# Short-Selling, Margin-Trading, and Market Valuation

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**Abstract:** This paper investigates the roles of short-selling and margin-trading on market valuation from both aggregate and cross-section perspectives. Based on the U.S. and Taiwan data, both the changes in aggregate short-selling and margin-trading data have negative correlations with the market returns. The negative correlation implies that short-sellers are momentum traders and margin-traders are contrarian traders. However, the cross-section results based on individual stocks show the opposite. Short-sellers seem to increase/decrease short position on those stocks with significant gain/loss during previous 65 days – a clear evidence of contrarian traders. Margin-traders seem to increase/decrease margin position on those stocks with significant gain/loss – a clear evidence of trend chasers. Further, these patterns are not affected by market states (up- and down-market). Finally, we show that the short-sellers are informed as they correctly forecast the stock price in a short period; yet margin-traders are naïve trend chasers. Although short-sellers are not particularly helpful in stabilizing the overall market, the latter findings imply that they contribute to efficient market at the micro level.

The role of short-selling on market valuation has long been debated. On the one hand, academics generally share the view that short-selling is undertaken by rational arbitrageurs, and help market to correct short-term deviations of stock prices from fundamentals [e.g. Diether, Lee, and Werner (2008)]. On the other hand, other people believe that short-selling do not play a particularly helpful role in stabilizing the overall stock market [e.g. Lamont and Stein (2004)]. In particular, critics believe short-selling does not prevent the dot-com bubble, and more recent, the credit bubble. On the contrary, it adds to the stock market volatility after the bubble's existence becomes common knowledge, as the insights of bearish investors flush out when the market is falling [Hong and Stein (2003)]. This latter view gains more momentum due to recent market turmoil. Aggressive short-selling (particularly the so called "naked" short-selling) could create enormous panic in a matter of days and are blamed in part for the "bank run" on and later demise of Lehman Brothers and Bear Sterns.

While the role of short-selling receives much attention and is hotly debated among academics, investors, market regulators, and congress, a second type of trading on margin – margin-trading – receive little attention. Buying on margin is to borrow money from a broker to buy stocks, the opposite of a short sale. As short-selling, margin-trading is also risky. First, the cost of margin-trading could be high as interest is charged on the borrowed proceeds. Second, with borrowed money, gains or losses are amplified. Third, traders buying on margin could receive additional margin call on short notice and be forced to sell part or all the securities as price falling. Finally, the broker who lends money is able to close the leverage position by selling the securities without consulting the owner of the margin account. Given the risky nature of margin trading, governments

worldwide generally impose the limit that one can borrow. For example, according to Regulation T of the Federal Reserve Board, investors are limited to borrow up to 50% of the purchasing price of the securities.

In this paper, we investigate the roles of both short-selling and margin-trading on the market valuations from both aggregate and cross-section basis. First, aggregate short-selling and margin-trading data are employed to address their roles in countering market-wide sentiment, in particularly, asset pricing bubbles and market crashes. An empirical answer to this question is particularly important for policy makers. One of their most important tasks is to promote a stabilized capital market, which is to avoid bubbles and crashes. It also perhaps helps to settle the dispute of the moral or ethic of those short-sellers to a certain level.

A second question the paper addressed is the short-run roles of short-selling and margin-trading on asset pricing under different market states. The motivations and strategies of short sellers and margin traders could be very different from an up market to a down market. In addition, a major criticism of short-selling is based on the argument that they add the severity of a bear market. Meanwhile, a major criticism of margin-trading is that they add additional fuel to bubbles. Therefore, it is particularly important to document the roles played by short-selling and margin-trading based on market states.

There are a few noticeable contributions of this study. First, although intensive studies have been done on the cross-section information role of short-selling on asset pricing, few investigate the role played by margin-trading. Second, among the short-selling literature, only a few have done based on data higher than monthly frequency. As indicated by Diether et. al. (2008), the lack of higher frequency data prevents academic

researcher to investigate what short-sellers actually do. On the other hand, even though the research by Diether et. al. (2008) is based on daily short-selling data, the sample period is short (January 2 to December 30, 2005). The short sample makes their results questionable in different market sentiments.

