Margin-Trading and Short-Selling with Asymmetric Information

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Abstract

By studying China's margin-trading and short-selling program, this paper provides evidence that allowing margin-trading and short-selling can have a negative effect on liquidity. It is because of the information asymmetry that makes uninformed investors reluctant to trade. This mechanism is verified by following evidence: First, this negative effect is more pronounced for the stocks (1) with smaller funds ownership, (2) without analyst coverage, or (3) without cross-listed shares. Second, when the asymmetric information problem is attenuated, which is the case of ETFs, this program has a positive impact on liquidity. Third, by employing the intra-day transaction data, I find that uninformed investors largely reduce their trading when this program is implemented, and the reduction is more severe for the stocks with greater information asymmetry.

JEL classification: G12, G14, G15, G18

Keywords: Margin-Trading and Short-Selling, Information Asymmetry, Liquidity, Intra-day Transaction

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1. Introduction

On March 31, 2010, in a pilot program covering ninety underlying securities, the China Securities Regulatory Commission (CSRC) started to allow margin-trading[1] and short-selling[2] "*to enlarge the supply and demand of funds and securities and to increase the trading volume to some extent, thus leading to active liquidity on the securities market*." Over time, the list of underlying securities was revised, and more securities were added. By the end of 2013, the underlying securities amounted to more than a quarter of the total number of stocks on the Shanghai and Shenzhen Stock Exchanges. By studying four events during which securities were added to the list (on March 31, 2010, December 5, 2011, January 31, 2013 and September 16, 2013), this paper investigates the effects of margin-trading and short-selling on liquidity of the Chinese stock market.

A large strand of empirical literature has established that margin-trading improves liquidity (Hardouvelis and Peristiani, 1992; Kahraman and Tookes, 2014). Studying short-selling, Beber and Pagano (2013) and Boehmer, Jones and Zhang (2013) find that the bans on short-selling are detrimental to liquidity. It thus implies that allowing short-selling improves liquidity. However, whether and how market friction changes this result is less well understood. Since the short sellers are generally more informed (Chang, Luo and Ren, 2013), the uninformed investors may avoid trading stocks if they believe their more informed counterparties can take advantage of them (Ausubel, 1990). Once the uninformed investors stop trading, the informed ones might also decide not to trade in order to avoid revealing their information (Milgrom and Stokey, 1982). This would result in a market breakdown in the spirit of the theory in Bhattacharya and Spiegel (1991). Consequently, when the asymmetric information problem is severe, allowing short-selling could also make liquidity worse.

Because of severe information asymmetry in the Chinese stock market (Chan, Menkveld and Yang, 2008), its margin-trading and short-selling program provides a quasi-experiment to test the above hypothesis. First, the Chinese stock market is dominated by the individual investors who have few financial skills. According to a recent report from the Shenzhen Stock Exchange,[3] from 2007 to 2012, on average about 42.8% of the total market capitalization was held by individual investors; and individual investors account for 85.6% of the total transactions. Second, because of murky accounting practices, black-box exchanges and inadequate corporate governance, the market lacks transparency. Individual Chinese investors could even be deprived of their legal rights to access the information on listed stocks. For example, it is reported in 2013 that a Chinese financial journalist was arrested on allegations of

[1] It is called "*Rong Zi*" in Chinese, meaning that investors can buy stocks on margin.
[2] It is called "*Rong Quan*" in Chinese, meaning that investors can sell stocks short.
[3] Source: http://www.szse.cn/main/aboutus/bsyw/39749823.shtml

defaming a state-backed company.[4] To sum up, these two characteristics make the asymmetric information problem severe in the Chinese stock market. Thus, once margin-trading and short-selling become available to more informed investors, their less informed counterparties may refuse to trade for fear of being taken advantage of. Therefore, liquidity would become worse.

The paper uses stock level data covering more than 2500 Chinese listed stocks to test this prediction. The stocks that are eligible for the margin-trading and short-selling program are taken as the treated stocks. One concern is that, comparing to the ineligible stocks, the treated stocks differ significantly in characteristics that may be correlated with liquidity. This will cause endogeneity in the regression. In order to overcome this problem, I employ three methods to construct the control group. Firstly, among the stocks that are ineligible for the program, I simply select those with their market value and turnover greater than the fifth percentile of the treated ones'. And then, I use percentage distance matching (as Beber and Pagano, 2013 and Boehmer, Jones and Zhang, 2013) and propensity distance matching (as Foucault, Sraer and Thesmar, 2011) to mitigate the difference between the treatment and the control groups. Consistent with the above prediction, I find that liquidity is adversely affected by the margin-trading and short-selling program. Specifically, for the stocks that are eligible for margin-trading and short-selling, the turnover ratio significantly decreases, and the Amihud illiquidity ratio and the Bid-Ask spread significantly increase when compared to the stocks in the control group.

I further identify the mechanism underlying this result. As argued above, if allowing margin-trading and short-selling makes liquidity worse because information asymmetry causes uninformed investors to refuse to trade, liquidity should therefore be more adversely affected for stocks with greater information asymmetry. To test this hypothesis, I employ several proxies of information asymmetry that are widely used in the literature. The first proxy is defined according to the stocks' funds ownership. The institutional funds, by holding the stocks, can reduce information asymmetry in those stocks (Edmans 2009, Wang and Zhang 2009). Thus information asymmetry would be more severe if the stock has smaller funds ownership. The second proxy is a dummy for the absence of analyst coverage. As Chinese individual investors have limited channels to obtain accurate information of listed stocks, they largely rely on analysts' reports. Therefore, it is reasonable to assume that information asymmetry is more pronounced for the stocks without analyst coverage. The last proxy is defined according to whether or not a stock has a cross-listed shares. Because cross-listing generally requires stricter information disclosure rules, we would expect information asymmetry to be less severe for the stocks with cross-listed shares.

