of FTD's are actually due to "naked short sales". In this case the seller offers shares for which they do not hold title, with the expectation that they can obtain the shares within the settlement period at a lower price and thereby complete the transaction with financial gain. Although the latter practice is illegal in the U.S., it can be very lucrative in a falling market if left unchecked.

There have been significant regulatory changes by the U.S. Securities and Exchange Commission (SEC) in recent years to curb abusive naked short selling. Questions remain as to the extent to which naked short selling actually occurs, and if so, under what circumstances. A recent study by the U.S. Government Accounting Office (GAO) has suggested that abusive naked shorting has been reduced, but much is still unknown (United States Government Accountability Office, 2009). The purpose of this study is to determine if factors suggested by the SEC to predict naked short selling are in fact useful and, if so, to what extent do they have analytical power. The analysis will extend testing for differences in naked short sale prediction across three major U.S. stock exchanges; the AMEX, NADSAQ and NYSE.

The strategy of short selling of securities in general has been part of the financial landscape for over three hundred years although it remains a controversial investment practice. The short seller is portrayed as the person who benefits only at the loss of other investors, preying upon their ill fortune. Not only do they reap gain from fundamental investors but they have historically been blamed for creating financial volatility and market collapse (Sloan, 2010). Through the centuries, the insidious work of short selling has been the focus of strict regulation and often faced an outright ban (Elul, 2009).

But even with the general disdain of ordinary investors against short selling, there have been voices which demand that it is an essential function of markets. In many repeated studies, the impact of short selling constraints has been shown to hinder the price discovery process (Diamond & Verrecchia, 1987; Senchack & Starks, 1993; Arnold, Butler, Crack, & Zhang, 2005; Reed, 2007; Kolasinksi, Reed, & Thornock, 2010; Saffi & Sigurdson, 2010), thereby masking the true value of the security. It is the short sellers that are seen by academics, and themselves, as the "corruption sleuths" that sniff out fraud and alert the market to overvalued firms (Bases, Vlastelica, Baldwin, & Bendeich, 2011). In this way the short seller brings appropriate market correction by selling overvalued shares in a regulated manner rather than having panic occur when fraud is revealed to the general public.

The U.S. Government Accountability Office (GAO) published a review on the effectiveness of restrictions to curb naked short selling trade activity in May 2009 (United States Government Accountability Office, 2009). This report made several important statements on the state of current SEC rules and their effectiveness in reducing abusive naked short selling. While acknowledging that failures to deliver had appeared to decrease under temporary emergency rules, it stated that "Trading and Markets staff said that they have not conducted any empirical studies to assess the effectiveness of the locate requirement for reducing FTD," (p. 43). The GAO report also stated "Trading and Markets and FINRA (Financial Industry Regulatory Authority) staffs said that those securities that are most vulnerable to such short selling abuse would be thinly traded, highly illiquid, and have a relatively low number of total shares outstanding," (p. 47). The terms "thinly traded" and "highly illiquid" describe the trading volume, whereas the "low number of total shares outstanding" characterizes the ability to make trades. Using publically available daily trade data across multiple U.S. stock exchanges, this study tested the GAO statement suggesting a link between trading volume and number of shares outstanding as predictors of delivery failures, as well as other potential factors.

A recent study conducted by Ziegler and Woodward (2010) examined naked short selling just prior and after announcement of a CFO turnover. When clearly negative news became public, as reported in mandatory SEC filings, there was a significant increase in delivery failures. In contrast, when the news was good, there was a significant decrease in delivery failures. This study provides insight into a real-time, observable, pattern of naked short selling, and further highlights a plausible mechanism by which regulators could fashion a monitoring regime. Most importantly it suggests that other naked shorting schemes probably exist, trading on publically available data.

LITERATURE REVIEW

Naked short selling has a long recorded history dated back to the 1600s, however little legislation to restrict the practice existed until the market collapse in the Great Depression. After significant market undulations in 1937, the recently formed Security and Exchanges Commission (SEC) adopted Rule 10a-1 in 1938, most commonly known as the "Uptick Rule" (Alexander & Peterson, 1999). This rule stated that a short position in a security can only be initiated when the current price is at least $1/8^{th}$ higher ($0.125) than the previous trade, or *on the uptick*. This simple requirement disallowed negative momentum when short sellers could "pile on" a falling security. The Uptick Rule became the hallmark test of short selling regulation and remained virtually unchanged until 2007 (Boehmer, Jones, & Zhang, 2008).

