The Skinny on the 2008 Naked Short Sale Restrictions[☆]

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Abstract

On July 15, 2008, the United States Securities and Exchange Commission announced temporary restrictions on naked short sales of the stocks of 19 financial firms. We examine stock price reactions and multiple measures of liquidity and price informativeness to consider whether the efficiency of the market for these firms' common stock was impacted by the short sale restrictions. We find evidence of a positive (negative) market reaction to the announcement (expiration) of the short sale restrictions. We also find strong evidence that the restrictions had a negative impact on various measures of liquidity and price informativeness.

JEL classification: G14; G28

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> *"False rumors can lead to a loss of confidence in our markets. Such loss of confidence can lead to panic selling, which may be further exacerbated by "naked" short selling. As a result, the prices of securities may artificially and unnecessarily decline well below the price level that would have resulted from the normal price discovery process." - Florence E. Harmon, Acting Secretary of the U.S. Securities and Exchange Commission*

Thus began the Securities and Exchange Commission's (SEC) July 15, 2008 announcement of an Emergency Order restricting "naked" short sales of the stocks of 19 publicly traded financial firms. The Emergency Order took effect on July 21, 2008 and was originally scheduled to expire on July 29, 2008, but was subsequently extended through August 12, 2008. The SEC also pointed to "a substantial threat of sudden and excessive fluctuations of securities prices generally and disruption in the functioning of the securities markets that could threaten fair and orderly markets" when issuing the Emergency Order.[1] While short sales have long been controversial, the SEC's actions appear to stand contrary to the large body of academic research that suggests that short sale restrictions reduce market efficiency, resulting in security mispricing.

[1] Securities and Exchange Commission, Release No. 58166 / July 15, 2008, p. 2.

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In this paper, we exploit the natural experiment that is the Emergency Order to determine the impact of short sale constraints on market quality. First, we consider the impact of the short sale restrictions in an event study setting by measuring abnormal returns at the announcement and expiration of the Emergency Order. Second, we investigate a number of proxies for price informativeness and market liquidity for insight into the relation between short sale restrictions and the efficiency of price discovery.

At least two factors bias against finding a significant impact related to the Emergency Order. First, short sales were still permitted during the restricted period. The Emergency Order only limited the use of *naked* short sales, and even then a number of entities received exceptions to the restrictions, including registered market makers, block positioners, and other market makers selling short as part of market making and hedging activities related to market making.[2] Second, a large number of the 19 financial firms affected by the Emergency Order have dual listings that are not subject to the oversight of the SEC. For many of these stocks, naked short sales could still be executed in international markets during the restricted period.

We report a positive market reaction to the announcement of the Emergency Order. Market model abnormal returns suggest that shareholder wealth increased by 16.9%, on average, in the 5 trading days beginning with the announcement of the short sale restrictions. However, the positive abnormal returns reported for the announcement of the Emergency Order were at least partially reversed when the short sale restrictions were lifted. These results are consistent

[2] Exceptions to the short sale restrictions were detailed in an amendment to the original Emergency Order that was issued by the SEC on July 18, 2008 (Release No. 58190).

with Miller's (1977) overpricing effect, which suggests that short sale restrictions dampen the incorporation of negative information into prices, resulting in overpriced securities.

Our results also point to a deterioration in market quality for the affected stocks during the restricted period. Morck et al. (2000) suggest a positive relation between market efficiency and firm-specific risk. Comparing our measure of market efficiency, namely the R^2 from a market model regression, measured before, during, and after the period covered by the Emergency Order, we find significantly higher R^2 values during the restriction period. This result is consistent with a decrease in relative amount of idiosyncratic risk incorporated into stock prices. The short sale restrictions had a negative impact on the liquidity of the affected stocks as bid-ask spreads widened and trading volume decreased. Finally, we find no evidence that daily return volatility decreased during the restricted period. In fact, our evidence suggests that daily return volatility was higher, albeit not significantly higher than a matched sample of financial firms, during the restricted period.

The remainder of this paper is structured as follows. Section I reviews the literature on short sales and discusses our contribution to this literature. Section II details the SEC's Emergency Order restricting short sales. Section III describes our sample and reports descriptive statistics. Section IV reports our primary results on the relation between the Emergency Order and market quality. Section V summarizes and concludes.

I. Literature review

The practice of selling stocks short has been criticized by those who believe that it contributes to the severity of price declines. However, the academic literature provides extensive evidence suggesting that short sale constraints, including regulatory restrictions, costs, and risks of shorting, reduce the efficient pricing of assets, especially in times of negative news. Miller (1977) explores the implications of short sale restrictions when investors have heterogeneous expectations about returns from investing in a risky security. Miller posits that such restrictions may result in overpriced securities as informed, bullish investors bid up stock prices above the price that would prevail in the absence of short sale restrictions. That is, in the absence of short sales, stock prices tend to reflect the views of the more optimistic investors. Alternatively, when informed, bearish investors are willing and able to sell short, negative information is more rapidly incorporated into stock prices, resulting in fewer overvalued securities. Building on Miller's static model, Harrison and Kreps (1978) examine the dynamic consequences of heterogeneous expectations and short sale constraints in a model in which an investor is willing to pay a price higher than their own valuation if there may be a subsequent investor who places a higher value on the stock. In this case, the stock price can exceed the valuation of even the most optimistic investor when investors are not allowed to short sell the stock. Both studies conclude that short sale constraints may result in overpriced stocks and subsequent low returns.

Diamond and Verrecchia (1987) study the effects of short selling restrictions in a rational expectations model with asymmetric information. Their model predicts that, although short sale restrictions do not lead to an upward bias in prices, they do reduce the speed at which stock prices adjust to private information, especially private negative information. Their model also

predicts that the liquidity associated with a downward movement in price is lower when short sales are restricted.