[4] Source: http://www.reuters.com/article/2013/10/30/us-china-reporter-idUSBRE99T0FU20131030
Another example can be found here: http://online.barrons.com/articles/SB50001424053111903533504579095270615168980

Overall, the regression results support the above hypothesis. The negative liquidity impact of the margin-trading and short-selling program is more pronounced for the treated stocks (1) with smaller funds ownership, (2) without analyst coverage, or (3) without cross-listed shares. These results suggest that the negative liquidity impact is due to the information asymmetry that causes uninformed investors to avoid trading.

Another test for the above hypothesis comes from the study of the liquidity impact on Exchange Trading Funds (ETFs). Because ETFs generally represent an industry or whole market, it is less likely that asymmetric information arises at ETFs level when compared to stocks. Thus, we would expect no change or even a positive liquidity effect on ETFs. I find result consistent with this intuition, liquidity actually improves for the ETFs when margin-trading and short-selling become eligible for them.

Moreover, by exploring the intra-day transaction data I further study the behavior of uninformed investors. Defining uninformed investors according to the trade size and its price impact, I find that when the program is implemented the small investors whose trades cause no price impact largely reduce their trading on the treated stocks compared to the control ones, and the reduction is more severe for stocks with greater information asymmetry. This provides the most direct evidence that the negative liquidity impact is because of information asymmetry that causes uninformed investors to be reluctant to trade.

I also exam the effects of the margin-trading and short-selling program on stock return volatility. According to Foucault, Sraer and Thesmar (2011), when small investors behave as noise trader, their trading has a positive impact on stock return volatility. In line with this result, I find that, after margin-trading and short-selling are implemented, volatility of stock returns declines for the treated stocks relative to the controls. This implies that the uninformed investors, who stop trading, play the role of noise traders in the market. It further confirms the argument that when margin-trading and short-selling are implemented, uninformed investors stop trading, thus making liquidity worse in the spirit of Milgrom and Stokey's no-trade theorem.

This paper makes several contributions to the literature. First, it is among the first papers to document the negative impact of margin-trading and short-selling on liquidity. Unlike the previous works that study the endogenous short-selling bans in which short-selling is constrained because of drops in stock prices, this paper investigates an exogenous change in short-selling rules from no shorting to rights to short. Meanwhile, the specificity of China's margin-trading and short-selling program in which mostly informed investors with strong information conduct margin-trading and short-selling also allows me to investigate the effects in a different setting. Moreover, in the previous papers that also study the margin-trading and short-selling program in China (Chang, Luo and Ren, 2013 and Sharif, Anderson and Marshall, 2014), short sellers can only borrow stocks from a limited set of qualified security companies;

these qualified security companies are the only source of stocks for short-selling. On February 28, 2013, a security lending business was implemented to allow funds and other institutional shareholders to lend out the stocks they hold.5 By studying this security lending business, this paper exams the impact of the margin-trading and short-selling program in a more deregulated environment and provides a more complete understanding of the program's effects. Second, this paper is the first one to identify the mechanism underlying the negative liquidity impact. By employing cross-sectional differences in stocks' information asymmetry, this paper finds that the negative liquidity impact is due to information asymmetry that causes uninformed investors reluctant to trade. This also speaks to an ongoing discussion in China about how the rights of individual investors should be properly protected. Unlike in developed markets, serious information asymmetry in the Chinese stock market requires more attention from policy makers when they reform the stock market. Third, previous works studying short-selling in China focus on a sample of cross-listed Chinese stocks. For example, Mei, Scheinkman and Xiong (2009) study stocks with both A and B shares;[6] Chan, Kot and Yang (2010) and Fang and Jiang (2013) study stocks with both A and H shares.[7] They generally look at a small sample because the number of cross-listed Chinese stocks is limited, and these stocks usually have large market capitalization, low information asymmetry and better liquidity. In contrast, I extend the analysis along two dimensions: events and stocks. This paper studies four addition events during which a large set of securities sequentially become eligible for margin-trading and short-selling and covers all stocks falling into the program, which represents around a quarter of total stocks in China. Furthermore, because the program begins with a small list of underlying securities and gradually covers a larger part of the market, this also allows me to obtain more accurate results by checking the same treatment at the different times, thus excluding factors that would bias the results.

The rest of this paper is structured as follows: Section 2 provides a detailed overview of the margin-trading and short-selling program in the Chinese stock market; Section 3 briefly reviews the related literature and develops the testable hypotheses; Section 4 summarizes the data and methodology; Section 5 presents the descriptive evidence and regression results; Section 6 presents the robustness check; and Section 7 concludes.

5 More details can be found in section 2.

6 A-shares are the stocks traded by domestic citizens, while B-shares are designed for the foreign investment and were not to domestic citizens until February 2001. Both A and B shares are traded on the Shanghai and Shenzhen Stock Exchanges.

7 H-shares refer to the shares of companies incorporated in mainland China that are traded on the Hong Kong Stock Exchange.

2. The China's Margin-Trading and Short-Selling Program

Although margin-trading and short-selling have been discussed in China since 2006, the first official news was announced by the CSRC in October 2008,[8] broadly stating the intention of lifting the constraints of margin-trading and short-selling in the Chinese stock market. Then, the detailed underlying security list for the margin-trading and short-selling program came out on February 12, 2010. According to the list, starting on March 31, 2010, the first 90 blue-chip securities (50 from the Shanghai Stock Exchange, 40 from the Shenzhen Stock Exchange) became available for margin buyers and short sellers. The China's margin-trading and short-selling program was officially launched.

