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### **Abstract**

In response to the sharp decline in prices of financial stocks in the fall of 2008, regulators in a number of countries banned short selling of particular stocks and industries. Evidence suggests that these bans did little to stop the slide in stock prices, but significantly increased costs of liquidity. In August 2011, the U.S. market experienced a large decline when Standard and Poor's announced a downgrade of U.S. debt. Our cross-sectional tests suggest that the decline in stock prices was not significantly driven or amplified by short selling. Short selling does not appear to be the root cause of recent stock market declines. Furthermore, banning short selling does not appear to prevent stock prices from falling when firm-specific or economy-wide economic fundamentals are weak, and may impose high costs on market participants.

Key words: short selling, down grade

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# Market Declines: Is Banning Short Selling the Solution?

## Introduction

On August 11, 2011, European regulators, in response to the continent's debt problems, decided to limit short selling. Existing bans on short selling in Greece and Turkey were supplemented by bans on short selling of financial stocks in France, Belgium, Italy and Spain. On August 25, 2011, Italian and Spanish regulators extended their bans through September 30, 2011 while French regulators indicated that their ban could last until November 11<sup>th</sup>. Over this time period, the U.S. was under pressure to follow suit.

There are many unresolved questions concerning short selling, short selling bans, and ad hoc short selling bans in particular. Should the US have also banned short selling in financial stocks in August 2011? In this article, we first examine the link between market declines and short selling, and consider the potential benefits and costs of short selling activity vis-à-vis the real economy. We continue with a discussion of the effectiveness of short sale bans in limiting stock price declines, as well as the costs imposed by these bans. Empirical analysis suggests that while short sale bans are often politically popular, they are not only costly, but ultimately do little to slow market declines.

## Short Selling

In order to understand short selling bans, we begin with short selling. Short selling is selling unowned shares with the expectation of covering the position later by repurchasing the shares at lower prices. Short selling is common. Diether, Lee, and Werner (2009) show that short selling accounted for 24% of New York Stock Exchange and 31% of Nasdaq volume during

2005. Most short sales are by market makers or high frequency traders who profit by providing short-term liquidity to the market, or by options market makers who short to hedge their options positions. Market makers and high-frequency traders do not like to maintain short positions. They typically close them within minutes or even seconds of opening them.

Our focus is on investors who short stocks for longer periods of time to profit from an expected decline in the stock price. These investors borrow shares to sell. The lender is usually an institution, often one with a passive investing strategy. The borrower places collateral, usually cash, with the lender. The standard collateral for U.S. equities is 102% of the shares' value. The lender pays interest on the collateral at a rebate rate that is negotiated between the borrower and lender. For stocks that are easy to borrow, rebate rates may range between 8 and 25 basis points below the Federal Funds rate with larger loans receiving a larger rebate. The difference between the Fed Funds rate and the rebate rate is compensation to the lender for lending the shares. If there is a large demand for shares to short, or a small supply of shares to be lent, the stock may be hard-to-borrow. In this case, the rebate rate may be substantially below the Fed Funds rate. In extreme cases the rebate rate can turn negative. The borrower pays interest rather than receiving interest on the collateral.

### **Short Selling and Market Declines**

From a long-run growth perspective, it is a problem if stocks are overpriced relative to their fundamental values. The market will eventually correct the mispricing, but in the meantime, real resources may flow to the overpriced stock or industry. And while stocks are liquid financial instruments, the investments in the mispriced firm or industry may not be so liquid, leading to long-term disruptions in the real economy long after the stock price is corrected. Consider new

firms caught at the end of the Internet bubble – while it took a short amount of time for the market correction to fix what were, in retrospect, overpriced technology stocks, the employees, customers, suppliers, and lenders to those firms took much longer to react, recover, and return to productivity at another firm or in another industry.

In much the same way, an artificially underpriced stock provides a distorted signal to investors. The effect is the reverse- capital flows away from the stock or industry toward other investments when it could have been put to better use at the original firm. Hence regulators and economists generally agree that it is good for short selling to depress stock prices if shares are overpriced, but bad if short selling pushes stock prices below their fundamental values.