After implementation of the Uptick Rule, there was almost no new regulation of short selling until 2005. During this period financial options and derivatives had emerged, banking regulation had eased and stock market volume had increased from millions of shares traded per day to billions. At the behest of corporate executives who railed against abuse of their stock by short sellers, the SEC considered actions to "monitor" FTD's while, at the same time, removed old barriers. This culminated in the landmark "Regulation SHO" (SEC, 2004, August 6), becoming effective on January of 2005.

Prior to Regulation SHO, brokers were able to delay delivery of securities almost indefinitely by passing FTD's to other brokers, effectively turning the transaction into an undated futures contract (Christian, Shapiro, & Whalen, 2006). The change brought by Regulation SHO required delivery failures to be fully closed by the 13th day of the transaction and placed stocks

which had high FTD's on a "watch list" for abuse. The new regulation also contained a "pilot study" under which the Uptick Rule was eliminated. The pilot study, as performed by the SEC and by numerous academics, revealed no significant impact to stock prices (Bai, 2006; Wu, 2006; Alexander & Peterson, 2008; Diether, Lee, & Werner, 2009). The Uptick Rule was subsequently dropped in July of 2007.

With the market meltdown in the summer and fall of 2008, the SEC moved to strengthen Regulation SHO with Rule 204T, requiring immediate closure of all transactions by the 4th day. During this period delivery failures were blamed in part for increased volatility and the failure of major investment banks (Fuld, 2008). Rule 204T had an immediate impact on the volume of FTD's, reducing the amount by more than 60% overnight. Even from a cursory viewpoint, this reduction in FTD's points to prior abuse of the system by naked short sellers. And although naked short selling is and has been illegal in the U.S. for a very long time, it was legal in other large markets until very recently, including Germany (Morgan Lewis, 2010) and Canada (Stanley, 2010).

Given the time correlation in removal of the Uptick Rule in mid-2007 and the beginning of volatility on the banking sector in the same year, legislators and pundits argued for an immediate reinstatement of the Uptick Rule (Sirri, 2010). Under enormous pressure from investors, trade associations, Congress, and a new administration, the SEC sought comments on how best to institute a new Uptick Rule which would provide needed safeguards while also not dampening market liquidity in the time of recession. After much comment and debate, the SEC approved a modified Uptick Rule which would be triggered if a stock value declined more than 10% on any single trading day and stay in effect through the next trading day (McCaffrey, 2010). This was seen by exchange executives as "the least bad of many bad alternatives" but as not going far enough by corporate executives.

At this very time four European Union countries have banned short selling of certain financial institutions and are now considering the outright ban of all short selling (Mara, 2011). The SEC temporarily banned shorting of financial stocks in 2008 to "restore equilibrium to markets" (SEC, 2008, July 18). Within months of this action, Chairman Christopher Cox stated "Knowing what we know now, I believe on balance the commission would not do it again" (Younglai, 2008). Short selling is a lightning rod for criticism when markets are in turmoil yet outright restrictions are most always later seen as misguided.

In the summer of 2008, regulators began looking for faster reporting of short interest to increase transparency, starting with bi-monthly reporting in June. Due to the market collapse in the fall of 2008 and with pressure from Congress, a number of "self-regulating organizations," including FINRA, NYSE and NASDAQ, are providing daily short position data, some as early as the next day (SEC, 2011, August 18). And the pressure for U.S. exchanges to produce real-time short interest data is mounting. As part of the Dodd-Frank Wall Street Reform and Consumer Protection Act, which seeks to overhaul the financial regulatory system, the SEC is required to investigate the "feasibility, benefits, and costs of requiring reporting in real time... of short sale positions of publicly listed securities" (SEC, 2011, May 3).

Ownership Measures

There must be a supply of stock available from willing lenders for non-naked short selling to occur. One often used surrogate measure for a lendable supply is the percentage of stock ownership by either insiders or institutions. The definition of insiders can be executives,

employee held stock, or family members from what was once a privately held firm. Institutional ownership is defined as "firms or individuals that exercise investment discretion, over the assets of others, in excess of $100 Million. Major institutions include financial holdings companies, banks, insurance companies, mutual fund managers, portfolio managers, self managed pension and endowment funds," (NASDAQ, 2011). Bris (2008) considered firm ownership an important factor in predicting short selling activity.