At the beginning of the program, only six security companies were allowed to undertake the margin-trading and short-selling business.[9] According to the administrative rules promulgated by the CSRC, only "qualified" investors can conduct margin-trading and short-selling, and the qualification requirements differ across the security companies which undertake these business. For example, in Haitong Securities Company,[10] qualified investors must: (1) have a trading history longer than one and a half years with that company (reduced to half a year after December 2011), (2) have capital of at least half a million RMB (around 8 thousand USD), and (3) pass an exam and a risk-attitude test to show they have the basic knowledge of margin-trading and short-selling. Then, these qualified investors who wanted to conduct margin-trading (short-selling) can to go to any of these six qualified security companies, open an account, deposit a required amount of money as a guarantee, and borrow the money (securities)[11] from the company to buy (sell) the securities in the underlying security list. Moreover, the interest rate of margin-trading and short-selling are very high,[12] which making margin-trading and short-selling costly for investors. This high cost as well as the above requirements on investors' qualification implicitly imply that only the professional traders who also have the strong information would conduct margin-trading or short-selling in the market.

With the development of this program, the CSRC increased the coverage of the program by adding more underlying securities. In order to be included as underlying securities, several requirements[13] should be satisfied: (1) the securities have been traded in the stock market longer than 3 months; (2) the market capitalization is larger than 800 million RMB (around 130 million USD); (3) the number of

[8] Source: http://www.csrc.gov.cn/pub/csrc_en/newsfacts/release/200812/t20081229_69251.htm
[9] The number of qualified security companies also increased with the development of the margin-trading and short-selling program.
[10] Source: http://www.htsec.com/htsec/Info/1930303
[11] The money or securities lent by the qualified security companies are owned by these companies themselves. The self-owned money and securities are the only source for margin-trading and short-selling.
[12] For example, at the beginning of the program, the interest rate of margin-trading and short-selling were both 7.86% in Haitong Securities; and the interest rate of short-selling was even larger (9.86%) in several other security companies.
[13] These requirements came out on 2011/11/25, together with the announcement of the first revision of underlying security list of margin-trading and short-selling program. Source: http://www.sse.com.cn/aboutus/innovation/margin/rules/c/147.shtml

shareholders is larger than 4000; (4) the average daily turnover is larger than 15% of the benchmark average daily turnover, and daily trading volume in value is not less than 50 million RMB; (5) the deviation of average daily quote change is less than 4% from the benchmark; and (6) the volatility is less than five times of the benchmark one.

Up to the end of 2013, there were four main addition events[14] on March 31, 2010, December 5, 2011, January 31, 2013 and September 16, 2013 after which more securities became eligible for margin-trading and short-selling, the underlying security list largely increased.

Because at the beginning of this pilot program, the investors could only borrow money or securities from the qualified security companies, the amount of funds and securities which were available for margin-trading and short-selling was very limited. Then, a refinancing business[15] was introduced on August 3, 2012 to allow more market participants to provide their funds and securities. A government-backed securities-related financial institution -- China Securities Finance Co., Ltd. (CSF) -- was established as the only institution providing margin refinancing[16] and security lending[17] services. Specifically, according to the duties delegated by the CSRC, CSF acts as the intermediary agency in lending funds (margin refinancing) and securities (security lending) from fund managers, institutional shareholders such as insurance companies, and other market participants to the qualified security companies when the security companies' own funds or securities are insufficient to facilitate their customers' needs (for margin-trading or short-selling). On August 30, 2012, the margin refinancing business was first implemented for all the underlying securities (which were already eligible for margin-trading and short-selling). However, the security lending business was not implemented until February 28, 2013, and initially only covered a small portion of securities in the underlying security list.

I obtained detailed information on the margin-trading and short-selling program as well as the refinancing business from the Shanghai and Shenzhen Stock Exchanges from March 2010 to the end of 2013. This paper focuses on the treated stocks from four addition events on March 31, 2010, December 5, 2011, January 31, 2013 and September 16, 2013. I report the announcement date and the effective date of each addition event as well as the number of additions in Panel A of Table 1. In Panel B of Table 1, I also report the event date and the number of stocks that are covered by the security lending business. Although the number of stocks that are covered by the security lending business increased once in September 2013, the total number is still less than half the stocks that are already eligible for margin-

[14] There are two more addition events on July 1, 2010 and July 29, 2010. In these two events, five and one additional stocks were separately added into the underlying security list. I don't include these two events because the sample size is too small, and there is also an overlapping in their event windows.
[15] It is called "*Zhuan Rong Tong*" in Chinese.
[16] It is called "*Zhuan Rong Zi*" in Chinese.
[17] It is called "*Zhuan Rong Quan*" in Chinese.

trading and short-selling. It is worth noting that, as shown in the Panel B of Table 1, 10 out of 266 treated stocks from the January 31, 2013 addition event and 42 out of 184 treated stocks from the September 16, 2013 addition event became also eligible for the security lending business shortly after they were added into the underlying security list for margin-trading and short-selling program. This will cause an overlapping event window for the addition event with the event of the security lending business in my study. Thus, I exclude these 52 stocks to avoid any contamination.

In the next part, I will briefly review the related literature and develop the testable hypotheses.