To answer the first question, this paper mainly utilizes the aggregate short-selling and margin-debt data provided by NYSE. As for the second question, it requires high frequency data of short-selling and margin-trading of each individual stock for a relatively long time – ideally covering different market states. To our best knowledge, there is no such margin-trading data available for U.S. market. As discussed previously, daily data for short-selling is also not available for most of years. Therefore, the daily short-selling and margin-trading data of Taiwan stock market is selected. These daily data are provided by Taiwan Economic Journal (TEJ). The sample ranges from 1/1/1991 to 10/30/2008 for both daily interests of shares sold short or purchased on margin for all individual stock traded on Taiwan market.

Based on the aggregate short-selling/margin-trading data of U.S. and Taiwan, we find that both of the changes of aggregate short-selling and margin-trading evidence strong significant negative correlation with market returns for both markets. The negative correlation has two opposite implications for short-selling and margin-trading, respectively. As for short-selling, the negative sign implies that the short-selling does not play a particularly helpful role in stabilizing the overall stock market - the same conclusion drawn by Lamont and Stein (2004). Contrary to this implication, the negative correlation implies that the margin-trading does play a helpful role in stabilizing the overall stock market. As the market is up, the overall margin-trading activities slow down;

as the market is down, margin-trading activities rise. Thus, it seems that at the aggregate levels, short sellers follow a momentum strategy, yet margin traders follow a contrarian strategy.

However, contrary to the conclusions based on aggregate short-selling and margin-trading, the cross-section study based on the daily short-selling and margin-trading data for each individual stock show that short sellers and margin traders follow contrarian and momentum trading strategies, respectively. These findings are not altered based on market states. Specifically, we examine the short-horizon relationship between short-selling/margin-trading activities and previous and subsequent returns. For both up- and down-market states, we find that a stock subjecting to either a positive short-selling or margin-trading shock (a sudden increase in short-selling/margin-trading activities relative to its previous 65 days of moving average) evidence a strong positive returns during the previous 5 (20 and 65) days. Further, we find that at the short-sellers, unlike the margin-traders, seems to be able to alter the stock price movement in a couple of days. A strategy of long stocks with abnormal low level of short-selling and short stocks with abnormal high level of short-selling yields a significant 3.7 basis point for the first day of holding period. Yet, it seems like the margin-traders are too late to the rally and suffer significant loss up to 20 days.

Several important implications can also be drawn from our findings based on the cross-sectional tests. First, short sellers, although as a group failing to stabilize the market, help markets correct short-term deviations of individual stock prices in both up- and down-market states. From this perspective, short-selling contributes to market efficiency. Second, the same contrarian nature of short sellers in the down-market states could

potential delay a stock's rebound –the critics' blame that short sellers prolong a down-market state after all is not unfounded. Third, the margin traders, although as a group helping in stabilizing the market, partially add to the overreaction of the stock price, especially after a positive rally for a stock. However, margin traders (mostly individual investors) are deemed to be late for the rally – strategy based on long stocks with unusually high level of margin-trading and short stocks with unusually low level of margin-trading yield inferior returns up to 20 days.

How should we interpret that short sellers in aggregate, act as momentum investors, yet cross-sectional as contrarian investors, correctly forecast and limit the short-run stock price overreaction within a fairly short period? We believe the explanation lies in the different nature of aggregate market and cross-section. As argued by Abreu and Brunnermeier (2003), investors who spot the market-wide bubble attack only if they can coordinate their selling strategies. But with moral hazard, it is risky for any one of them to bet against a market-wide bubble. Instead, time the market makes more sense. Therefore, short sellers, on aggregate, prefer to ride the market up until bubble's existence becomes common knowledge. Alternatively, Lamont and Stein (2004) suggest that the negative correlation of short-selling and market return could be explained by the high short-sale-constraints in the up market states. However, the low aggregate short-selling activity suggested by Abreu and Brunnermeier (2003) in an up market does not imply that short sellers will not act when they identify overreaction based on individual stock. Intuitively, even though it is risky to bet against the entire market, short sellers find that it is less risky to bet against one individual stock. Therefore, cross-

sectional, if short sellers actually decide to trade, it is not surprising to see that they trade on short-term overreaction of stock prices.

The paper is organized as the follows. Section I describes data and the detailed measures for short-selling and margin-trading activities. Second II presents the empirical evidence based on aggregate short-selling and market-trading data. Section III reports the results based on Taiwan daily short and margin interest. Section IV concludes the paper.