Culp and Heaton (2008) note that "Empirical evidence does suggest that stocks with narrow ownership — likely composed of the most optimistic investors — might be subject to binding short sale constraints, and such stocks perform poorly on average." Simply stated, as the percentage of stock owned by insider's increases, the probability of lending decreases, and thereby constrains short sales. However, because insider ownership will, as stated, have overly optimistic sentiments concerning their stock, it become a natural target for short sellers who might believe the firm is actually overvalued. Following this logic, Graham and Hughen (2007) found that short interest increases with inside ownership, theorized as due to poor corporate performance by insiders with unrealistic expectations. Even though short sales are then constrained, there is additional pressure to short in these cases.

Having the opposite effect, institutional ownership has been a proxy for a lendable supply used by brokers for short selling. Indeed for Regulation SHO, it was noted that " that in developing 'Easy to Borrow' lists, broker-dealer stock loan desks use information from a number of sources, including institutional lenders that have sophisticated systems for estimating borrow supply," (SEC, 2004, July 28). Several studies find that institutional ownership effects loan supply for short selling (D'Avolio, 2002; Asquith, Pathak, & Ritter, 2005; Nagel, 2005), wherein short sales constraints decrease as institutional ownership increases. As assumed by Asquith, et al., "short-sale constraints are most binding when there is a strong demand and limited supply," (p. 244).

Options and Short Interest

The advent of financial options provided another similar mechanism for an investor with negative sentiment to reap profit on their information. The purchase of a put option, which is the right to sell at a stated price at some point in the future, can be used as a "synthetic short" (Figlewski & Webb, 1993; Evans, Geczy, Musto, & Reed, 2009). For example, if an investor has negative beliefs about a stock currently valued at $10, they can purchase an "at the money" put option at $10 for an expiration of one month. If at the end of the month the stock has dropped to $8, the investor will then exercise the option and sell the stock to the writer of the put option for $10, pocketing $2 per share. But often short interest and open options positions are seen together. In a first study of this effect, the authors found that "Changes in the open interest of options are positively related to changes in short interest" (Brent, Morse, & Sitce, 1990). This was hypothesized to be due to the fact that shorting and options are both useful hedging mechanisms. This is borne out in the study by Figlewski and Web (1993) where short interest increases were tied to hedging by option writers. Another study found that the informational content of short interest was lessened in stocks with tradable options (Senchack & Starks, 1993). This was due to hedging by option writers and not necessarily due to negative sentiment. However in a later study (Danielsen & Sorescu, 2001), the authors contend that "As investors establish short positions via options (and market makers hedge their exposure), we hypothesize that the de-facto removal of short sale constraints drives down the price of the underlying stock."

Indeed, Chen and Singal (2003) find that "speculative short sellers are more likely to use put options than short sales." In this way the options are acting in a similar informational role as short interest. This point was also supported in another study done in the Canadian market (Ackert & Athanassakos, 2005).

METHODOLGY AND DATA PROCESSING

The predictive power of stock characteristics and their correlation with post-transaction delivery failures is the purpose of this study. As seen in the literature, these characteristics include (1) average trading volume, (2) number of shares outstanding, (3) market capitalization, (4) the percentage of insider ownership, (5) the percentage of institutional ownership, (6) whether the stock has listed options, (7) the volume of short interest.

The hypotheses deal with the relationship between the stock trading or ownership characteristics in predicting the average number of delivery failures. In general terms, larger firms with more shares outstanding and a larger trading volume should see a decrease in delivery failures. It is the smaller, less followed, firms which can be more easily manipulated by abusive naked short sellers, and therefore should see higher levels of delivery failures. Likewise, firms having high insider ownership should see an increase in delivery failures, where firms with high institutional ownership or available listed options should see a decrease. Finally, stocks which have high short interest should see an increase in delivery failures. The following research hypotheses are then stated as:

H1: There exists an inverse relationship between a stock's average daily trading volume and an increase in the average daily failures to deliver.

H2: There exists an inverse relationship between the number of outstanding shares of firms' stock and an increase in the average daily failures to deliver.