Chen et al. (2002) note that empirical evidence in support of Miller's hypothesis remained sparse after 25 years despite its persuasive and intuitive appeal. During this time, most related studies looked at the relation between short interest and subsequent returns using the level of actual short interest as a proxy for the amount of negative information reflected in stock prices. However, this approach ignores the fact that low short interest may imply that negative information is being held from the market because a stock is difficult or too costly to short, which would result in the underestimation of the overpricing magnitude. Chen et al. develop a model based on Miller's model with low breadth of ownership as a proxy for tighter short-sale constraints and overvaluation. Using data on mutual fund holdings, they find that stocks that experience declines in breadth of ownership subsequently underperform those that experience increases.

Support for Miller's overpricing effect is also found in Boehme et al. (2006), who examine portfolios of firms grouped independently along both short sale constraints and dispersion of investors' beliefs to determine whether firms in the most constrained and highest dispersion portfolios are ex ante overvalued. They find more severe overvaluation when dispersion of beliefs is considered, as compared to studies that examine only the effect of short sale constraints. Boehme et al. suggest that arbitrage may not fully eliminate the observed overpricing since stocks that meet both conditions are often illiquid, resulting in high transaction costs, and their returns may be too volatile to attract arbitrageurs. They conclude their study by

advocating for the relaxation of regulatory burdens that restrict short selling since lower restrictions could counterbalance incentives to inflate share prices by allowing negative information to be more fully reflected in stock prices.

A number of studies have used the overpricing implications of short selling restrictions to explain the reversal of price anomalies. Houge et al. (2001) find empirical support for Miller's hypothesis in a study of the relation between divergence of opinion and the long-run underperformance of initial public offerings (IPOs). The authors argue that institutional controls restrict short selling in the early post-offering period and use the opening bid-ask spread, time of the first trade, and institutional flipping as proxies for the divergence of opinion. Controlling for IPO quality, they find that wide initial spreads, late opening trades, and high levels of institutional flipping are associated with poor long-term returns. Ofek and Richardson (2003) examine the effect of short sales restrictions, which take the form of lockup agreements following IPOs, and suggest a compelling explanation for why the Internet bubble burst in early 2000. Since lockup agreements represent a form of short sale constraint, the expiration of the lockup agreement is equivalent to loosening such constraints. In addition, institutional holdings of Internet stocks during the bubble period was significantly lower than for a sample of control firms, which is consistent with heterogeneity of investor beliefs. Ofek and Richardson suggest that the deflation of the Internet bubble may have at least partially resulted from the increased presence of informed, bearish investors following the expiration of lockup agreements.

Lamont (2004) examines the effects of short sales and market frictions on the efficiency of price discovery for a sample of firms that took legal and regulatory actions to impede the short

sale of their stocks. These actions included accusing short sellers of illegal activities, requesting authorities to investigate short sellers, and lawsuits. Lamont finds that the firms that took these actions underperform in the year subsequent to the legal and regulatory action, a result consistent with the hypothesis that short sales constraints facilitates stock overpricing, resulting in low expected returns.

Charoenrook and Daouk (2005) and Bris et al. (2007) compare market characteristics in countries where short sales are legal and practiced with those where they are prohibited or severely limited. Charoenrook and Daouk find that markets where short selling is permitted tend to have lower aggregate volatility and greater liquidity. They also find that, in markets that permit short selling, liquidity is generally higher in down markets than in up markets and prices tend to increase when short sale restrictions are lifted. While Charoenrook and Daouk's volatility and liquidity results are generally consistent with studies that focus on short selling constraints of individual stocks, their findings suggest that short selling restrictions may have different effects on price discovery at an aggregate level. Bris et al. report a lower downside-minus-upside R^2 in countries where short sales are allowed and practiced, which is consistent with the hypothesis that more idiosyncratic risk is incorporated into prices when short selling is unconstrained. They also report a lower downside-minus-upside cross-autocorrelation between signed-market returns and individual stock returns, consistent with the argument that short selling facilitates more efficient downside price discovery.

Alexander and Peterson (2008) leverage Regulation SHO, which temporarily suspended short sale price tests for a subset of Russell 3000 stocks, to study the impact of price tests on

trader behavior and market quality. The price tests, known on the NYSE as the uptick rule and on the Nasdaq as the bid test, were introduced by the SEC to prevent market manipulation by short sellers. Alexander and Peterson find no evidence that the temporary suspension of the price tests negatively impacted market quality as measured by liquidity, price efficiency, or market volatility. The authors conclude their study by suggesting that such tests should be removed for all stocks. Based on the results of the pilot program, the SEC subsequently removed short sale price tests for all stocks in July, 2007.

Our work contributes to the existing literature by examining the impact of the SEC's temporary restriction of naked short selling for a sample of financial stocks. The SEC's Emergency Order restricting naked short sales is a natural experiment that allows us to employ an event study to directly assess the relation between changes in short selling regulations and changes in stock prices. Additionally, we examine the underlying market quality for the stocks subject to the restrictions, including liquidity, volatility, and the incorporation of idiosyncratic risk into stock prices. Our results contribute to the debate on short sales by suggesting, at the individual stock level, that short sales facilitate a more efficient price discovery.

II. The Securities and Exchange Commission's Emergency Order

Section 12(k)(2) of the Securities Exchange Act of 1934 grants the Securities and Exchange Commission the power to impose restrictions on actions falling under its jurisdiction. On July 15, 2008, the Commission exercised this power by announcing an Emergency Order temporarily banning the short sale of the stocks of 19 financial firms unless the person engaging

in the short sale had borrowed or arranged to borrow the security to be shorted prior to the short sale transaction. This prohibition of "naked" short sales took effect on July 21, 2008 and was scheduled to lapse on July 30, 2008 unless extended by the Commission.