3. Literature Review and Testable Hypotheses

With regard to the impact of margin-trading on liquidity, the results are mostly from empirical works. For example, Hardouvelis and Peristiani (1992) found that an increase in margin requirements leads to a decrease in liquidity. So, to be in line with this finding, we would expect the introduction of margin-trading improves liquidity. In a recent paper, Kahraman and Tookes (2014) also find consistent results. By employing a regression discontinuity design, they show that liquidity is higher when stocks become eligible for margin-trading and it decreases with ineligibility. However, when it comes to the impact of short-selling on liquidity, the prediction is not clear. Diamond and Verrecchia (1987) analyzed a variant of the Glosten and Milgrom (1985) model and showed that short-selling allows informed investors to trade on bad news, thus increasing the speed of price discovery and helping to resolve the uncertainty about fundamentals. If this effect dominates the adverse selection due to the informed trading, allowing short-selling will improve liquidity. Some empirical works find evidence supporting this prediction. For example, Beber and Pagano (2013) found that the short-selling bans implemented around the world in 2007-2009 were detrimental to liquidity. Boehmer, Jones and Zhang (2013) also found that the liquidity declined for stocks after the 2008 U.S. shorting ban. With samples from the Hong Kong stock market, Chan, Kot and Yang (2010) found that the H-share volume (relative to the A-share volume) was higher for the shortable stocks than for the non-shortable stocks. They conclude that, by including the bearish investors, short-selling eligibility allows more investors to trade, thus improving liquidity.

However, other authors (Amihud and Mendelson, 1986; Easley and O'Hara, 2004) show that a higher proportion of informed traders will increase the adverse selection component of the Bid-Ask spread, and thus reduce liquidity. Several papers (Ausubel, 1990; Bhattacharya and Spiegel, 1991) also argue that the less-informed investors will be more reluctant to trade if they expect “insiders” will take advantage of them in the trading. As shown by Boehmer, Jones and Zhang (2008, 2012) and Chang, Luo and Ren

(2013), short sellers are better informed and tend to have an advantage in the stock information. This reinforces the concern of an asymmetric information problem investigated by the above authors. Therefore, rather than encouraging more investors to trade, the introduction of margin-trading and short-selling can prevent some from joining the market, thus decreasing liquidity. To test this point, the first hypothesis we can make is as follows:

Hypothesis 1: In the presence of information asymmetry, allowing margin-trading and short-selling decreases stock's liquidity.

If the above prediction is correct, allowing margin-trading and short-selling has a negative effect on stocks' liquidity. We can further test if this result is driven by information asymmetry that causes the uninformed investors to avoid trading. The aim of the tests is to identify this mechanism by exploring the heterogeneity of information asymmetry. The first heterogeneity comes from the cross-sectional difference between stocks. Thus, the second hypothesis to test is:

Hypothesis 2: The more severe information asymmetry of stocks is, the worse their liquidity becomes after margin-trading and short-selling are implemented.

The second heterogeneity is from the difference between stocks and ETFs. As discussed earlier, because it is less likely that information asymmetry arises at ETFs level compared to stocks, we would expect no effect or even a positive impact on the liquidity of ETFs. This gives the third hypothesis to test:

Hypothesis 3: Allowing margin-trading and short-selling increases ETFs' liquidity.

In the paper by Fang, Qian and Zhang (2014), the trading of individual investors are studied by using intra-day transaction data. By assuming that "small" trades are executed by individual investors, they rely on trade size to identify individual investors. The trading of individual investors are captured by the trades in the bottom 25 percent of all the trades in the sample sorted by trading volume. Similarly as their work, I rely on trade size and trade's price impact to identify uninformed investors. I assume that "small" trades which cause no price impact are executed by uninformed investors. This provides me a way to directly study the behavior of uninformed investors. Thus, if the negative liquidity is due to information asymmetry that causes uninformed investors reluctant to trade, the corresponding hypothesis is:

Hypothesis 4: After margin-trading and short-selling are implemented, the trading of uninformed investors decreases, and this decrease is more pronounced for the stocks with greater information asymmetry.

4. Data and Empirical Strategy

4.1. Data

This paper conducts event study to evaluate the effects of China's margin-trading and short-selling on liquidity. Weekly data is used. The event day is the date when margin-trading and short-selling are effective. I drop the weeks between the announcement date and effective date in case that any impact has already been effective at the announcement, thus cause the contamination. Then, the 40 weeks around the event day are chosen as the event window.

The study first focuses on the stocks in the underlying security list, and ETFs are excluded because the concern for information asymmetry would not be as severe as for stocks. Four addition events on March 31, 2010, December 5, 2011, January 31, 2013 and September 16, 2013 are used to analyze the effects of margin-trading and short-selling on liquidity. Panel A of Table 1 provides the detailed information on the number of treated stocks, the announcement date and the effective date for each addition event. Because, as shown by Panel B of Table 1, 10 out of 266 treated stocks from the January 31, 2013 addition event and 42 out of 184 treated stocks from the September 16, 2013 addition event are also affected by the security lending business during the addition event's estimation window, I exclude these 52 stocks to avoid any contamination.

In the regression, I use three variables to measure stock liquidity. The first one is the turnover ratio, defined as the weekly average of the ratio of daily trading volume divided by common shares outstanding; the second one is the Amihud illiquidity ratio (Amihud and Mendelson, 1986; Amihud, 2002) which is computed as the absolute value of daily stock return divided by trading volume in value and then averaged over one week; the last one is the weekly averaged daily Bid-Ask spread. Stock level data such as closing price, trading volume, trading volume in value, bid and ask prices are from Datastream; the data of market capitalization and common shares outstanding are from Worldscrop. Due to missing data, the number of stocks in the regression is occasionally smaller than that in Table 1.

I also manually collect the intra-day transaction data from the web of SINA finance[18]. For each trade of each stock, SINA finance provides its execution time, transaction price, trading volume and trading

[18] Source: http://vip.stock.finance.sina.com.cn/mkt/

volume in value. From this intra-day transaction dataset, I pick out the trades that are less than 7,776 RMB[19] (about 1200 USD) in size, which is the bottom 25 percent of all the trades in the sample sorted by trading volume, and cause no price impact. Because Chinese stock market is flooded by individual investors who barely have any source of information on stocks, it is reasonable to assume that these small trades which do not cause any price impact are executed by uninformed investors. Then, within each day I take the sum of these trades to get the total trading volume, the total trading volume in value and the total number of trades. These three variables are used to study the trading behavior of uninformed investors.