H3: There exists a direct relationship between the market capitalization and an increase in the average failures to deliver.

H4: There exists a direct relationship between the percentage of insider ownership and an increase in the average failures to deliver.

H5: There exists an inverse relationship between the percentage of institutional ownership and an increase in the average failures to deliver.

H6: There exists an inverse relationship between the availability of listed options for a stock and an increase in the average failures to deliver.

H7: There exists a direct relationship between a stock's short interest and an increase in the average daily failures to deliver.

The study covers the 6-month period of January through June, 2011. This period is clearly very recent and will provide an up-to-date view of market conditions for academics, regulators and investors. During this period the markets were relatively calm, eliminating general concerns about excess volatility skewing the results. Existing data was pulled and correlated by stock ticker symbol from many sources, including the SEC Fails-To-Deliver database, daily stock quotes from EODData, the Yahoo! Finance web site, and short interest information from ShortSqueeze.com. The key which ties the data sets together is the ticker symbol and date of the transaction. Specially constructed custom software was written to merge and summarize each ticker into a single record, yielding average values for the 6-month period

by stock ticker. The final data set totaled 5,137 records, consisting of 405 records from the AMEX exchange, 2,517 were from NASDAQ, and the remaining 2,215 from the NYSE.

Methodology

To test the hypotheses, a linear regression model was created to predict delivery failures as dependent upon trading volume, outstanding shares, market capitalization, ownership and listed options. This model is described as:

$$APF = \alpha + \beta_1*V + \beta_2*S + \beta_3*M + \beta_4*I + \beta_5*T + \beta_6*O + \beta_7*D + \varepsilon, \text{ where}$$

- APF is the average percent of delivery failures per daily trading volume;
- V is the average daily trading volume;
- S is the quantity of shares outstanding in millions of shares;
- M is the market capitalization in millions of dollars;
- I is the percentage of insider ownership;
- T is the percentage of institutional ownership;
- O is whether listed options are available;
- D is the short interest represented by the number of Days to Cover.

ANALYSIS OF RESULTS

Table 1 (Appendix), provides descriptive statistics for the dependent variable in the regression, the average percent of delivery failures per daily trading volume. Statistics are compute for the overall data set as well as by the three listing exchanges. Immediate inspection reveals several important factors. First, there is a non-trivial percent of delivery failures by volume on a daily basis, having an overall average delivery failure rate of 2.53%. The dollar impact of these failures for the period and is presented in Table 2.

For the 6-month period of this study, consisting of 129 trading days, this represents almost 600 million dollars each day through by delivery failures. The second important factor to notice from Table 1 is the difference in percentage delivery failures between the exchanges. Looking at the averages, the AMEX has roughly four times the failure rate as the NYSE and roughly two and one-half that of the NASDAQ.

Regression Model

The model specified included the independent variables of (1) average daily trading volume, (2) number of outstanding shares, and (3) the market capitalization, (4) the percentage of insider ownership, (5) the percentage of institutional ownership, (6) the availability of listed options, and (7) the short interest Days to Cover. Running the regression yielded the results given in Tables 3a and 3b. The model predicts approximately ½ of the variation within the data, having a number of significant variables, all with acceptable model collinearity between variables.

Discussion

Except for the number of outstanding shares, each of the independent variables was found significant in the regression. It was also true that each of the variables, again with the exception

of the number of outstanding shares, had the hypothesized signs. This analysis implies that delivery failures can be partially predicted by looking at the specific stock characteristics of daily volume, firm market capitalization, insider ownership, institutional ownership, the availability of listed options, and the amount of short interest. It also rejects the conjecture put forward by the SEC that the number of outstanding shares is significant in predicting delivery failures.

SUMMARY

The purpose of this study was to confirm or refute propositions put forward by prior researchers and the SEC in regards to predictors of stock delivery failures in short sale transactions. The study period ran from January 1, 2011 through June 30, 2011, covering 129 trading days. Data was drawn from the SEC's publication of delivery failures, a 3rd party provider of daily trading data, and an on-line system available to investors. The relevant pieces of information were then summarized into a single record for each stock covering the study period, using averaged daily values.