On July 18, 2008, the Commission amended the Emergency Order to exclude certain entities from the short sale restrictions. The excluded entities included registered market makers, block positioners, and other market makers selling short as part of market making and hedging activities. According to the Commission, the amendments were "in the public interest and for the protection of investors to maintain fair and orderly securities markets, and to prevent substantial disruption to securities markets."

The original Emergency Order was scheduled to lapse on July 30, 2008. However, on July 29, 2008, the Commission extended the Emergency Order again justifying an extension as "in the public interest and necessary to maintain fair and orderly securities markets and for the protection of investors." The extension continued the naked short sale restrictions through August 12, 2008. At 11:59 p.m. EDT, August 12, 2008, the restrictions lapsed without an additional extension, permitting all investors to again pursue naked short sales.

We measure abnormal returns around two important dates. First, we examine the market reaction to the initial announcement of the Emergency Order, which was issued on July 15, 2008. Second, we examine the market reaction to the end of the short sale restrictions. Although the short sale restrictions were scheduled to expire on August 12, 2008, the SEC had the power to extend the Emergency Order a second time. Thus, it is reasonable to expect that the expiration of the Emergency Order contained some information for market participants.

Our empirical tests measuring market liquidity and price informativeness focus on three periods. The focal point is the 17 trading days during which short sales were restricted by the Emergency Order. This 17 day period extends from July 21, 2008 through August 12, 2008. We refer to this period as the "restricted period." In order to identify changes in the market for the affected securities, we compare the restricted period to (1) the 17 trading days ending the day before the announcement of the short sale restrictions (June 19, 2008 through July 14, 2008) and (2) the 17 trading days beginning with the expiration of the short sale restrictions (August 13, 2008 through September 5, 2008). We refer to these periods as the "pre-period" and "post-period," respectively. The next section describes our sample and the methodology utilized in this study.

III. Sample construction, matching procedure and descriptive statistics

In Table I we identify the 19 firms affected by the SEC's Emergency Order. With the exceptions of BNP Paribas Securities Corp. and Daiwa Securities Group Inc., which trade over the counter, the common stock of each firm trades on the New York Stock Exchange. All 19 firms operate in the financial services industry, including 17 Wall Street firms and 2 mortgage-lending giants (Fannie Mae and Freddy Mac).

<<TABLE I ABOUT HERE>>

We utilize a matched sample of NYSE stocks drawn from the Center for Research in Security Prices (CRSP) universe to examine stock returns, price informativeness, and market liquidity effects associated with the short sale restrictions. The CRSP data requirement results in the exclusion of BNP Paribas Securities Corp. and Daiwa Securities Group Inc. as CRSP does not track firms traded on the Pink Sheets. The remaining 17 stocks make up our base sample. Our matching procedure begins with the requirement that all match firms have a Standard Industrial Classification (SIC) in the 6000-6799 (financial firms) range. For all match firm candidates that meet the SIC requirement, we calculate the mean market value of equity, closing stock price, volatility of daily returns, and daily turnover between January 1, 2007 and December 31, 2007.[3] Market value of equity corresponds to the dollar value of shares outstanding in the US. Volatility of daily returns is computed as the standard deviation of daily returns. Daily turnover is the ratio of the daily number of shares traded to the number of shares outstanding. The match for each of the stocks subject to short sale restrictions is determined by finding the stock that minimizes the following expression:

$$Distance = \Sigma_i \left| (factor_i^{restricted} - factor_i^{matched}) / ((factor_i^{restricted} + factor_i^{matched})/2) \right| , \quad (1)$$

where the factors refer to the four variables described above. Restricted refers to each of the firms subject to the SEC's Emergency Order while matched refers to all firms not subject to the

[3] Due to data availability, the calculation period for The Royal Bank of Scotland's stock and its match candidates begins on October 18, 2007.

short sale restrictions with an SIC code between 6000 and 6799.[4] Matches are performed without replacement, resulting in a unique match for each firm subject to the short sale restrictions.

In Table II we report descriptive statistics for both the base sample and the matched sample. At the bottom of Table II we report the results of a t-test of the difference of the means and a Wilcoxon rank sum test of the difference of the medians for each of the four match criteria. The results of these tests suggest that there is no statistically significant difference in the means or medians of the base sample as compared to the matched sample under any of the four measures.

<<TABLE II ABOUT HERE>>

IV. Empirical results

The focus of our empirical analysis is threefold. First, we perform an event study that measures the market's reaction to the announcement and expiration of the Emergency Order. Second, we consider the impact of the short sale restrictions on liquidity by examining bid-ask spreads and trading volume. Third, we consider the volatility of stock returns and the incorporation of idiosyncratic risk before, during, and after the short sale restrictions.

A. Event study results

[4] Robustness tests indicate that our results are essentially unchanged when matching without an SIC Code requirement or using Fama and French's (1997) industry classifications as the industry filter.

In an efficient market, market participants' view of the short sale restrictions should be reflected in stock returns around the key event dates related to the Emergency Order. In order to gauge the market's receptiveness to the short sale restrictions, we measure abnormal returns around both the announcement and expiration of the Emergency Order. Our benchmark for measuring abnormal returns is the market model:

$$R_t = \alpha + BR_m + \varepsilon_t \,, \tag{2}$$

where R_t is the return on the stock, R_m is the return on the market index (the S&P500 in our analysis), and β is a measure of systematic risk. The market model is estimated over the calendar year beginning on June 1, 2007 and ending on May 31, 2008. Daily abnormal returns are calculated by subtracting the expected return based on the market model from the actual return. Cumulative abnormal returns are calculated by summing the daily abnormal returns over the event window. Announcement returns are calculated over the 5 trading day window beginning on July 15, 2008 and ending on July 21, 2008. Expiration returns are calculated over the 5 trading day window beginning on August 13, 2008 and ending on August 19, 2008.[5]

We report the results of our event study analysis in Table III. The first column lists the stocks that are the focus of the short sale restrictions. Columns 2 and 3 report the announcement period abnormal returns for the base sample and the matched sample, respectively. Columns 4 and 5 report the expiration period abnormal returns for the base sample and the matched sample, respectively. At the bottom of Table III we report the results of t-tests and Wilcoxon rank sum tests.