Short sellers claim that by identifying overvalued stocks and correcting the mispricing, they provide an invaluable service to investors. For example, short seller James Chanos testified to the House Committee on Energy and Commerce in 2002 that his firm looked for companies with materially overstated earnings, a flawed business plan, or that engaged in outright fraud. Months before Enron's collapse, Chanos began shorting the stock based on suspicious gain-on-sale accounting, cryptic disclosure of related party transactions, and an apparent return on investments that was less than its cost of capital. Chanos testified that almost all recent financial fraud had been discovered by short sellers or journalists, rather than Wall Street analysts or the SEC.

Economists and regulators applaud this kind of activity. Their concern is that short sellers will artificially drive prices below their fundamental values. It is not easy for short sellers to make money in this way, however. Short sales may depress stock prices, but the short seller only profits after buying shares at low prices and closing the position. If purchases and sales have a symmetric impact on prices, prices will rise to their original levels when the short seller buys

back shares. The short seller will not make money on this strategy and will instead lose money on trading costs.

One way for the short seller to make a profit shorting stock that is not overvalued is to somehow fool other investors into selling while he repurchases shares at prices that are lower than when he originally sold. This is a risky scheme though, and may prove very unprofitable. If the short seller succeeds in moving prices below fundamental values and smart investors catch on to his game before he covers his shorts, he can suffer substantial losses as the smart investors drive up share prices through their purchases.

If short sellers spread false rumors about a company or attempt to manipulate its share price, they are engaged in illegal activities and we would expect the companies to fight back. Owen Lamont (2004) examined 327 disputes between short sellers and companies. On average, across the 327 disputes, stocks underperformed the market over the next year by a whopping 24.7%. A simple explanation for these abysmal returns is that the stocks were overpriced and short sellers successfully ferreted out the mispricing. A second explanation, preferred by the managers of the shorted firms, is that short sellers continued to drive prices even further below fundamental values after companies fought back. Lamont, however, finds this explanation unconvincing because “many of the sample firms are subsequently revealed to be fraudulent.” In addition, investigations into the activities of the short sellers were requested by 66 of Lamont’s sample firms. If the SEC investigated and found that they were spreading false rumors, manipulating prices, or committing other illegal acts, their short positions would be closed, the fraud would be revealed, and the stock would rebound. The companies that claimed to request investigations earned abnormal returns of -27.7% over the next year. In this study, it appears that it was the companies, not the short sellers, who were making false statements.

Finally, it may be possible to profit from selling short even if the stock is not overpriced if a decline in the stock price harms the firm's business. This seems to have been a concern of the SEC when the short sale ban was implemented.<sup>1</sup> Financial firms with low stock prices may be required by counterparties to post more or higher quality collateral. In some cases, other firms may avoid trading with a financial firm with a low stock price or may stop lending securities to them. Of course, this is a good thing if the financial firm's stock price is low because their business is unsound. It limits systemic risk. It is a problem if the stock price is driven to artificially low levels because of short selling. Note though that it takes time to damage a financial firm in this way. Prices need to be held artificially low for an extended period. The financial firms will find it in their interest to convince investors of the soundness of their assets. If other smart investors believe the financial firm's assets are solid, they will trade against the short sellers, making this a risky strategy.<sup>2</sup>

### **Are short selling bans effective in preventing or softening market declines?**

Recent regulatory actions across the world have given researchers new opportunities to test whether short sale bans have muted and/or prevented market downturns. In the fall of 2008 financial stock prices declined sharply throughout the world. The U.S., and several other countries responded by initiating bans on short selling of financial stocks. In perhaps the most comprehensive analysis of these bans, Beber and Pagano (2011) examine the impact of short selling bans in 30 countries between January 2008 and June of 2009. Focusing on those countries

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<sup>1</sup> See <http://www.sec.gov/news/press/2008/2008-211.thm>: "...it appears that unbridled short selling is contributing to the recent, sudden price declines in the securities of financial institutions unrelated to true price valuation. Financial institutions are particularly vulnerable to this crisis of confidence and panic selling because they depend on the confidence of their trading counterparties in the conduct of their core business."