Seven testable hypotheses were constructed and tested to determine their power in predicting delivery failures. Of these six were found significant; average daily trading volume, market capitalization, insider ownership, institutional ownership, listed options, and the amount of short interest. Importantly, each of these variables was significant to the 99% level and had their respective hypothesized sign.

Implications

There are several very important implications from this study. First, a very sizeable portion of delivery failures were predicted by the six significant variables. What is noteworthy is that these variables are easily observable by both investors and regulators alike. For investors looking to avoid stocks which could be the subject of abusive naked shorting, these variables provide a deterministic methodology. Regulators can also predict which stocks are more likely to need scrutiny in terms of delivery failures. Most importantly, these variables are not subject to interpretation or subjective measurement, rather they are directly observable and on a daily basis.

This study also shows that delivery failures are not random events but can be predicted by observable variables. If most failures to deliver were caused by a "daily chain of cascading fails" as suggest by Fleming and Garbade (2005), one would expect this effect to be random for any given stock. If delivery failures were large but random, much could be attributed to a breakdown of the market clearing mechanisms, or simply poor communications. Since this is not the case, there must be some other mechanism at work. Given the link establishing delivery failures to naked short selling has been made within the literature (Fotak, Raman, & Yadav, 2009; Boulton & Braga-Alves, 2010; Stone, 2010), the implication is that naked short selling continues to occur regardless of the current, more stringent, regulations.

Limitations

The study period of this work covered a brief six month window, chosen specifically to be after the most recent regulatory changes, to be very current so as to be useful to regulators, and with little market volatility. The implications found prior to the new regulation are unknown and potentially the subject of further study. Indeed it would be helpful to assess the impact of

the current regulations by performing a longitudinal study of this kind. Further, while it was advantageous to develop the model during a time of relative calm, it is more often the case that regulators are concerned about times of large market swings. Such has been the case during the summer of 2011, with the predictive ability of the developed model unknown during times of increased volatility. This would be another valuable follow-on study.

Delivery failure data used for analysis was performed for only the big three U.S. listing exchanges. Many studies show parallels between the U.S. and foreign markets in respect to short selling. There are also smaller stock exchanges, such as the Philadelphia, Arizona, and Chicago exchanges which might show similar patterns of delivery failures. If the data can be harvested, extending the study could better define the fundamental drivers of naked shorting.

Conclusions

There continues to be significant debate within the investment, corporate, and political community about the utility of short selling. Academics, however, are almost unanimous in their praise of short selling as a method to reduce volatility. It is the problem of abusive naked short selling which continues to vex all sides in the debate. Are delivery failures driven by naked short sellers, hoping to move the price of a particular stock lower by their own selling pressure? Or is it simply that lendable supplies on certain stocks are constrained to the point that it "forces" short sellers to act even without having made arrangements to borrow the underlying security? Regardless of the reason, delivery failures occurred at an average daily rate above 2.5% during the study period across the three large U.S. exchanges. And also regardless of the motive, both are illegal under current SEC rules.

This study cannot answer the fundamental question as to the motives of each investor/broker when failing to deliver. However, what this study did show is the fact that these delivery failures are not random. The SEC now have more evidence that the current regulations do not fully remove naked shorting from the market and that those stocks which are more vulnerable to abuse can be readily identified through observable data already in hand.

REFERENCES

Ackert, L. F., & Athanassakos, G. (2005). The relationship between short interest and stock returns in the Canadian market. *Journal of Banking and Finance, 29*, 1729–1749.

Alexander, G. J., & Peterson, M. A. (1999). Short Selling on the New York Stock Exchange and the Effects of the Uptick Rule. *Journal of Financial Intermediation, 8*, 90–116.

Arnold, T., Butler, A. W., Crack, T. F., & Zhang, Y. (2005). The Information Content of Short Interest: A Natural Experiment. *Journal of Business, 78*(4), 1307-1335.

Asquith, P., Pathak, P. A., & Ritter, J. R. (2005). Short interest, institutional ownership, and stock returns. *Journal of Financial Economics, 78*, 243–276.

Bai, L. (2006, December). The Uptick Rule of Short Sale Regulation – Can it Alleviate Downward Price Pressure from Negative Earnings Shocks? *Working Paper*. Duke University.