[5] Additional tests indicate that our results are robust to alternative event windows.

<<TABLE III ABOUT HERE>>

The results for the stocks of the firms subject to the short sale restrictions are striking, as all 17 exhibit positive cumulative abnormal returns over the announcement window. The stock of the mean (median) firm subject to the short sale restrictions experienced a significant 16.9% (12.4%) cumulative abnormal return at the announcement. The matched sample results indicate that the positive impact was not limited to the stocks subject to the short sale restrictions, as 14 of 17 matching financial stocks also experienced positive cumulative abnormal return at the announcement, with a mean (median) value of 11.2% (5.4%). The announcement period abnormal returns difference between the two samples is economically significant but only marginally statistically significant.

The expiration of the Emergency Order was greeted with negative cumulative abnormal returns for the vast majority of the base and matched sample firms. The mean (median) cumulative abnormal return was -5.2% (-4.2%) for the sample of stocks subject to the short sale restrictions and -0.7% (-0.8%) for the matched sample. Tests of significance indicate that the negative returns for the sample of stocks subject to the short sale restrictions and the -4.5% difference in returns between the base and matched sample are statistically significant at the highest confidence intervals.

Together, these results are consistent with Miller's (1977) overpricing hypothesis which suggests that, in the presence of short sale constraints, stock prices tend to reflect the views of

the more optimistic investors. Consistent with Miller's hypothesis, the price of the stocks for which short sales were restricted rose when the restrictions were announced. This is consistent with prices adjusting to reflect the valuations of the more optimistic investors. The expiration of the short sale restrictions eliminated constraints on pessimistic investors. This allowed them to more freedom to establish a bearish position in the firms, which resulted in a decline in stock prices.

B. Liquidity

Amihud and Mendelson (1986) document a positive relation between liquidity and a company's cost of capital. If short sale constraints are associated with higher trading costs, Amihud and Mendelson's results suggest that firms subject to such constraints are at a competitive disadvantage when compared to firms without short sale constraints. In this section, we examine the effect of the Emergency Order on liquidity by examining percentage closing bid-ask spreads, defined as the difference between the closing bid and ask quotes divided by the quote midpoint, and trading volume.

B.1. Bid-ask spreads

In Table IV we report our analysis of percentage closing bid-ask spreads before, during and after the period covered by the Emergency Order. The short sale restrictions were in effect from July21, 2008 through August 12, 2008 which is a total of 17 trading days. For comparison purposes, we also examine the 17 trading days immediately preceding the announcement of the

short sale restrictions (June 19, 2008 – July 14, 2008, "pre-period") and the 17 trading days beginning with the expiration of the short sale restrictions (August 13, 2008 – September 5, 2008, "post-period"). For expositional purposes, we construct ratios of mean closing bid-ask spreads for each of the 17 firms subject to the short sale restrictions and their matched firm. Columns 2 and 3 report the ratio of the mean bid-ask spread during the restricted period to the mean bid-ask spread during the pre-period for the sample of stocks subject to the short sale restrictions and the matched sample, respectively. Columns 4 and 5 report the ratio of bid-ask spreads for the restricted period to bid-ask spreads during the post-period, while columns 6 and 7 report the ratio of the bid-ask spreads for the pre-period to bid-ask spreads during the post-period. By construction, a ratio equal to one suggests no change in bid-ask spreads from period to period, while a ratio greater (less) than one suggests that spreads increased (decreased).

<<TABLE IV ABOUT HERE>>

The first column of results suggest that bid-ask spreads increased significantly for the stocks subject to the short sale restrictions from the pre-period to the restricted period. The mean (median) ratio of 1.733 (1.637) suggests that bid-ask spreads increased by over 73% (63%) during the restricted period. The same pattern is not present for the matched sample as ratio of mean spreads from the pre-period to the restricted period is not statistically different than one. T-test and Wilcoxon rank sum tests indicate that the difference between the base sample and the matched sample is highly significant.

In columns 4 and 5 we report that percentage closing bid-ask spreads were higher for both the base sample and the matched sample during the restricted period as compared to the post-period. The mean (median) ratio of 1.568 (1.422) suggests that bid-ask spreads were over 56% (42%) higher for stocks subject to the short sale restrictions during the restricted period. Bid-ask spreads were also significantly higher for the matched sample during the restricted period. However, a t-test and Wilcoxon rank sum test both confirm that the increase in spreads is significantly higher for the stocks subject to the short sale restrictions.

The final two columns of Table IV report little difference in bid-ask spreads between the pre-period and post-period for the sample of stocks subject to the short sale restrictions. These results suggest that the increase in bid-ask spreads observed during the restricted period was a temporary phenomenon, which we attribute to the SEC's Emergency Order restricting naked short sales.

B.2 Trading volume

Along with bid-ask spreads, trading volume is an important measure of liquidity. In Table V, we compare the trading volume for the base sample and matched sample in the periods before, during, and after the short sale restrictions. As in Table IV, ratios are used to illustrate the relative trading volume between periods.

The first column of results in Table V provides evidence of a decline in trading volume for the sample of stocks subject to short sale restrictions from the pre-period to the restricted period. The sample mean (median) ratio of 0.853 (0.858) suggests that trading volume decreased

by 14.7% (14.2%) during the restricted period. Relative trading volume is significantly lower for the base sample than for the matched sample when the restricted period is compared to the pre-period and the post-period.