<sup>2</sup> A Google Scholar search of academic work with the words "short sales market manipulation" identifies few academic articles that document a meaningful relationship between manipulative short selling and large stock price declines. Along these lines, Macey, Mitchell and Netter (1989) conclude that "it is unlikely in today's highly developed market that 'bear raids' could seriously disrupt the workings of the market."

in which short sale bans did not apply to all stocks, Beber and Pagano compare the median cumulative excess returns for stocks subject to short sale bans to those that are not. Excess returns are computed by taking the difference between individual stock returns and the respective equally-weighted country index. The authors cumulate the daily excess returns immediately following the initiation of the short sale ban and present their results separately for the United States and for the rest of the world.

Their results suggest that in the United States, financial stocks generated positive abnormal returns (relative to the market) during the short sale ban (a result that is consistent with the argument that short sale bans keep stock prices from declining). However, the authors note that this effect may be due to legislative efforts intended to support U.S. financial institutions during that time period. Consistent with this assertion, when the authors focus on countries that were not impacted by the TARP, they find the excess returns generated by stocks for which short sales are banned are similar to the returns generated by stocks in which short selling was permitted. Together, the authors conclude that imposition of short sale bans in 2008 and 2009 was "at best neutral in its effects on stock prices."

To better understand the impact of the short sale ban on U.S. financial stocks, we next examine cumulative daily returns for the 995 banned stocks from the list of financial stocks in which short sales are prohibited at some time during the 2008 short sale ban. Daily holding period returns are obtained from CRSP and cumulative returns are equally weighted across. We plot these returns in Chart 1.

Chart 1 demonstrates that the prices of financial stocks were under stress in the days preceding the September 19th ban on the short selling of shares of financial stocks. The large negative return on September 15th occurs on the day that Lehman Brothers Holdings Inc. files



for Chapter 11 protection. While there is a large positive return on the two days surrounding the imposition of the short sale ban, as suggested by Beber and Pagano (2011) there were other things happening during this time period. For example, the U.S. Treasury Department submitted draft legislation to Congress asking for authority to purchase troubled assets on September 20th.<sup>3</sup> Despite the large positive return associated with the initiation of the short sale ban, over the fourteen days during which the ban was in effect financial stock prices fell by more than 12%. Indeed, shortly after the ban was lifted, the prices of financial stocks stabilized. Together with the results of Beber and Pagano (2011), these results demonstrate that steep market declines continued during the short sale bans of 2008 and 2009.

The largest decline in U.S. stock prices since 2008 occurred after Standard and Poor's announced a downgrade of U.S. Treasury bonds from AAA to AA+ after the market close on Friday, August 5<sup>th</sup>. On Monday, August 8<sup>th</sup>, U.S. stocks fell sharply, with the S&P 500 index declining 6.66%. In this case, there was no blanket ban on short selling. How much of this decline, if any, can be attributed to short-selling?

A large proportion of short-sales are made by market makers and high-frequency traders. These short sellers profit by providing liquidity to stock purchasers during momentary order imbalances. They reverse their short positions very quickly. Their impact on prices is confined to smoothing of minute-by-minute fluctuations. Our concern is with short positions that are longer-term bets on stock price declines. These short sales appear in biweekly totals of the shares in short positions, or short interest. To measure the impact of short-selling on stock prices when U.S. debt was downgraded, we regress U.S. stock returns over July 29, 2011 - August 15, 2011

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<sup>3</sup> U.S. Treasury Department, "Text of Draft Proposal for Bailout Plan."  
[http://www.nytimes.com/2008/09/21/business/21draftend.html?\\_r=1&ref=business&oref=slogin](http://www.nytimes.com/2008/09/21/business/21draftend.html?_r=1&ref=business&oref=slogin)

on a normalized measure of the change in short interest over the period.<sup>4</sup> The change in short interest is calculated as the short interest on August 15, 2011 minus the short interest on July 29, 2011, divided by the average short interest across the two days. For inclusion in the regressions, the stock has to have a positive short interest on one or both of the dates. The short interest change is normalized by dividing by the average short interest over the two dates. This limits the range of the normalized change to -2 to +2.

Table 1 provides summary statistics on the distribution across stocks of changes in short positions and returns between July 29, 2011 and August 15, 2011. Short interest did indeed increase for most stocks over this period, and returns were negative for more than three-quarters of them.