4.2. Construction of Control Group

To test the above hypotheses in section 3, difference in difference method is employed. The treated stocks are those that become eligible for margin-trading and short-selling in each wave of stock addition event. However, as discussed earlier, comparing to the stocks that are ineligible for the program, the treated stocks differ significantly in characteristics that may be correlated with liquidity. This may cause endogeneity problem in regressions. In order to solve this problem, I use three methods to construct the control stocks.

The first method used in this paper is to simply select stocks among the ones which are not eligible for the program. To be specific, for each wave of the treated stocks, I select the control ones among the ineligible stocks with their market capitalization and turnover ratio greater than the 5th percentile of the treated ones'.[20] I call the control stocks from this selection method as selected control stocks.

To further mitigate the difference between the treated and control stocks, I employ a matched sample estimation approach to identify the effect of the margin-trading and short-selling program on liquidity. Specifically, two different matching methods --- percentage difference matching (as Beber and Pagano, 2013, Boehmer, Jones and Zhang, 2013) and propensity score matching (as Foucault, Sraer and Thesmar, 2011) --- are used to make sure that the conclusions are robust to the matching method.

In the percentage distance matching, each treated stock that is eligible for margin-trading and short-selling is matched with an exempt stock[21] that is traded on the same stock exchange and is closest in

[19] As a robustness check, I also restrict the trades to be less than 3000 RMB as Fang, Qian and Zhang (2014). All the regression results from the intra-day transaction data still hold.

[20] According to the necessary conditions for the stocks to be included into this margin-trading and short-selling program, market capitalization and turnover are most important requirements. This is the main reason that I select control stocks according to these two variables. In fact, as a robustness check, I also try to select according to other variables such as price, trading volume or trading volume in value, as well as using 1% instead of 5% as the selection threshold. All the results still hold.

[21] The exempt stock could also become eligible for margin-trading and short-selling in the future, but it remained to be ineligible during the event window checked by the regressions.

terms of market capitalization and price. The criteria is computed as the squared proportional difference in market capitalization plus the squared proportional difference in the average price over a 30-day period before the addition is announced. More formally, for each treated stock i its matched stock is chosen by solving the following problem:

$$\forall\ Stock\ j \in Ineligible\ Stocks = \text{arg}min_{j \neq i}\sqrt{|(MV_j - MV_i)/MV_i|^2 + |(P_j - P_i)/P_i|^2} \quad (1)$$
$$s.t.\ \ Stock\ j\ is\ from\ the\ same\ stock\ exchange\ as\ Stock\ i.$$

where MV is the market capitalization, P is the average price during the 30-days before the addition is announced. I chose the 30-day average price before the announcement day in order to prevent the liquidity shock on any stock from the matching procedure.

In the propensity score matching, core is computed by estimating the following logistic regression:

$$Treat_i = \alpha_i + \beta_1 MV_i + \beta_2 P_i + \varepsilon_i \quad (2)$$

where $Treat_i$=1 if stock i is the treated one, 0 otherwise. I then use the estimates of this logistic regression to compute the probability (the "score") that a stock is eligible for the program given its capitalization and averaged price. Finally, each treated stock is matched with the ineligible stock that has the closest score.

Table 2 reports the summary statistics of the stock level controls, liquidity measurements and intra-day transaction data over a 40-week event window. In each case, I report the means and standard deviations of the stock level controls separately for the treatment group, the selected control group as well as those from two matching methods. Then, for the liquidity measurements and the intra-day transaction data, I also report the summary statistics separately for the periods before and after the treatment.

4.3. Regression Analysis

Within an event window of 40 weeks around the event date, I test my first hypothesis by the following regression:

$$y_{i,t} = \alpha_i + \beta_1 Post_t + \beta_2 Treat_{i,t} + \beta_3 Post_t * Treat_{i,t} + \gamma X + \varepsilon_{i,t} \quad (3)$$

where $y_{i,t}$ is the liquidity measurement of stock i at week t; α_i is stock fixed effect, $Post_t$ is a dummy variable equal to one after margin-trading and short-selling are allowed; $Treat_{i,t}$ is the dummy variable for treated stocks, equal to 1 if stock i is eligible for the program at week t; X stands for several stock level variables such as log of market capitalization and stock returns' volatility. The strategy here is to identify the effect of margin-trading and short-selling on a particular measure of liquidity by comparing the treated stocks with the matched ones during the periods before and after margin-trading and short-selling are allowed. More simply put, a difference-in-differences methodology is employed, and the effect of margin-trading and short-selling on liquidity is thus measured by the coefficient β_3 in this specification. Moreover, because the OLS standard errors of difference-in-differences estimates can be biased if there is a serial correlation in the error terms for a given stock over time, I employ a two-way cluster standard errors to allow for the correlation in residuals over time given a stock as well as across stocks at each t.