<<TABLE V ABOUT HERE>>

The remaining results in Table V suggest that the volume decline continued in the post-period not only for the base sample, but also for the matched sample. These results are consistent with the well documented decrease in trading volume during the summer months. However, there is no reason to believe that the seasonal decrease in trading volume would begin to affect the stocks subject to the short sale restrictions earlier than the matched sample. This leads us to interpret our results, particularly those comparing the restricted period to the pre-period, as consistent with the notion that the short sale restrictions had a negative impact on trading volume for the stocks subject to the restrictions. Together, the bid-ask spread and trading volume results suggest that the short sale restrictions had a negative impact on the liquidity of the stocks for which naked short sales were temporarily prohibited.

C. Stock return volatility

Proponents of short sale restrictions often cite lower volatility as justification for such restrictions. However, Charoenrook and Daouk (2005) suggest that there is no widely accepted theory on the association between short-selling and stock return volatility. In Kraus and Rubin's

(2002) model, short sale constraints can cause return volatility to increase or decrease depending on the model's parameters. In Table VI we examine the relation between the Emergency Order restricting naked short sales and stock return volatility. As in prior tables, ratios are used to capture differences in stock return volatility across periods.

The results comparing volatility during the restricted period to the pre-period are presented in columns 2 and 3. Contrary to the notion that short sale constraints reduce return volatility, the results in Table VI suggest that return volatility increased during the restricted period. However, this increase is not unique to the stocks subject to the short sale restrictions. The matched sample exhibits a similar increase in return volatility during this period. We document a similar result when comparing the restricted period to the post-period in columns 4 and 5. Stock return volatility for both the base sample and matched sample was higher during the restricted period than the post-period. There is evidence that the increase in volatility was more pronounced for the matched sample than the base sample of stocks for which short sales were restricted. The final two columns of results report that, in the post-period, return volatility returned to a level similar to that observed during the pre-period.

<<TABLE VI ABOUT HERE>>

The results reported in Table VI suggest that volatility increased during the restricted period for not only those stocks subject to short sale restrictions, but financial stocks as a whole.

The volatility increases generally appear to have disappeared following the expiration of the short sale restrictions.

D. Idiosyncratic risk

Roll (1988) examines R^2 values from the CAPM and APT models to study the explanatory power of systematic economic factors. Stocks with high R^2 values exhibit price movements that are synchronized with the market, indicating a relatively lower sensitivity to firm-level information. Examining R^2 values in various international markets, Morck et al. (2000) find that the systematic component of returns is large in emerging markets, while idiosyncratic returns are higher in developed markets with strong property rights. In a country-level examination of short sale constraints, Bris et al. (2007) provide evidence that negative information is impounded faster into prices in countries where short sales are common.

In Table VII we report the results of an analysis of R^2 from a simple market model regression in the periods before, during, and after the short sale restrictions.[6] We report three R^2 values for each sample firm. The first column of results reports the R^2 from a market model regression over the 17 trading days ending the day before the announcement of the Emergency Order. The mean R^2 is 0.385. The second column of results reports the R^2 from a market model regression during the 17 trading days that comprise the restricted period. During this period the mean R^2 is 0.598. It is noteworthy that 14 of 17 stocks experienced increases in their R^2 from the pre-period to the restricted period. In the 17 trading days beginning with the expiration of the

[6] Consistent with Roll (1988), reported R^2 values are actually adjusted-R^2s from a market model regression.

Emergency Order, the mean R^2 declines to 0.519, as reported in the final column. T-tests of the difference in means between the periods suggest that R^2 values are significantly higher during the restricted period as compared to the pre- and post-periods. These results are consistent with the notion that, for the sample of stocks subject to the short sale restrictions, short sale restrictions limit the relative amount of idiosyncratic risk incorporated into prices.

<<TABLE VII ABOUT HERE>>

V. Conclusions

On July 15, 2008, the United States Securities and Exchange Commission issued an Emergency Order restricting short sales of the common stock of 19 financial firms. In the Emergency Order, the Commission stated that the restrictions are "in the public interest and for the protection of investors to maintain fair and orderly securities markets, and to prevent substantial disruption in the securities markets." However, academic research on the topic of short sales suggests that short sale constraints have a negative impact on market quality. This study exploits the natural experiment that is the Emergency Order to investigate the impact of short sale restrictions. We report evidence consistent with the view that short sale restrictions have a negative impact on market quality.

Consistent with Miller's (1977) overpricing effect, we find that abnormal returns at the announcement of the short sale restrictions were positive for the affected stocks. However, a portion of these gains were returned at the expiration of the Emergency Order. Several proxies

for liquidity and price informativeness suggest that the short sale restrictions had a negative impact on the market quality of the stocks of the firms for which short sales were restricted.

Recent actions by regulators suggest that they are not finished in this area. On September 18, 2008, the U.K. Financial Services Authority imposed a four month ban on short selling of financial stocks. The next day, the U.S. Securities and Exchange Commission issued an Emergency Order prohibiting short sales of the stocks of 799 financial firms. Within days, the NYSE and Nasdaq added nearly 100 companies to the SEC's list of firms for which short sales were prohibited. Short sale restrictions were also imposed in France, Ireland, and Portugal while naked short sales were banned in Australia. Other countries are considering similar actions. Our results complement prior research which concludes that restrictions on short sales damage market quality. In light of these results, regulators may want to tread lightly.

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Table I
Securities subject to the short sale restrictions
This table lists the 19 financial firms impacted by the United States Securities and Exchange Commission's 2008 Emergency Order restricting naked short sales. Also listed is the ticker symbol for the common stock of the firm that is traded in the United States.