There is, however, considerable cross-sectional variation in changes in short interest. More than a quarter of the firms actually reported a decrease in short-interest. For them, short sellers were net purchasers of stock during this period. Table 2 reports ordinary least squares regressions of stock returns on changes in short interest. If short sellers were responsible for the decline in prices, we should see lower returns for stocks with greater changes in short interest. Stocks with larger increases in short interest had *higher*, not lower stock returns over this period. If short-selling was driving down prices, we would expect stocks with larger increases in short-selling to have *lower* returns.

The impact of short selling on stock prices is weak. The adjusted  $R^2$  is only 0.0069 when all stocks are included, and 0.0066 when stocks with prices above \$5 are used. When we use stocks with at least 1,000,000 shares short on both dates, the adjusted  $R^2$  rises to a still small 0.0166. Changes in short interest do not explain much of the stock price decline around the S&P

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<sup>4</sup> Using short interest as a proxy for short sale demand, Asquith, Pathak, and Ritter (2005) find stocks that are short sale constrained underperform during the period from 1988 through 2002 by 2.15% per month on an equally weighted basis.

downgrade of U.S. debt. This is also depicted in the two related graphs. Chart 2 shows a scatter plot of returns over July 29, 2011 to August 15, 2011 (vertical axis) against normalized changes in short interest (horizontal axis) using all stocks. The slight upward slope of the least-squares regression line in the chart shows that returns are higher for stocks with larger changes in short selling – exactly the opposite of what we would expect if short selling was pushing down prices.

As an alternative way of examining the impact of short selling on returns when S&P downgraded U.S. Treasury bonds, we compare the returns of stocks that could not be shorted on August 8<sup>th</sup>, with the returns of stocks that were eligible for short-selling. In February 2010, the S.E.C. adopted circuit breaker restrictions on short-selling. Short selling of a stock that declined 10% or more is only allowed at prices higher than the national best bid. This restriction holds for the entire day in which the circuit breaker is triggered, and for the following day as well.

We create a dummy variable for stocks that had triggered the short-sale restriction on Friday, August 5<sup>th</sup> before the downgrade was announced, and were thus ineligible to be shorted on Monday, August 8<sup>th</sup>. We then regress each stock's return on August 8<sup>th</sup> on the short restriction dummy. In a second set of regressions, we include volume on August 8<sup>th</sup> divided by September volume as a second explanatory variable. Regression results are reported in Table 3. Stocks with restricted short-selling actually performed worse on August 8<sup>th</sup> than stocks without restrictions at the beginning of the day. Here, as with the short interest results, there is no indication that short selling had anything to do with the sharp decline in U.S. stock prices on August 8<sup>th</sup>. Stocks appear to have fallen as a result of the Standard and Poor's downgrade and weak economic fundamentals in the U.S. and elsewhere.

### **Costs of Short Selling Bans**

The obvious place to start when looking to identify the costs imposed by short sale bans is the equity market. In their multivariate analysis, Boehmer, Jones, and Zhang (2009) find that the U.S. short sale ban is associated with an increase in average relative effective bid-ask spreads for banned stocks of 23 basis points. For the 404 financial stocks that were subject to the short sale ban for its entirety, this increase in spreads represents an increase in liquidity costs of \$604,051,750.<sup>5</sup> Of course, this estimate of damages does not include the costs associated with mutually beneficial trades that did not occur because of the inflated liquidity costs. Beber and Pagano (2011) demonstrate that investors in foreign equity markets were also harmed financially by short sale bans. For example, in their multivariate analysis of bid ask spread Beber and Pagano find that on average, the imposition of a short sale ban during their sample period is associated with an increase of relative quoted spreads from 4.05% to 6.03%.

The damage inflicted by the short sale bans was not confined to equity markets. For example, in the United States the short sale ban was initiated on a triple witching Friday (a Friday on which contracts for stock index futures, stock index options, and stock options each expire). While market makers in U.S. derivative markets were initially exempt from the short sale ban, this exemption was scheduled to expire at 11:59pm on Friday, September 19th. Thus, market makers presumed they would be unable to short stock to hedge their risk after the close of trading on Friday. As one should have expected, this restriction wreaked havoc in options markets. By midday on September 19th, several option market makers had threatened to stop trading if their short-selling exemption was not extended. Apparently these threats were considered to be credible - prior to the opening of markets on Monday, September 22nd the U.S.