## I.      The data and Measures of Short-Selling and Margin-Trading

We obtain U.S. aggregate short-selling and margin-trading data from NYSE. NYSE provides the aggregate monthly short-selling data (short sales with member breakdown) from 1966 to 2007. By definition, the monthly aggregate short sales refer to the total number of shares sold short within one month.  As explained by NYSE, the data concept of short sales is different from short interest, which refers to the outstanding balance as collected by most previous studies. During the data range, about 68% of NYSE short-selling is originated by NYSE specialists. This percentage could reach above 80% during some earlier years when short-selling was not so popular among the public. One of the main purposes of specialists in participating short-selling is engaged in high-frequency hedging. For this reason, we follow the practice of Lamont and Stein (2004) and only measure the total shares sold short by nonmembers (public investors). Therefore, unlike most of the previous literature, short-sale ratios are calculated by using the total short-sales by nonmembers divided by total trading volume.

NYSE reports aggregate margin-trading data from 1959 to 2007. The data is called as margin debt. By definition, margin debt refers to the outstanding dollar balance

that investor borrowed from a brokerage firm to purchase securities. By law, NYSE member organizations have been required to report this number monthly through Form R-1 in securities margin accounts. The measure we use to capture margin-trading ratio is the total margin debt divided by total market value. As shown in Figure 1, both the relative short-sale and margin-trading ratios tend to have an upward trend during this period. Thus, we should look at the changes in the short-sale/margin-trading ratios and the market returns.

We obtain the daily short-selling and margin-trading data for each individual stock traded in Taiwan Stock Exchange from the Taiwan Economic Journal (TEJ)[2]. Unlike the U.S. regulation, the regulation of Taiwan Stock Exchange calls for daily release of the outstanding shares sold short and bought at margin for each stock. Further, there are no specialists in the Taiwan market. Therefore, all short-selling/margin-trading are originated by investors. The data is available from January 1991 to October 2008. The length and frequency of the data provide a unique opportunity to investigate the roles played by short-sellers and margin-traders in different market sentiments.

The standard practice when using short interest data is to scale short interest by number of shares outstanding. The relative short interest (RSI) obtained through this practice could be a bias measurement of short-selling activity in the market. Specifically, it is well known that the total trading volume during a bear market is low, and could skyrocket in a bull market. As the entire market trading activity slows down in the down market state, the outstanding short/margin interest might be low compared to an up market, even though they are proportion high relative to the aggregate trading volume.

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[2] For a detailed description of the institutional background knowledge for Taiwan Stock Market and its rules of short-selling and margin-trading, please refer to Hu, Huang, and Liao (2008).

The conventional practice of scaling short interest by number of shares outstanding does not controlling for this change of market activity, which yields a bias measurement.

The bias is not a big concern if research focus is on short window. The bias could be problematic if the focus is on the aggregate short-selling/margin-trading activities and the market returns over time. To control for the bias, we propose to scale the outstanding short/margin interest by trading volumes, which is borrowed from a common practice in the industry to capture how many days it takes for short-sellers to close their position for an individual stock. Specifically, the monthly aggregate short-selling/margin-trading ratios for Taiwan market are measured by the daily average amount of shares sold short or bought on margin for each month divided by average total trading volume.

The meaning of the new measurements is not directly comparable to the measurement used based on U.S. data (short sales scaled by trading volume; margin debt scaled by market value) in the previous section as well as used in other literature. Instead, the measurements capture the Days to Cover Short and Days to Cover Margin, respectively. By definition, Days to Cover Short/Margin (DCS/DCM) is

$$Days\ to\ Cover = \frac{Average\ Short/M\arg in\ Interest}{Average\ Daily\ Trading\ Volume}$$

It refers to how many days it takes for all short-seller/margin-traders to close out their position given the current aggregate market activity. Intuitively, if DCS (also refers as "short interest ratio" in the industry) for the market is high, it implies that short-selling is heavy relative to the current market activity; if DCM is high, it implies that margin-trading is heavy relative to the current market activity.

Figure 2a and 2b shows the annual average DCS and DCM respectively. It is interesting to see that the average DCS is 0.358 days; on the contrary, average DCM is

8.86 days. It implies that short-sellers in the Taiwan Stock Market tend to focus on very short-term trading strategies. This extremely short window is noticeable compared to short-sellers in U.S. where Cohen, Diether, and Malloy (2007) find that the median length a trader closes out a short position is 11 trading days. Relatively, the margin-traders in Taiwan Stock Market tend to follow a longer trading strategy. Again, to guard against trend which is shown in both graphs, we focus on using the change of DSC and DSM when measure the relation between aggregate short-selling/margin-trading and the market valuation.