Bases, D., Vlastelica, R., Baldwin, C., & Bendeich, M. (2011, August 5). *Special report: The "shorts" who popped a China bubble*. Retrieved August 5, 2011, from Reuters: http://www.reuters.com/article/2011/08/05/us-china-accounting-shorts-idUSTRE7740PC20110805

Boehmer, E., Jones, C. M., & Zhang, X. (2008, November 11). Unshackling Short Sellers: The Repeal of the Uptick Rule. *Working Paper*.

Boulton, T. J., & Braga-Alves, M. V. (2010). The Skinny on the 2008 Naked Short Sale Restrictions. *Journal of Financial Markets, 13*(4).

Brent, A., Morse, D., & Sitce, E. K. (1990). Short Interest: Explanations and Tests. *Journal of Financial and Quantitative Analysis, 25*(2), 273-289.

Bris, A. (2008). *Short Selling Activity in Financial Stocks and the SEC July 15th Emergency Order.* Lausanne, Switzerland: IMD.

Chen, H., & Singal, V. (2003). Role of Speculative Short Sales in Price Formation: The Case of the Weekend Effect. *The Journal of Finance, 58*(2), 685-705.

Christian, J. W., Shapiro, R., & Whalen, J.-P. (2006). Naked Short Selling: How Exposed Are Investors? *Houston Law Review, 43*(4), 1033-1090.

Culp, C. L., & Heaton, J. B. (2008). The Economics of Naked Short Selling. *Regulation*, 46-51.

D'Avolio, G. (2002). The market for borrowing stock. *Journal of Financial Economics, 66*, 271–306.

Danielsen, B. R., & Sorescu, S. M. (2001). Why Do Option Introductions Depress Stock Prices? A Study of Diminishing Short Sale Constraints. *Journal of Financial and Quantitative Analysis, 36*(4), 451-484.

Diamond, D. W., & Verrecchia, R. E. (1987). Constraints on Short-Selling and Asset Price Adjustment to Private Information. *Journal of Financial Economics, 18*, 227-311.

Diether, K. B., Lee, K.-H., & Werner, I. M. (2009). It's SHO Time! Short-Sale Price-Tests and Market Quality. *The Journal of Finance, 64*(1), 37-73.

Elul, R. (2009). Regulating Short Sales. *Business Review*(2), 11-18.

Evans, R. B., Geczy, C. C., Musto, D. K., & Reed, A. V. (2008). Failure Is an Option: Impediments to Short Selling and Options Prices. *Review of Financial Studies, 22*(5), 1955-1980.

Figlewski, S., & Webb, G. P. (1993). Options, Short Sales, and Market Completeness. *The Journal of Finance, 48*(2), 761-777.

Fleming, M. J., & Garbade, K. D. (2005, September). Explaining Settlement Fails. *Current Issues in Economics and Finance, 11*(9), 1-7.

Fotak, V., Raman, V., & Yadav, P. K. (2009, April). Naked Short Sellers: Angels or Barbarians?

Fuld, R. (2008, October 6). Statement of Richard S. Fuld, Jr. Before the United States House of Representatives Committee on Oversight and Government Reform. Washington, DC: Library of Congress.

Graham, J. E., & Hughen, J. C. (2007). Ownership Structure, Expectations, and Short Sales on the NASDAQ. *Journal of Economics and Finance, 31*(1), 33-48.

Kolasinksi, A. C., Reed, A. V., & Thornock, J. R. (2010). Prohibitions versus Constraints: The 2008 Short Sales Regulations.

Mara, D. (2011, August 12). *Germany calls for Europe-wide short-selling ban*. Retrieved August 12, 2011, from DW-World Deutchse Welle: http://www.dw-world.de/dw/article/0,,15312312,00.html

McCaffrey, D. P. (2010). Review of the Policy Debate over Short Sale Regulation During the Market Crisis. *Albany Law Review, 73*(2), 483-519.

Morgan Lewis. (2010, July 12). *German Short Selling Legislation Expected to Become Effective in July 2010*. Retrieved August 12, 2011, from Morgan Lewis - investment management lawflash: http://www.morganlewis.com/pubs/IM_GermanShortSelling_LF_13jul10.pdf

Nagel, S. (2005). Short sales, institutional investors and the cross-section of stock returns. *Journal of Financial Economics, 78*, 277-309.