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<sup>5</sup> This figure is estimated from the figures presented in Table 2 and in Table 4 of Boehmer, Jones and Zhang (2009) and is computed as follows. Average dollar trading volume for a banned stock during the short sale ban is \$66,749,000. We multiply this figure by 404 (the number of financial stocks subject to the short sale ban for its entirety), by .0016% (the increase in effective half-spreads), and finally by 14 (the duration of the short sale ban).

Securities and Exchange Commission had extended the short selling exemption to market makers in derivative markets. However, as noted by Battalio and Schultz (2011), it took several more trading days for the SEC to relax and/or clarify other overly restrictive components of their short sale prohibition.

How did option markets respond to this regulatory action? In their multivariate analysis, Battalio and Schultz (2011) find that puts and calls on banned stocks with an October expiration have quoted spreads that are more than \$0.96 wider than the quoted spreads of their control options. They also find that the quoted spreads of options on banned stocks remain elevated by an average of 10% for the remainder of the short sale ban. Following Battalio and Schultz (2011), we estimate the inflated trading costs paid by liquidity demanders in option markets during the short sale ban as follows. We start with an estimate of the marginal cost of trading options on banned stocks obtained from daily multivariate regressions. We next multiply this difference by the number of contracts traded on banned stocks on that day. Finally, since liquidity demanders pay half of the inflated spread, we multiply this estimate by .5. We present the daily estimated inflated costs in Chart 3.

Option market makers were unsure on September 19th as to whether they would be able to hedge their positions by shorting stock during the remainder of the short sale ban. Thus, it is not surprising that liquidity demanding investors paid more than \$110 million in inflated liquidity costs on that Friday. The statistics presented in Chart 4 suggest that the inflated costs did not disappear once the option market makers were granted their exemption to the short sale ban. Battalio and Schultz (2011) attribute these inflated costs to the regulatory uncertainty that prevailed during this time period. Overall, Battalio and Schultz estimate that liquidity demanding investors paid more than \$505 million in inflated liquidity costs during the 14-day short sale ban.

Together, estimated inflated cost of liquidity attributable to the short sale ban in U.S. equity and option markets exceeds \$1 billion dollars. And, as noted earlier, this estimate ignores the lost gains from those trades that would have been made had bid ask spreads been at or closer to normal levels. These estimates also ignore the costs imposed on other markets. For example, since convertible bond arbitrageurs purchase more than 75% of primary issues of convertible debt (see Choi et. al (2010)) and hedge their purchases by shorting shares of stock, it is not surprising that the convertible bond market dried up when the short sale ban was instituted (see Alistair Barr (2008)).

### **Summary and Policy Implications**

In September 2008, the U.S., along with a number of other countries, banned short selling in financial stocks. More recently, in response to the European debt crisis, several European countries banned short selling on financial stocks. With the European bans, and recent volatility in the U.S. equity markets, the idea of restricting short selling in U.S. markets has resurfaced.

In this article, we examine the evidence on short selling. The 2008 short sale ban has been studied extensively. The preponderance of evidence suggests that the short sale ban did little to slow the decline in financial stock prices. On the other hand, the ban produced clear and harmful side effects. Trading costs in equity and options markets increased during the ban. Stock and option prices uncoupled.

The impact of the S&P downgrade of the U.S. on the equity market has not been studied, and we provide a first look at the role of short selling in the sharp decrease in equity prices that accompanied the downgrade. The relation between changes in short interest and stock returns around the downgrade is weak but positive - stocks with larger increases in short interest earned

higher, not lower returns over the first half of August 2011. Stocks that could not be shorted on the day the downgrade was announced actually had lower returns than stocks that were eligible for shorting.

As a whole, the work that we perform and review indicate no harm in the aggregate from short selling during market downturns and no benefit from banning short selling. There are likely to be other ill effects of short sale bans besides decreased liquidity and higher trading costs. Short sellers restrain management malfeasance by rooting out fraud and earnings manipulation. The evidence does not suggest that short sellers are the problem. They are the messengers with bad news about companies' prospects. They are unpopular because they deliver messages that people would rather not hear.