To test the second hypothesis, I employ several proxies for stock's information asymmetry. I use the data from Wind[22] on analyst coverage and the institutional investors holding data from Factset in WRDS. The first proxy used in this paper is one minus the stocks' funds ownership (e.g., Wang and Zhang, 2009; Michaely and Vincent, 2012). First, the institutional investors, by holding the stocks, can incorporate more information into the prices, thus making the information asymmetry less severe. Moreover, because the institutional investors (mainly funds) in China are restricted from conducting short-selling, and their holdings cannot be lent to short sellers;[23] the available amount of one treated stock for short sellers would be less if there are more institutional shareholders in that stock. Consequently, the uninformed investors' concern of trading with more informed counterparties would be lessened. In summary, either of these above two channels would make the negative effect that margin-trading and short-selling have on liquidity less pronounced if there are more institutional shareholders in the treated stocks. The second proxy is a dummy of the absence of analyst coverage. As mentioned earlier, stock analyst is one of the most important sources of information for individual Chinese investors. It is then natural to use no analyst coverage as the proxy for a stock's information asymmetry. We would expect information asymmetry to be more pronounced for the stocks without analyst coverage. The last proxy is a dummy of the absence of cross-listed (H) shares. Generally, because cross-listing are often with stricter information disclosure rules, increased media attention, greater analyst coverage, and higher quality of accounting information

[22] Wind Information of Shanghai, which is one of China's largest financial information vendors.
[23] Notice that I exclude the stocks that are also affected by the security refinancing business during the event window.

(Roosenboom and Van Dijk, 2009), we would expect information asymmetry to be less severe for the stocks with cross-listed shares.

Generally, to identify the mechanism that results in the negative impact on liquidity (Hypothesis 2), the following regression is estimated:

$$y_{i,t} = \alpha_i + \beta_1 Post_t + \beta_2 Treat_{i,t} + \beta_3 Asym_{i,t} + \beta_4 Post_t * Treat_{i,t} + \beta_5 Post_t * Asym_{i,t} + \beta_6 Treat_{i,t} * Asym_{i,t} + \beta_7 Post_t * Treat_{i,t} * Asym_{i,t} + \gamma X + \varepsilon_{i,t} \quad (4)$$

where $Asym_{i,t}$ could be (1) one minus the stocks' funds ownership; (2) the dummy variable for no analyst coverage on stock i; or (3) the dummy variable for no cross-listed shares. If the negative impact of margin-trading and short-selling is due to the information asymmetry which makes the uninformed investors reluctant to trade, we would find the negative effects to be more pronounced when $Asym_i$ is larger, i.e., the information asymmetry is more severe. That means that, to be in line with my hypothesis 2, the interested coefficient β_7 should be negative for the liquidity measurement of the turnover ratio, and positive for the liquidity measurement of the Bid-Ask spread and the Amihud illiquidity ratio.

In order to test hypothesis 3 and 4, similar regressions as equation (3) and (4) are used. The dependent variable is replaced by the liquidity measurements for ETFs and the three variables from intra-day transaction data respectively.

5. Results

5.1. Negative Liquidity Impact on Stocks

I first present the results of the impact of margin-trading and short-selling on stocks' liquidity. By using weekly data within the event window covering 40 weeks around the addition event, I compare the change in the turnover ratio between the treated stocks and the control ones from the three methods discussed in section 4.2. Another two measurements, the Amihud illiquidity ratio and the Bid-Ask spread, are also used to give a more complete understanding. For each of these three liquidity measurements, I first compare the treated stocks with the control ones from the selection method. In the first regression, the simplest model is checked. In the following regressions, more controls such as the log of market capitalization and stock returns' volatility and different fixed effects are added. In the last regression, I further allow the different trends between treated and control stocks. Then, the results from the comparisons between the treated stocks and the control ones from percentage distance matching and

propensity score matching are presented respectively. To save the space, only the results from the most demanding model are reported.

The results for Hypothesis 1 are reported in Table 3. As argued in Section 4.3, the liquidity impact is captured by the coefficient of the interaction between post and treated stock dummy. From column (1) of Panel A in Table 3, we can see that the coefficient of the interaction part is significantly negative, and this result is robust to including more controls or different fixed effects. Specifically, as shown in column (4), the turnover ratio decreases 18 basis points for the treated stocks compared with the selected control ones. And the result still holds when the control stocks from percentage distance matching (in, column (6)) or propensity score matching (in, column (7)) are used. All the results show that allowing margin-trading and short-selling reduces the trading on the treated stocks.

When checking the impact on the Amihud illiquidity ratio and the Bid-Ask spread, the results support the same conclusion. From column (4), (6) and (7) of Panel B in Table 3, there is a significant increase in the Amihud illiquidity ratio, indicating that allowing margin-trading and short-selling causes a lager order flow's price impact for the treated stocks. Moreover, as shown in column (4) of Panel C in Table 3, the Bid-Ask spread of the treatment stocks decreases 42 basis points (p-value<5%) relative to the control ones. Thus the liquidity is worse off.

Figure 1 provides a visual representation of the above findings. It plots the evolution of the liquidity measurement for the treated stocks and the control ones from three construct methods during the period covering 20 weeks before and after margin-trading and short-selling are allowed. Similar to the regression analysis, I drop the weeks between the event day and the announcement day. It can be seen clearly that, when margin-trading and short-selling are implemented, the turnover ratio decreases and the Amihud illiquidity ratio increases for the treated stocks when compared to the control ones; the Bid-Ask spread also slightly increases. So, allowing margin-trading and short-selling makes the liquidity of the treated stocks worse in comparison to the control ones. More importantly, from Figure 1, we can see the difference between each liquidity measurement basically does not change much before the event. This is crucial for the identification of difference-in-differences methods, because it indicates that the negative liquidity impact I find is not driven by the difference in the trends of the treated and control stocks before the event. Actually, I can formally test this point. As shown in Table 4, with the data from the period before treatment, I regress the liquidity measurement on the time trend as well as the interaction of trend with the treated stock dummy. The results show that there is no difference between the treated and control stocks on the Amihud illiquidity ratio. Although there is difference between two groups on the turnover

ratio and the Bid-Ask spread, the sign is opposite to the negative liquidity impact I find above, which means that the difference cannot drive the above negative liquidity impact.[24]

From the above analysis, we can come to the conclusion that allowing margin-trading and short-selling in China actually has a negative effect on liquidity. This empirical result does not depend on how I measure liquidity, and is robust to various controls.