Company	Ticker(s)
Allianz SE	AZ
Bank of America Corp	BAC
Barclays PLC	BCS
BNP Paribas Securities Corp	BNPQF/BNPQY
Citigroup Inc	C
Credit Suisse Group	CS
Daiwa Securities Group Inc	DSECY
Deutsche Bank Group AG	DB
Fannie Mae	FNM
Freddie Mac	FRE
Goldman Sachs Group Inc	GS
HSBC Holdings Plc ADS	HBC
JPMorgan Chase & Co	JPM
Lehman Brothers Holdings Inc	LEH
Merrill Lynch & Co Inc	MER
Mizuho Financial Group Inc	MFG
Morgan Stanley	MS
Royal Bank ADS	RBS
UBS AG	UBS

Table II
Base and matched sample characteristics

This table presents the descriptive statistics for a sample of stocks for which naked short sales were restricted by the SEC's 2008 Emergency Order and a matching sample of NYSE stocks with SIC codes between 6000 and 6799 from the Center for Research in Security Prices (CRSP) universe. The four variables presented in the table represent the criteria used to identify the matched sample. MVE is the mean market value of shares outstanding in the United States. Price is the mean closing stock price. Turnover is the mean ratio of the daily number of stocks traded to the number of shares outstanding. Volatility is the standard deviation of daily returns. All variables are calculated over the period January 1, 2007 through December 31, 2007. P-values are for t-tests of the difference of means and Wilcoxon rank sums test for difference of medians.

	MVE		Price		Turnover		Volatility	
	Sample	Matched Sample	Sample	Matched Sample	Sample	Matched Sample	Sample	Matched Sample
Allianz SE	2,265,795	2,489,108	21.554	28.425	9.029	8.845	0.016	0.015
Bank of America Corp	220,432,883	172,473,029	49.540	66.705	5.094	5.113	0.014	0.015
Barclays PLC	3,345,822	2,917,289	53.772	57.534	12.865	12.357	0.023	0.018
Citigroup Inc	236,392,183	39,720,171	47.778	42.823	8.274	5.871	0.018	0.017
Credit Suisse Group	3,407,378	3,700,269	68.972	65.480	16.209	11.191	0.016	0.019
Deutsche Bank Group AG	67,935,739	30,289,182	136.331	90.124	0.765	0.425	0.017	0.015
Fannie Mae	56,027,518	70,252,000	57.515	59.238	8.080	6.314	0.034	0.018
Freddie Mac	39,144,131	24,637,425	57.942	69.672	9.040	9.992	0.034	0.019
Goldman Sachs Group Inc	87,134,311	19,740,080	211.838	84.659	23.560	24.983	0.022	0.024
HSBC Holdings Plc ADS	10,052,271	14,717,978	90.745	91.444	9.136	7.980	0.012	0.016
JPMorgan Chase & Co	163,277,203	116,538,705	47.754	34.731	5.556	5.140	0.017	0.017
Lehman Brothers Holdings Inc	36,818,598	32,701,534	69.225	36.627	18.838	15.318	0.026	0.029
Merrill Lynch & Co Inc	68,900,960	28,878,411	79.100	70.498	14.282	11.054	0.023	0.024
Mizuho Financial Group Inc	214,891	224,640	12.630	12.807	9.911	9.797	0.022	0.020
Morgan Stanley	75,575,114	97,537,985	71.558	50.932	9.461	6.007	0.023	0.017
Royal Bank ADS	1,247,074	1,008,418	9.555	8.221	10.531	11.988	0.033	0.029
UBS AG	120,298,081	47,464,223	57.145	65.968	1.126	0.866	0.017	0.013
Mean	70,145,291	41,487,673	67.233	55.052	10.103	9.014	0.022	0.019
Difference	28,657,618		12.180		1.089		0.002	
P-value	(0.196)		(0.359)		(0.586)		(0.223)	
Median	56,027,518	28,878,411	57.515	59.238	9.136	8.845	0.022	0.018
Difference	27,149,107		-1.723		0.291		0.003	
P-value	(0.352)		(0.783)		(0.605)		(0.389)	

Table III
Event study cumulative abnormal returns

This table reports the results of an event study analysis of cumulative abnormal returns at the announcement and expiration of the United States Securities and Exchange Commission's 2008 Emergency Order restricting naked short sales. Results for both event windows are reported for the 17 stocks subject to the short sale restrictions that are traded on the NYSE and a matched sample of 17 financial firms not subject to the restrictions that are matched according to most closely approximate the sample firms based on the following criteria: market value of equity, stock price, daily turnover, and volatility of daily returns. Abnormal returns are measured relative to the market model. The table reports cumulative abnormal returns around the announcement date (July 15-21, 2008) and the expiration date (August 13-19, 2008) which are calculated as the sum of the daily abnormal returns. P-values are for t-tests of the difference of means and Wilcoxon rank sums test for difference of medians.

	[July 15, July 21]		[August 13, August 19]	
Company	Sample	Matched sample	Sample	Matched sample
Allianz SE	0.010	0.036	-0.042	0.018
Bank of America Corp	0.358	0.149	-0.040	-0.032
Barclays PLC	0.164	0.054	-0.086	-0.004
Citigroup Inc	0.240	-0.027	-0.022	-0.016
Credit Suisse Group	0.083	0.047	-0.060	-0.037
Deutsche Bank Group AG	0.073	0.104	-0.056	-0.015
Fannie Mae	0.446	0.050	-0.207	0.016
Freddie Mac	0.264	0.168	-0.134	-0.004
Goldman Sachs Group Inc	0.093	0.035	-0.029	-0.011
HSBC Holdings Plc ADS	0.075	-0.022	-0.023	0.020
JPMorgan Chase & Co	0.180	0.251	-0.017	-0.037
Lehman Brothers Holdings Inc	0.362	0.544	-0.044	0.023
Merrill Lynch & Co Inc	0.136	0.137	0.022	-0.008
Mizuho Financial Group Inc	0.033	0.070	-0.025	-0.003
Morgan Stanley	0.107	0.309	-0.049	-0.038
Royal Bank ADS	0.124	-0.035	-0.090	0.028
UBS AG	0.124	0.040	0.015	-0.013
Mean	0.169	0.112	-0.052	-0.007
P-value	(0.000)	(0.006)	(0.001)	(0.227)
Difference	0.056		-0.045	
P-value	(0.143)		(0.011)	
Median	0.124	0.054	-0.042	-0.008
P-value	(0.000)	(0.000)	(0.000)	(0.329)
Difference	0.070		-0.033	
P-value	(0.092)		(0.001)	