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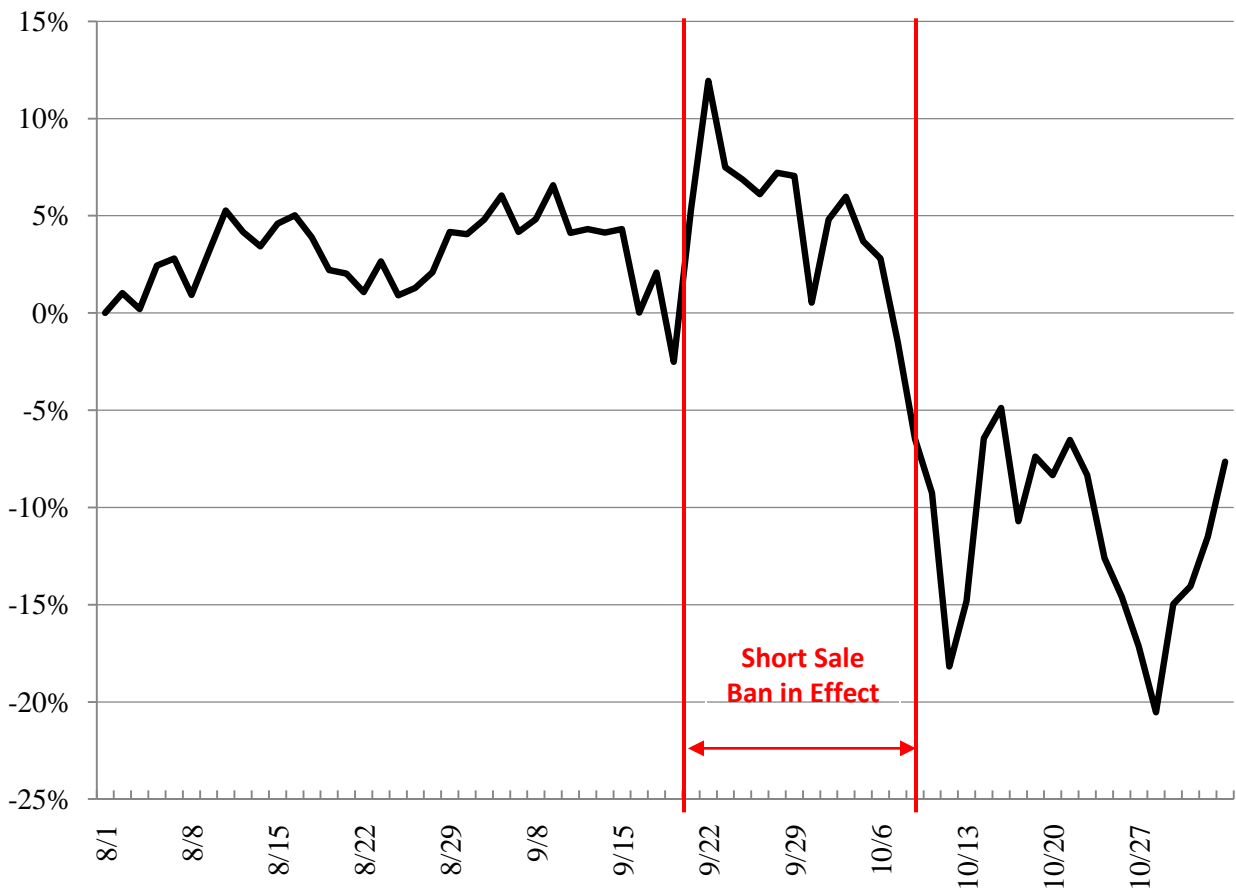