To address the short-run roles of short-selling and margin-trading on asset pricing under different market states, daily short/margin interests released by Taiwan Stock Exchange for each eligible individual stock are used. Since we focus on short-horizon window, the bias discussed previously is less a problem. Therefore, Relative Short Interest and Margin Interest for an eligible stock are measured by its daily short/margin interest scaled by number of shares outstanding, which is the common practice by the previous literature.

## II.    Aggregate Short-Selling/Margin-Trading and The Market Valuation

We report the monthly and quarterly Pearson correlation between the value-weighted NYSE stocks and the changes in the short-sale/margin-trading ratios in Panel a, Table 1. Both changes in short-sale and margin-trading ratios move strongly counter to market aggregate returns. For instance, the correlation of quarterly changes in short-sale ratios and quarterly returns is -0.344, with p-value less than 0.0001; the correlation of quarterly changes in margin-trading ratios and quarterly returns is -0.338, with p-value

also less than 0.0001. Panel b, Table 1, reports the monthly and quarterly Pearson correlation between the value- (equal-) weighted market returns and the changes in DCS/DCM for the Taiwan stock market. Again these correlations show significant negative correlations.

Our finding regarding NYSE short-selling activity is very similar as Lamont and Stein (2004), in which they also find that the correlation of the change in short-sales ratio and market return is -0.51 on annual basis. While the strong negative correlations in both U.S. and Taiwan markets imply that the short-seller on aggregate show actions of naïve trend-chasers, Lamont and Stein (2004) interpret this negative correlation as due to the open-end nature of professional money management – the redemptions force short-selling funds to scale back their aggregate short positions in the up markets. However, the question remains unclear is why end investors (fund contributors) redeem at the first place if the professional fund managers are rational arbitrageurs. This becomes an even greater issue for the case of Taiwan market, where individual investors dominate the market and institutional funds essentially are not existent – redemption pressure argument could not be applied.

We believe the insights in Abreu and Brunnermeier (2003) provide a more convincing answer. In the model developed by Abreu and Brunnermeier (2003), the rational arbitrageurs (potential short-sellers) realize that the market is overvalued. However, since it is risky for any one of those to bet against the bubble along, they only attack the deviation if each is confident that other skeptics are on board. The inability of arbitrageurs to temporarily coordinate their selling strategies in a bull market together with individual incentive to time the market results overall lower aggregate short-selling.

Regardless whether short-sellers are rational arbitrageurs or naïve trend chasers, the inability of short-sellers to attack bubble and the overall negative correlation between short-selling and market returns justify the public's blame on them for potentially adding additional panic when market crashes. In the down market, the negative correlation implies that the short-sellers could add additional downward pressure if there is any sign of market rebound. Therefore, in a down market, any relaxing of regulatory rules, such as repeal of up-tick rule, to make short-selling easier is likely to be misguided.

Table 1 also shows the correlations between margin-trading and market returns. The correlations for both U.S. and Taiwan market are significant negative. For example, the monthly changes in average margin-trading ratios and monthly market return for NYSE is -0.609 with a p-value less than 0.0001. This implies that the margin-traders, in aggregate terms, seem to reflect the actions of contrarian investors. This finding is on the contrary to what long believed on Wall Street – level of margin debt is high when market rises and falls when market down. Follow this wisdom, high level of margin debt is considered as bullish sign and low level of margin debt is considered as bearish sign – contrary to what evidenced by this paper.

III.    **The Trading Strategies of Short-Sellers and Margin-Traders: Up- and Down-Market Evidences**

In this section, we would examine the behavior of short-sellers and margin-traders, particularly their strategies under different market sentiments, by focusing on individual stocks of the Taiwan market. As demonstrated in the previous section, on aggregate, short-sellers show trend chasing characteristics, does it mean that short-sellers are not

informed while margin-traders are informed traders? What are potentially differences between up markets and down markets? To address these questions, further investigation needs to be done to find what short-sellers and margin-traders actually do.