5.2. Role of Information Asymmetry

The next step is to identify the mechanism that drives this result. As argued by Hypothesis 2, if this negative liquidity effect is due to the information asymmetry which makes uninformed investors reluctant to trade, we should expect it to be more pronounced for the stocks with greater information asymmetry. Tables 5 through 7 report the results on my second hypothesis. To be specific, in Table 5 one minus stocks' funds ownership is used as the proxy for information asymmetry; in Table 6 the dummy of no analyst coverage is used as the proxy for information asymmetry; in Table 7 the dummy of no cross-listed shares is used.

Generally, all the regressions provide consistent results supporting Hypothesis 2. For example, as shown in Table 5, when information asymmetry is defined according to funds ownership, the coefficient of the triple difference is negative in Panel A for the turnover ratio and positive for the Amihud illiquidity ratio in Panel B. Thus, when margin-trading and short-selling are allowed, the less shares are held by the institutional investors, the worse the liquidity would become. More interestingly, the coefficient of the interaction between post and treated stock dummy is positive for the turnover ratio in Panel A and negative for the Amihud ratio in Panel B. This means that if there is no information asymmetry, allowing margin-trading and short-selling increases (decreases) the turnover ratio (Amihud illiquidity ratio) for the treated stocks relative to the control ones. Checking Panel C in Table 5, no significant results are found for the Bid-Ask spread. However, the sign of the triple difference are as predicted.

Using the dummy of no analyst coverage or no cross-listed shares gives similar results. As shown in Table 6 and Table 7, although the significance may change between the regressions, all of them provide consistent evidence that the negative liquidity impact is more pronounced for the stocks with greater information asymmetry.

[24] This difference between the treated and control stocks on the liquidity measures can actually weaken the estimation of equation (3). In order to control this, I allow for different time trend as a robustness check in the regressions.

In summary, all the above results support Hypothesis 2. Margin-trading and short-selling in China make the stock liquidity worse due to the fact that in the presence of severe information asymmetry, the uninformed investors become more reluctant to trade.

5.3. Positive Liquidity Impact on ETFs

In above sections, I exclude ETFs in the underlying security list because it is much less likely that asymmetric information arises at the ETFs level as they represent a whole industry or market. So, with less concern for information asymmetry, we should expect no change or even a positive liquidity impact on the treated ETFs when margin-trading and short-selling are implemented. In this section, I investigate the liquidity impact on ETFs to test hypothesis 3. In the underlying security list, there are ten ETFs by the end of 2013. For three of them,[25] the data is not enough to conduct an event study because these funds became eligible for margin-trading and short-selling shortly after being established. The rest seven ETFs are all from the addition event on December 5, 2011. They include five passive funds which simply follow different market indices, and two active funds -- one tracks the stocks with high and stable dividend payout ratio,[26] the other one tracks the stocks with better corporate governance.[27] Because the passive funds just represent the whole market, they are likely with even less information asymmetry when compared to the active funds. Thus, I first check the liquidity impact on all the treated ETFs and then separately for the passive and active funds respectively.

I get data for only 57 Chinese ETFs from Datastream, the difference between the eligible ETFs and the ineligible ones are not as large as for the stocks. Thus, all ineligible ETFs are taken as the control funds. Then, the same regression as equation (3) is used. The regression results are reported in Table 8. From Panel A of Table 8, in contrast to the liquidity impact on the treated stocks, we can see that the trading volume significantly increases, the Amihud illiquidity ratio and the Bid-Ask spread significantly decreases for the treated ETFs compared to the control ones after margin-trading and short-selling are implemented. When checking the impact separately for the passive and active funds, as shown by Panel B of Table 8, the above positive liquidity is mainly from the passive funds. This confirms my previous argument that when the concern of information asymmetry is further attenuated, the positive liquidity impact of margin-trading and short-selling would be even stronger.

To sum up, allowing margin-trading and short-selling significantly improves liquidity for the treated ETFs. This result provides another evidence suggesting that the negative liquidity impact of the China's

[25] Including Harvest CSI 300 Index ETF, Huatai-Pinebridge CSI 300 ETF and China AMC Hang Seng Index ETF.
[26] SSE *180* Corporation Administration ETF.
[27] Huatai-PineBridge SSE Dividend Index ETF.

margin-trading and short-selling program on the treated stocks is due to information asymmetry because when asymmetric information problem is attenuated, as the previous empirical work, allowing margin-trading and short-selling improves liquidity.

5.4. Uninformed Investors

From the above results, we can come to the conclusion that the negative liquidity impact is due to information asymmetry that causes uninformed investors to be reluctant to trade. In this section, in order to further test this mechanism, the trading behavior of uninformed investors which is proxyed by the small trades that cause no price impact is studied. The hypothesis 4 is tested. Similar to the results of liquidity impacts, the average impact on uninformed investors' trading is first reported in Table 9, and the heterogeneous impacts across the stocks with different information asymmetry level are further checked in Tables 10 through 12.

Generally, all the results are consistent to hypothesis 4. Specifically, as shown by Panel A in Table 9, after margin-trading and short-selling are implemented, the trading volume by uninformed investors reduce 8 (6) basis point for the treated stocks relative to the selected control (matched) stocks. The same results are found for the trading volume in value and the number of trades. Checking Tables 10, 11 and 12, the results show that this reduction is more pronounced for the stocks with smaller funds ownership, with no analysis coverage or no cross-listed shares. All these results confirm the mechanism underlying the negative liquidity impact of China's margin-trading and short-selling program. It is because the information asymmetry that causes uninformed investors stop trading.