Table IV
Closing bid-ask spreads

This table reports closing bid-ask spreads around the United States Securities and Exchange Commission's 2008 Emergency Order restricting naked short sales. Results are reported for the 17 stocks subject to the short sale restrictions that are traded on the NYSE and a matched sample of 17 financial firms not subject to the restrictions that are matched to most closely approximate the sample firms based on the following criteria: market value of equity, stock price, daily turnover, and volatility of daily returns. Three ratios are reported in the table for each sample: (1) mean percentage closing bid-ask spreads during the 17 day restricted period divided by mean percentage closing bid-ask spreads in the 17 days immediately prior to the announcement of the restrictions; (2) mean percentage closing bid-ask spreads during the 17 day restricted period divided by mean percentage closing bid-ask spreads in the 17 days beginning with the expiration of the restrictions; and (3) mean percentage closing bid-ask spreads in the 17 days immediately prior to the restricted period divided by the mean percentage closing bid-ask spreads in the 17 days beginning with the expiration of the restrictions. P-values are for t-tests of the difference of means and Wilcoxon rank sums test for difference of medians.

	During/Before		During/After		Before/After	
	Sample	Matched sample	Sample	Matched sample	Sample	Matched sample
Allianz SE	1.637	0.837	1.158	1.048	0.707	1.252
Bank of America Corp	1.550	1.031	1.525	0.898	0.984	0.871
Barclays PLC	2.319	1.153	1.279	1.359	0.551	1.178
Citigroup Inc	1.244	0.679	1.390	1.049	1.117	1.545
Credit Suisse Group	2.282	1.372	2.107	1.469	0.923	1.071
Deutsche Bank Group AG	2.225	0.947	1.747	0.999	0.785	1.055
Fannie Mae	2.180	1.410	1.001	1.434	0.459	1.018
Freddie Mac	1.186	1.426	1.038	1.924	0.875	1.350
Goldman Sachs Group Inc	1.593	1.005	1.398	1.281	0.877	1.274
HSBC Holdings Plc ADS	1.425	0.934	1.422	1.442	0.998	1.543
JPMorgan Chase & Co	1.648	0.718	2.254	1.116	1.368	1.555
Lehman Brothers Holdings Inc	1.183	1.246	1.306	1.004	1.103	0.806
Merrill Lynch & Co Inc	2.360	0.806	1.941	0.955	0.822	1.185
Mizuho Financial Group Inc	0.999	1.175	1.050	0.959	1.052	0.816
Morgan Stanley	1.096	1.416	1.594	1.625	1.455	1.147
Royal Bank ADS	2.141	1.089	1.555	1.230	0.726	1.129
UBS AG	2.401	0.822	2.887	0.669	1.202	0.814
Mean	1.733	1.063	1.568	1.204	0.942	1.153
P-value	(0.000)	(0.317)	(0.000)	(0.016)	(0.377)	(0.022)
Difference	0.671		0.364		-0.212	
P-value	(0.000)		(0.016)		(0.022)	
Median	1.637	1.031	1.422	1.116	0.923	1.147
P-value	(0.000)	(0.404)	(0.000)	(0.015)	(0.306)	(0.045)
Difference	0.606		0.306		-0.224	
P-value	(0.000)		(0.018)		(0.030)	

Table V
Daily trading volume

This table reports relative trading volume around the United States Securities and Exchange Commission's 2008 Emergency Order restricting naked short sales. Results are reported for the 17 stocks subject to the short sale restrictions that are traded on the NYSE and a matched sample of 17 financial firms not subject to the restrictions that are matched to most closely approximate the sample firms based on the following criteria: market value of equity, stock price, daily turnover, and volatility of daily returns. Three ratios are reported in the table for each sample: (1) mean trading volume during the 17 day restricted period divided by mean trading volume in the 17 days immediately prior to the announcement of the restrictions; (2) mean trading volume during the 17 day restricted period divided by mean trading volume in the 17 days beginning with the expiration of the restrictions; and (3) mean trading volume in the 17 days immediately prior to the restricted period divided by the mean trading volume in the 17 days beginning with the expiration of the restrictions. P-values are for t-tests of the difference of means and Wilcoxon rank sums test for difference of medians.

	During/Before		During/After		Before/After	
Company	Sample	Matched sample	Sample	Matched sample	Sample	Matched sample
Allianz SE	0.571	0.896	0.981	1.730	1.717	1.931
Bank of America Corp	1.002	1.328	1.482	1.176	1.480	0.885
Barclays PLC	0.627	1.158	1.285	1.232	2.050	1.064
Citigroup Inc	0.883	1.214	1.477	1.280	1.672	1.054
Credit Suisse Group	0.774	1.182	1.228	1.632	1.587	1.381
Deutsche Bank Group AG	0.904	1.033	0.988	1.473	1.093	1.426
Fannie Mae	0.870	1.097	0.576	1.472	0.662	1.341
Freddie Mac	0.871	0.896	0.520	1.447	0.597	1.616
Goldman Sachs Group Inc	0.658	1.171	1.050	1.052	1.596	0.898
HSBC Holdings Plc ADS	0.901	0.898	1.455	1.672	1.614	1.862
JPMorgan Chase & Co	0.802	1.169	1.219	1.500	1.521	1.283
Lehman Brothers Holdings Inc	0.538	1.877	0.701	2.444	1.303	1.302
Merrill Lynch & Co Inc	1.765	1.102	1.762	1.713	0.999	1.554
Mizuho Financial Group Inc	1.030	0.682	1.287	0.956	1.249	1.400
Morgan Stanley	0.858	1.459	1.285	1.936	1.497	1.327
Royal Bank ADS	0.795	0.838	1.569	1.097	1.974	1.309
UBS AG	0.651	0.780	1.497	1.190	2.299	1.526
Mean	0.853	1.105	1.198	1.471	1.465	1.362
P-value	(0.043)	(0.148)	(0.035)	(0.000)	(0.001)	(0.000)
Difference	-0.252		-0.273		0.103	
P-value	(0.027)		(0.073)		(0.468)	
Median	0.858	1.102	1.285	1.472	1.521	1.341
P-value	(0.006)	(0.207)	(0.051)	(0.000)	(0.001)	(0.000)
Difference	-0.244		-0.187		0.180	
P-value	(0.003)		(0.113)		(0.302)	