The obvious moment an examination should start is when the relative short-sale /margin-trade ratio is abnormally high or low for an individual stock. In defining an event with abnormal high or low relative short-sale ratio/margin-trade ratio, we compare the daily relative short-sale / margin-trade ratio (daily short/margin interests scaled by number of shares outstanding) at day t against its previous 65-day moving average. This method resembles the same method used by Wall Street Journal in defining volume-movers based on daily trading volume for individual stocks. If the change at day t, compared to its previous changes from day t-1 to t-64, ranked in the top decile, we indentify the stock as has a positive short-sale/margin-trade shock; otherwise, if the change falls in the lowest decile, the stock is designated as has a negative short-sale/margin-trade shock.

One special advantage to have a relative long data range by using Taiwan market data is that examine can be extended to different market sentiments. There is reason to believe that short-sellers and margin-traders might change their behavior from mostly up markets to mostly down markets. To test this hypothesis, up and down markets are defined following the method employed by Cooper, Gutierrez, and Hameed (2004). Cumulative value-weight returns for 200 days (roughly equivalent to one year trading period) are first calculated.[3] If the cumulative return during these 200 days is nonnegative, this period is defined as an up market; if negative, a down market.

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[3] For robustness tests, we also define up/down markets based on cumulative returns of 100, 300, and 400, respectively. The different window does not change the major results.

Once a positive or a negative short-selling/margin-trading shock is indentified, tests are conducted to find how short-sellers and margin-traders strategy - either substantially increasing or decreasing in position - relates to past returns. The answer can provide evidence whether short-sellers / Margin-traders are trend chaser or informed traders.

Table 2 presents the results. Short-sellers are evidenced to target those stocks gaining significantly within the last 5, 20, and 65 days. For instance, for those stocks with substantial higher short-interest at day t, the average cumulative return for the previous 5 days is 2.75% (t-stat = 23.16) – a great difference from the average cumulative return for those stocks with negative short-selling shock[ -1.249%  (t-stat = -12.50)]. Noticeably, this pattern does not change from up-market states to down-market states. From this perspective, short-sellers are clearly rational arbitrageurs, even in the down markets. They can identify short-run overreaction and subsequently increase short positions. However, the particular contrarian nature of short-sellers during the down markets could delay the markets from rebound - partially justifying the critics' claim.

Table 2 also demonstrates that margin-traders, on the opposite of short-sellers, are trend chasers. For instance, for those stocks with substantial higher margin-interest at day t, the average cumulative return for the previous 5 days is 0.981% (t-stat = 9.49). Yet, the same return is -0.07% (t-stat = -0.72) for those stocks with substantial lower margin-interest. Compared to short-sellers, the margin-traders also seem to be particular in favor of past winners with relatively longer win streak. For example, the stocks with positive margin-interest shock evidence even higher cumulative returns for the past 65 days, while the stocks with positive short-interest shock have a lower cumulative return for the past

65 days, compared to the cumulative returns of 5 and 20 days. The trend-chasing nature of the margin-traders implies that margin-traders are not rational arbitrageurs.

## IV.    Who are informed?

The paper so far indentifies a particular strategy for both short-sellers and margin-traders, respectively. Short-sellers are evidenced to be contrarian traders; margin-traders are evidenced to be trend chasers. However, whether an investor follows contrarian or trend trading strategy does not automatically prove that the investor is an informed or naïve trader. In this section, we investigate who are informed investors by examining the subsequent returns following their strategies.

If the subsequently stock returns followed by a positive shock in short-interest underperform those stocks followed by a negative shock, we conclude that short-sellers are informed traders. Similar argument applies to margin-traders – if the subsequently stock returns followed by a positive margin-trading shock outperform those stocks with negative shocks, we conclude that margin-traders are informed traders. To investigate this empirically, we follow the overlapping method introduced by Jegadeesh and Titman (1993) to form portfolios based on either short-selling or margin-trading shocks defined previously in section I. The strategy is to long stocks with positive shocks (either short-selling or margin-trading) and short stocks with negative shocks. We then evaluate the subsequent returns during the holding period. Following other literature, we skip one day, t+1, between portfolio formation day and holding period.