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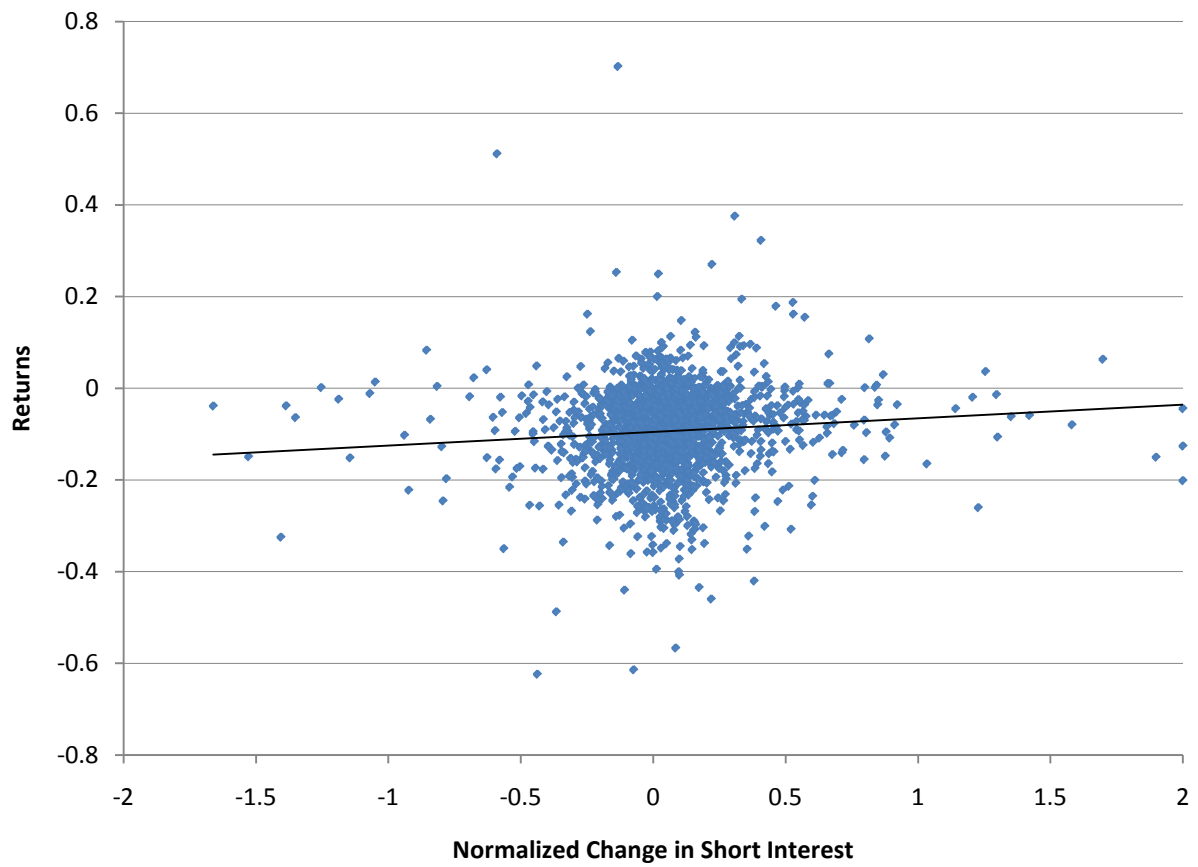
**Chart 1**