Table VI
Standard deviation of daily returns

This table reports the standard deviation of daily returns around the United States Securities and Exchange Commission's 2008 Emergency Order restricting naked short sales. Results are reported for the 17 stocks subject to the short sale restrictions that are traded on the NYSE and a matched sample of 17 financial firms not subject to the restrictions that are matched to most closely approximate the sample firms based on the following criteria: market value of equity, stock price, daily turnover, and volatility of daily returns. Three ratios are reported in the table for each sample: (1) standard deviation of daily returns during the 17 day restricted period divided by the standard deviation of daily returns over the 17 days immediately prior to the announcement of the restrictions; (2) standard deviation of daily returns during the 17 day restricted period divided by the standard deviation of daily returns over the 17 days beginning with the expiration of the restrictions; and (3) standard deviation of daily returns in the 17 days immediately prior to the restricted period divided by the standard deviation of daily returns over the 17 days beginning with the expiration of the restrictions. P-values are for t-tests of the difference of means and Wilcoxon rank sums test for difference of medians.

	During/Before		During/After		Before/After	
Company	Sample	Matched sample	Sample	Matched sample	Sample	Matched sample
Allianz SE	1.236	1.021	1.075	1.873	0.870	1.834
Bank of America Corp	1.562	2.174	1.446	1.759	0.925	0.809
Barclays PLC	1.156	1.080	1.088	2.162	0.942	2.001
Citigroup Inc	1.534	1.553	1.438	1.678	0.938	1.081
Credit Suisse Group	1.382	1.138	1.593	1.762	1.153	1.549
Deutsche Bank Group AG	1.151	1.648	1.121	1.208	0.974	0.733
Fannie Mae	1.266	1.203	0.770	1.356	0.608	1.127
Freddie Mac	1.004	1.393	0.648	1.770	0.645	1.271
Goldman Sachs Group Inc	1.173	2.402	1.485	1.702	1.266	0.709
HSBC Holdings Plc ADS	1.524	1.032	1.372	1.561	0.900	1.513
JPMorgan Chase & Co	1.620	1.530	1.459	1.448	0.900	0.946
Lehman Brothers Holdings Inc	1.115	0.885	1.412	1.732	1.266	1.957
Merrill Lynch & Co Inc	1.676	1.288	1.629	1.708	0.972	1.327
Mizuho Financial Group Inc	1.688	0.979	1.798	0.896	1.065	0.916
Morgan Stanley	1.535	1.589	1.416	1.967	0.922	1.238
Royal Bank ADS	1.126	1.312	1.269	1.644	1.127	1.253
UBS AG	0.962	1.448	1.159	1.099	1.205	0.759
Mean	1.336	1.393	1.305	1.607	0.981	1.237
P-value	(0.000)	(0.001)	(0.001)	(0.000)	(0.681)	(0.033)
Difference	-0.057		-0.303		-0.256	
P-value	(0.628)		(0.016)		(0.038)	
Median	1.266	1.312	1.412	1.702	0.942	1.238
P-value	(0.000)	(0.000)	(0.001)	(0.000)	(0.747)	(0.057)
Difference	-0.046		-0.291		-0.296	
P-value	(0.973)		(0.007)		(0.079)	

Table VII
Market model R^2

This table reports the adjusted R^2 values from market model regressions of daily returns around the United States Securities and Exchange Commission's 2008 Emergency Order restricting naked short sales. Results are reported for the 17 stocks subject to the short sale restrictions that are traded on the NYSE. Results are reported for three windows: (1) the 17 days immediately prior to the announcement of the restrictions; (2) the 17 day restricted period; and (3) the 17 days beginning with the expiration of the restrictions. P-values are for t-tests of the difference of means and Wilcoxon rank sums test for difference of medians.

	[June 19, July 14]	[July 15, August 12]	[August 13, September 5]
Allianz SE	0.687	0.534	0.601
Bank of America Corp	0.615	0.557	0.587
Barclays PLC	0.539	0.461	0.635
Citigroup Inc	0.535	0.783	0.739
Credit Suisse Group	0.436	0.520	0.539
Deutsche Bank Group AG	0.223	0.741	0.697
Fannie Mae	0.161	0.313	0.209
Freddie Mac	0.116	0.405	-0.003
Goldman Sachs Group Inc	0.347	0.747	0.471
HSBC Holdings Plc ADS	0.403	0.588	0.337
JPMorgan Chase & Co	0.342	0.711	0.695
Lehman Brothers Holdings Inc	0.051	0.712	0.629
Merrill Lynch & Co Inc	0.620	0.679	0.652
Mizuho Financial Group Inc	0.027	0.518	0.085
Morgan Stanley	0.446	0.484	0.418
Royal Bank ADS	0.103	0.331	0.368
UBS AG	0.203	0.633	0.627
Mean	0.344	0.572	0.487
Difference (period - restricted period)	-0.227		-0.084
P-value	(0.001)		(0.052)