CAPM model is used to find the abnormal returns of the strategy. Table 3 reports test results for the holding period ranging from day t+2 to t+61. Panel a, Table 3 shows

that the strategy of long stocks with increased short-interest and short stocks with decreased short-interest yields a significant negative return of 3.7 basis point at day t+2. The significant negative return implies that the short-sellers can indentify the short-term price deviation and correctly forecast the future stock price move. From this perspective, the short-sellers evidence behavior of informed-traders, consistent with findings by Diether et. al. (2008) and Boehmer, Jones, and Zhang (2008). However, the short-term success quickly dies out as holding period is extended to more than 5 days. The quickly faded success implies that the short-sellers do not have information which will last in the long-term – this type of information typically involves the change of corporate fundamentals.

Panel b, Table 3 reports the average daily returns of the trading strategy of long stocks with positive margin-trading shocks and short stocks with negative margin-trading shocks. The strategy yields negative significant returns at least up to 5-days of holding period. For instance, for holding period of 5 days, the return is negative 2.34 basis point and statistically significant. The negative returns imply that margin-traders evidence the characteristics of naïve trend chasers – they increase margin-interest on those stocks with significant gain in the past 65 days, yet probably also are late for the latest rally. Thus, their forecasts of the stock price are in the wrong direction.

## V.    Conclusion

Short-selling and margin-trading are opposite forces: short-sellers are bearish investors while margin-traders are optimistic investors. This paper investigates the impact of short-selling and margin-trading on market valuation from both aggregate and cross-section perspectives. From the aggregate perspective based on both U.S. and Taiwan data,

the change in short-selling and margin-trading and market returns are negative both at monthly and quarterly basis. The negative correlations imply that short-sellers are trend-chasers, yet margin-traders are contrarian traders. From this perspective, short sales activities, in aggregate, are not particularly helpful in stabilizing the entire market.

We also use the daily data of Taiwan to investigate what short-seller and margin-traders actually do and their impact on individual stock price. Unlike previous literature, this paper distinguishes two major market sentiments – up markets and down markets – and investigates the behavior of short-sellers/margin-traders under each type of market, respectively. We find that the behavior of short-sellers and margin-traders are not different from up markets to down markets. Both short-sellers and margin traders tend to increase/decrease their position on a stock if the stock evidences significant gain/loss during previous 65 days, either in up markets or down markets. Therefore, short-sellers evidence characteristics of contrarian investors; margin-traders evidence characteristics of trend chasers.

Finally, we investigate who are informed - short-sellers or margin-traders? The strategy of long stocks with positive short interest shock and short stocks with negative short interest shock yield a significant negative abnormal return. It implies that short-sellers do correctly forecast the stock price, but in the extremely short window, as the abnormal returns fade out within several days of portfolio holding period. However, margin-traders seem to misjudge the future price direction. The strategy of long stocks with positive margin interest shock and short stocks with negative margin interest shock yields a significant negative return, at least within 5 days of holding period. The negative return implies that margin-traders largely are naïve trend chasers.

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**Table 1**
**Aggregate Short-Selling / Margin-Trading and Market Valuation**
Pearson correlations are reported with p-value listed in the parentheses. For U.S. data, aggregate short sales is defined by using the total short-sales by nonmembers divided by total trading volume; aggregate margin-debt is defined by using total dollar value of margin-debt divided by total market value. For Taiwan data, average days to cover short/margin are defined by using aggregate short-/margin-interest divided by total trading volumes.

| Returns | | Panel a: NYSE | |
|---|---|---|---|
| | | Changes in Aggregate Short Sales | Changes in Aggregate Margin-Debt |
| Value-Weighed Returns of NYSE | Monthly | -0.144 | -0.609 |
| | | (0.0012) | (<.0001) |
| | Quarterly | -0.344 | -0.338 |
| | | (<.0001) | <.0001 |
| | Annually | -0.451 | -0.013 |
| | | (0.0031) | (0.9298) |
| | | Panel b: Taiwan Market | |
| | | Changes in Average Days to Cover Short | Changes in Average Days to Cover Margin |
| Equally-Weighted Returns of Taiwan | Monthly | -0.378 | -0.421 |
| | | (<.0001) | (<.0001) |
| | Quarterly | -0.550 | -0.533 |
| | | (<.0001) | (<.0001) |
| | Annually | -0.048 | -0.434 |
| | | (0.8665) | (0.1058) |
| Value-Weighted Returns of Taiwan | Monthly | -0.360 | -0.464 |
| | | (<.0001) | (<.0001) |
| | Quarterly | -0.552 | -0.566 |
| | | (<.0001) | (<.0001) |
| | Annually | -0.269 | -0.532 |
| | | (0.3329) | (0.0410) |