NASDAQ. (2011). *Institutional Holdings*. Retrieved October 8, 2011, from NASDAQ: http://holdings.nasdaq.com/asp/help/holdings.asp

Reed, A. V. (2007, February 22). Costly Short Selling and Stock Price Adjustment to Earnings Announcements. *Working Paper*. Kenan Flagler Business School, The University of North Carolina at Chapel Hill.

Saffi, P. A., & Sigurdson, K. (2010). Price Efficiency and Short Selling. *Working Paper*.

SEC. (2004, August 6). 17 CFR Parts 240, 241 and 242. *Federal Register, 69*(151), 48007-48031.

SEC. (2004, July 28). *Regulation SHO*. Retrieved February 14, 2010, from Securities and Exchange Commission: http://www.sec.gov/rules/final/34-50103.htm

SEC. (2008, October 17). *Amendment to Regulation SHO to Adopt Exchange Act Rule 204T — A Small Entity Compliance Guide*. Retrieved August 20, 2011, from Securities and Exchange Commission:
http://www.sec.gov/divisions/marketreg/tmcompliance/regsho204t-secg.htm

SEC. (2011, May 3). Release No. 34-64383; File No. 4-627. *Short Sale Reporting Study Required by Dodd-Frank Act Section 417(a)(2)*. Washington, D.C.

Senchack, A. J., & Starks, L. T. (1993). Short-Sale Restrictions and Market Reaction to Short-Interest Announcements. *Journal of Financial and Quantitative Analysis, 28*(2), 177-194.

Sirri, E. R. (2010). Regulatory Politics and Short Selling. *University of Pittsburg Law Review, 71*, 517-544.

Sloan, R. (2010). *Don't Blame the Shorts: Why Short Sellers Are Always Blamed for Market Crahses and How History Is Repeating Itself.* New York: McGraw-Hill.

Stanley, C. A. (2010). The Panic Effect: Possible Unintended Consequences of the Temporary Bans on Short Selling Enacted During the 2008 Financial Crisis.

Stone, E. C. (2010, September 2). Fails to Deliver: The Price Impact of Naked Short Sales. *Working Paper*.

United States Government Accountability Office. (2009). *Regulation SHO: Recent Actions Appear to Have Initially Reduced Failures to Deliver, but More Industry Guidance Is Needed.* Washington, D.C.

Younglai, R. (2008, December 31). *SEC chief has regrets over short-selling ban*. Retrieved August 14, 2011, from Reuters: http://www.reuters.com/article/2008/12/31/us-sec-cox-idUSTRE4BU3GG20081231

Ziegler, P., & Woodward, L. (2010). Effectiveness in Reduction of Naked Short Sales: An Event Study Using 8-K Filings. *International Journal of Business, Accounting and Finance, 4*(2), 118-128.

APPENDIX

Table 1 - Descriptive Statistics for the Average Delivery Failures as a Percent of Daily Trading Volume

Data Set	N	Mean	Std. Dev	Median	Skewness	Kurtosis
AMEX	405	6.73	10.6	3.17	4.60	28.0
NASDAQ	2517	2.78	6.52	0.993	7.12	64.7
NYSE	2215	1.47	2.87	0.531	7.62	116.3
ALL	5137	2.53	5.93	0.851	7.66	80.2

Table 2 - Dollar Impact of Delivery Failures

Data Set	# Records	# Failed Shares	$ Amount
AMEX	30,304	0.517B	$2.413B
NASDAQ	177,225	1.923B	$24.314B
NYSE	184,063	1.952B	$48.024B
ALL	391,592	4.392B	$74.751B

Table 3a - Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.691[a]	.477	.477	.72188

Table 3b - Regression Model Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.725	.023		31.861	.000		
	AvgDailyVolume	-2.871E-8	.000	-.118	-9.648	.000	.687	1.455
	Shares	2.220E-5	.000	.016	1.137	.256	.538	1.859
	MarketCap	-5.552E-6	.000	-.097	-7.603	.000	.622	1.607
	InsideOwnerPct	.002	.001	.031	2.830	.005	.871	1.148
	InstitutionalOwnerPct	-.013	.000	-.470	-36.781	.000	.626	1.596
	Optionable	-.462	.026	-.226	-17.988	.000	.648	1.543
	ShortDaysToCover	.033	.002	.228	21.638	.000	.920	1.087