**Equal-weighted cumulative returns for banned stocks.**

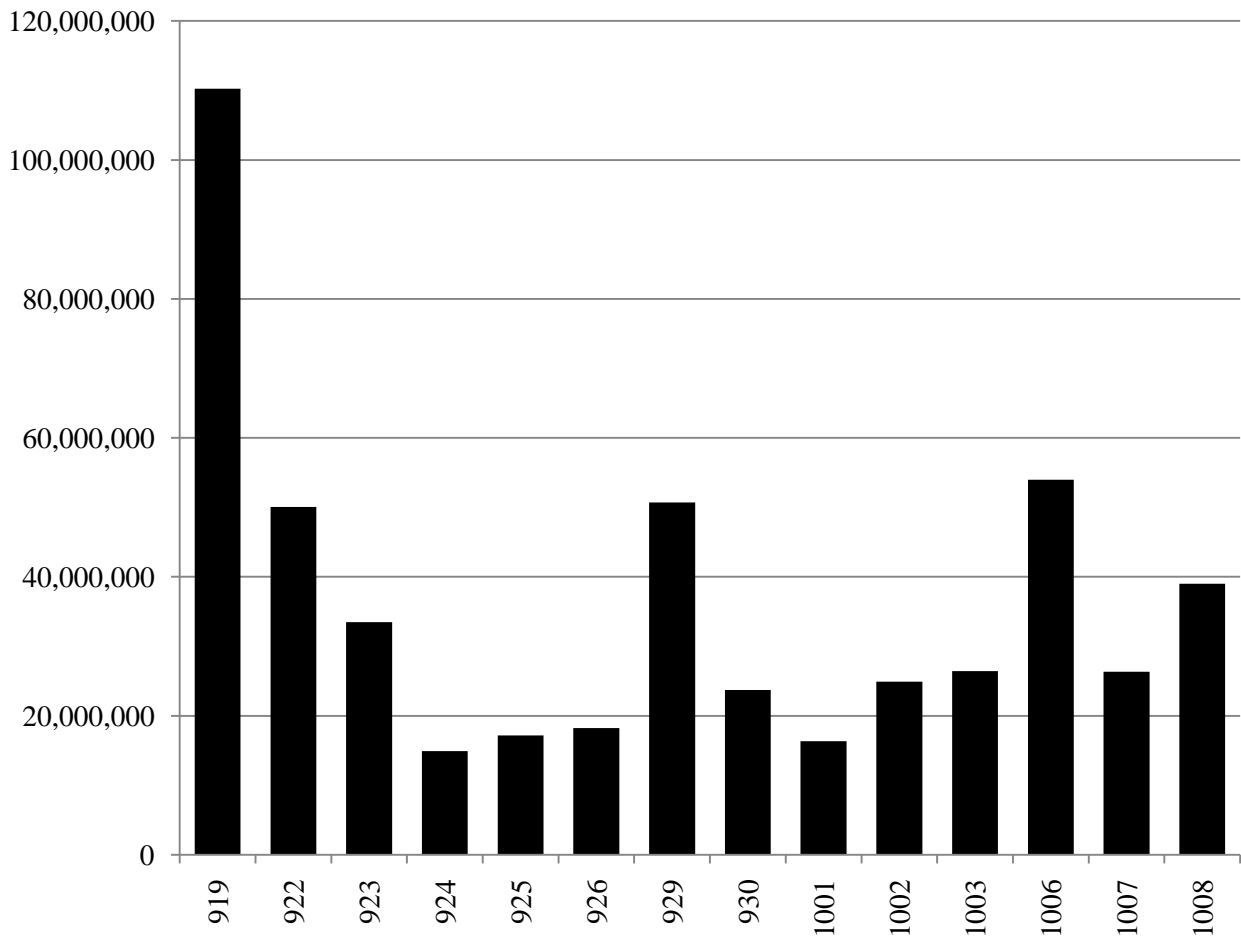


## Chart 2

**Returns and Changes in Normalized Short Interest 7/29/2011 to 8/15/2011. All Stocks.**



**Chart 3**  
**Estimates of the increased trading costs paid by liquidity demanding investors trading options on stocks for which short sales are banned on September 19th, 2008**



**Table 1**  
**Distribution of changes in short positions and returns**

	10%	25%	Median	75%	90%	Mean
Change in Short Interest	-0.1714	-0.0438	0.0493	0.1550	0.3063	0.0605
Returns	-0.2023	-0.1440	-0.0870	-0.0377	0.0029	-0.0939

**Table 2**  
**OLS regression of stock returns and changes in short interest**

	Intercept	t-statistic	$\Delta$ in Short Interest	t-statistic	Stocks	Adj. R <sup>2</sup>
All Stocks	-0.0957	-43.03	0.0298	3.72	1,843	0.0069
Stocks $\geq$ \$5	-0.0927	-41.77	0.0277	3.43	1,611	0.0066
Stocks: 1,000,000 shares short	-0.1027	-40.30	0.0624	4.79	1,306	0.0166

**Table 3**  
**OLS regression on stock returns and short-selling restrictions**

Intercept	t-statistic	Short-Sale Restricted	t-statistic	Normalized Volume	t-statistic	Stocks	Adj. R <sup>2</sup>
-0.0836	-68.97	-0.0216	-5.12			1,905	0.0131
-0.0844	-49.41	-0.0217	-5.14	0.0044	0.07	1,611	0.0128