**Table 2**
**The Trading Strategies of Short-Sellers and Margin-Traders**

We indentify both positive/negative short-selling and margin-trade shocks by finding the change in the relative short-sale/margin-trade ratio at day 0 to its previous 65 days of moving average. If the change at day 0 falls in the top decile compared to changes from day -64 to day -1, the stock is designated as having a positive short-selling/margin-trade shock; otherwise, a negative shock if the change falls in the lowest decile. As stocks have been grouped based on positive / negative shocks, we calculate the average cumulative returns from day -5 to day -1, day -20 to day -1, and day -65 to day -1 for each group. Cumulative returns are in percentage; robust t-stats are presented in the parenthesis.

| Portfolios | Panel a:<br>Full Range 1991 - 2008 | | | Panel b:<br>Down Markets | | | Panel c:<br>Up Markets | | |
|---|---|---|---|---|---|---|---|---|---|
| | 5 days | 20 days | 65 days | 5 days | 20 days | 65 days | 5 days | 20 days | 65 days |
| **Positive Short-Selling Shocks** | 2.715 | 3.890 | 0.917 | 2.283 | 2.369 | -5.148 | 3.062 | 5.075 | 5.108 |
| | (23.16) | (14.24) | (1.89) | (11.03) | (4.83) | (-6.16) | (22.43) | (16.36) | (9.43) |
| **Negative Short-Selling Shocks** | -1.249 | -2.866 | 0.118 | -1.669 | -4.671 | -6.683 | -0.951 | -1.594 | 4.786 |
| | (-12.50) | (-12.48) | (0.25) | (-9.27) | (-10.99) | (-8.71) | (-8.38) | (-6.39) | (9.00) |
| **Positive - Negative** | 3.965 | 6.756 | 0.799 | 3.953 | 7.040 | 1.535 | 4.013 | 6.670 | 0.322 |
| | (62.81) | (55.52) | (4.37) | (35.77) | (31.27) | (4.50) | (53.37) | (48.87) | (1.58) |
| | | | | | | | | | |
| **Positive Margin-Trading Shock** | 0.981 | 2.749 | 3.486 | 0.423 | 0.793 | -3.527 | 1.398 | 4.204 | 8.254 |
| | (9.49) | (11.23) | (7.22) | (2.52) | (1.93) | (-4.59) | (11.00) | (14.47) | (14.71) |
| **Negative Margin-Trading Shock** | -0.077 | -0.542 | -0.369 | -0.428 | -2.415 | -7.409 | 0.184 | 0.811 | 4.417 |
| | (-0.72) | (-2.12) | (-0.79) | (-2.19) | (-5.17) | (-9.92) | (1.55) | (2.87) | (8.31) |
| **Positive - Negative** | 1.046 | 3.257 | 3.786 | 0.822 | 3.129 | 3.733 | 1.213 | 3.393 | 3.837 |
| | (7.75) | (16.91) | (15.71) | (3.42) | (8.97) | (9.06) | (7.56) | (15.17) | (12.92) |

## Table 3
### Daily Average Equally-Weighted Returns During the Holding Period

At day t, a positive/negative short-selling/margin-trading shock is identified by comparing the relative short/margin ratio against their previous 65-day of moving average. Portfolios are consequently formed. High and low refers to the stocks with positive and negative short-selling/margin-trading shock, respectively. High-Low is the portfolio of long stocks with positive short-selling/margin-trading shock and short stocks with negative shocks. The subsequent equally-weighted daily average returns are then calculated from day t+2. The abnormal returns are obtained by using CAPM model. Newey-West t-stats are reported in the parentheses.

| Holding Periods | Panel a The Effects of Short-Interest Shocks | | | Panel b The Effects of Margin-Interest Shocks | | |
|---|---|---|---|---|---|---|
| | Abnormal Returns in % | | | Abnormal Returns in % | | |
| | Low | High | High-Low | Low | High | High-Low |
| **1 day** | 0.0314 | -0.0057 | -0.0372 | 0.0214 | -0.0110 | -0.0325 |
| | (3.68) | (-0.62) | (-2.85) | (3.09) | (-1.25) | (-2.85) |
| **5 days** | 0.0195 | 0.0013 | -0.0182 | 0.0168 | -0.0065 | -0.0234 |
| | (2.45) | (0.16) | (-1.56) | (2.59) | (-0.77) | (-2.19) |
| **20 days** | 0.0078 | 0.0072 | -0.0007 | 0.0101 | -0.0033 | -0.0134 |
| | (1.22) | (1.04) | (-0.08) | (1.71) | (-0.48) | (-1.53) |
| **60 days** | 0.0054 | 0.0047 | -0.0007 | 0.0085 | 0.0000 | -0.0085 |
| | (1.03) | (0.85) | (-0.12) | (1.78) | (0.00) | (-1.40) |

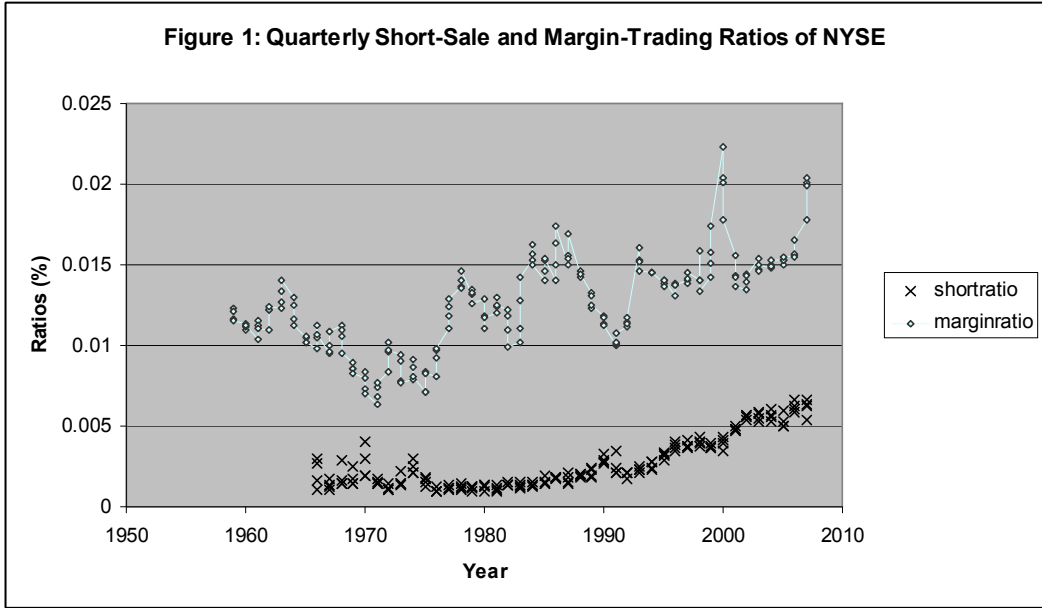**Figure 1: Quarterly Short-Sale and Margin-Trading Ratios of NYSE**

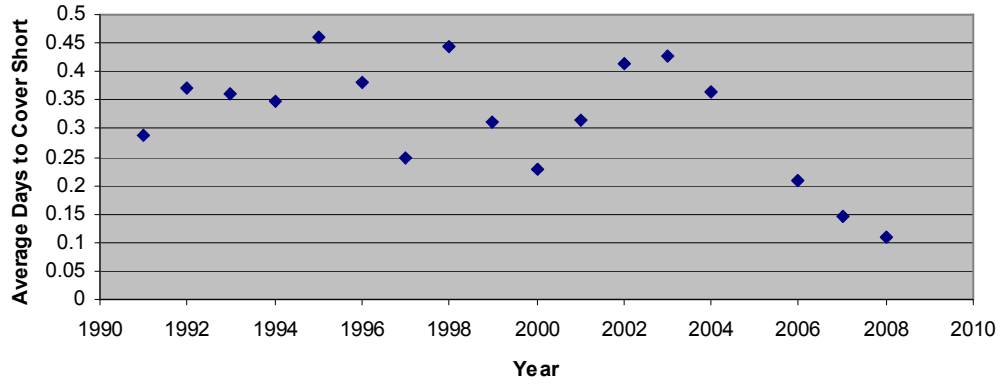Figure 2a: Annual Average Days to Cover Short in the Taiwan Stcok Market



Figure 2b: Annual Average Days to Cover Margin in the Taiwan Stock Market