6. Robustness Check

6.1. Uniformed Investors and Stock Volatility

In this section, I check the impact of the China's margin-trading and short-selling program on stock return volatility. According to Foucault, Sraer and Thesmar (2011), if individual investors behave as noise traders, their trading should have a positive effect on the volatility and the autocovariance of stock returns. This implies that if the individual investors (who mainly compose the uninformed investors in China's stock market) stop trading, stock return volatility should decrease. As argued in the beginning of this paper, the negative liquidity impact of the margin-trading and short-selling program is due to the fact that uninformed investors stop trading, the test in this section will thus provide a more complete understanding of the behavior of them.

In this section, three different measures of volatility for a given stock-week: (i) the standard deviation of its raw daily return (Volatility), (ii) the standard deviation of the daily difference between its return and the market return (Volatility2), and (iii) the standard deviation of the residual of the market model, that is, the time-series regression of the daily excess return for stock on the daily excess market return (Volatility3) are used. Similar to equation (3), I regress the three volatility measures on the post dummy, the dummy for the treated stocks and the interaction part of them. The interested coefficient is the one of the interaction part. The results are reported in Table 13. We can see, when margin-trading and short-selling are implemented, the volatility significantly decrease for the treated stocks relative to the control ones. In line with Foucault, Sraer and Thesmar (2011), these results suggest that these investors play the role of noise traders in the market. It confirms my previous argument that when margin-trading and short-selling are implemented in China, the uninformed investors become reluctant to trade, the informed ones could also choose not to trade to avoid revealing their information, and thus liquidity becomes worse in the spirit of no-trade theorem.

6.2. Security lending Business

On February 28, 2013, in order to facilitate short-selling, China introduced a security lending business. Fund managers and other institutional shareholders are allowed to lend their shares to short sellers when the shares owned by the qualified security companies are insufficient. Although this business covers only a small part of the underlying securities which are eligible for margin-trading and short-selling, it can provide a robustness check for the results of section 5.1. If the uninformed investors became reluctant to trade because of information asymmetry, we should expect the same liquidity impact from this security lending business because it further facilitates the short-selling activities, making the uninformed investors more likely to be exploited by their informed counterparties, thus will also cause them reluctant to trade.

I employ the same methods to construct the control stocks and conduct the same event study within a 40 week event window to investigate the liquidity impact. The treated stocks, in this section, are the ones that are already eligible for the margin-trading and short-selling program and become eligible for the security lending business during the sample period. The event data in this section is the date when the treated stocks become eligible for the security lending business. As shown by Panel B of Table 1, 10 out of 86 stocks and 42 out of 207 stocks are also affected by the addition events of section 5.1 during the event window of the security lending business, thus I drop these stocks to avoid any contamination.

The results are reported in Table 14. In Panel A, the treated stocks are compared with the stocks which are not eligible for margin-trading and short-selling; in Panel B, they are compared with the ones

which are eligible for margin-trading and short-selling but not eligible for the security lending business. From Panel A of Table 14, we can see that the liquidity becomes significantly worse for the treated stocks; the turnover ratio significantly decreases, the Amihud illiquidity ratio and the Bid-Ask spread significantly increase after the security lending business is implemented. Although regressions in Panel B give weaker results, no contradicted results are found. Overall, by further facilitating short-selling, the security lending business makes liquidity worse. This provides further evidence that the China's margin-trading and short-selling program has a negative effect on liquidity because it introduces more informed investors which in turn makes the uninformed investors reluctant to trade.

7. Conclusion

This paper studies the impact of margin-trading and short-selling on liquidity in the Chinese stock market.

I find that the liquidity becomes relatively worse for the treated stocks when margin-trading and short-selling are implemented. The turnover ratio significantly decreases, the Amihud illiquidity ratio and the Bid-Ask spread significantly increase for stocks in the treatment group when compared to the control group. This result does not depend on the measures of liquidity and is robust to various methods of construction of the control group. To further explore the mechanism driving this result, I use several information asymmetry proxies. I show that this negative liquidity impact is more pronounced for the treated stocks (1) with smaller funds ownership, (2) without analyst coverage; or (3) without cross-listed shares. Moreover, I also study the liquidity impact on ETFs. Since the information asymmetry is less concerned for the ETFs, which generally represent a whole market, we should find no change or even a positive liquidity effect. In line with this prediction, I find the liquidity significantly improves for the treated ETFs when margin-trading and short-selling are implemented.

All these pieces of evidences show that the China's margin-trading and short-selling program makes liquidity worse because of information asymmetry that causes uninformed investors reluctant to trade. This is also proved by the tests on the trading behavior of uninformed investors. Using a proxy defined according to the small trades that cause no price impact, I find the uninformed investors largely reduce their trading on the treated stocks compared to the control ones when margin-trading and short-selling are implemented. And similar to the effect on liquidity, this reduction is more pronounced for the stocks with greater information asymmetry.

To sum up, the results of this paper strongly support the asymmetric information argument by Ausubel (1990), and are in line with the spirit of the theory by Milgrom and Stokey (1982). In the presence of information asymmetry, allowing margin-trading and short-selling makes uninformed investors reluctant to trade. Thus, unlike the previous empirical evidence, when China's margin-trading and short-selling program is implemented liquidity become worse.

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Figure 1. Liquidity Impact

The figure displays time dummy estimates from the regression $y_{it} = \beta_1 D_t + Controls_{it} + a_i + \varepsilon_{it}$, separately for the treated stocks and the controls ones from the three methods. y is one of the three liquidity measurements. Time is measured weekly. The sample period covers 20 weeks before and after margin-trading and short-selling are implemented. Similar to the regression analysis, I drop the weeks between the event day and the announcement day. So week zero in this figure is the first week after when the treatment is implemented, and week minus one is one week before the announcement day.

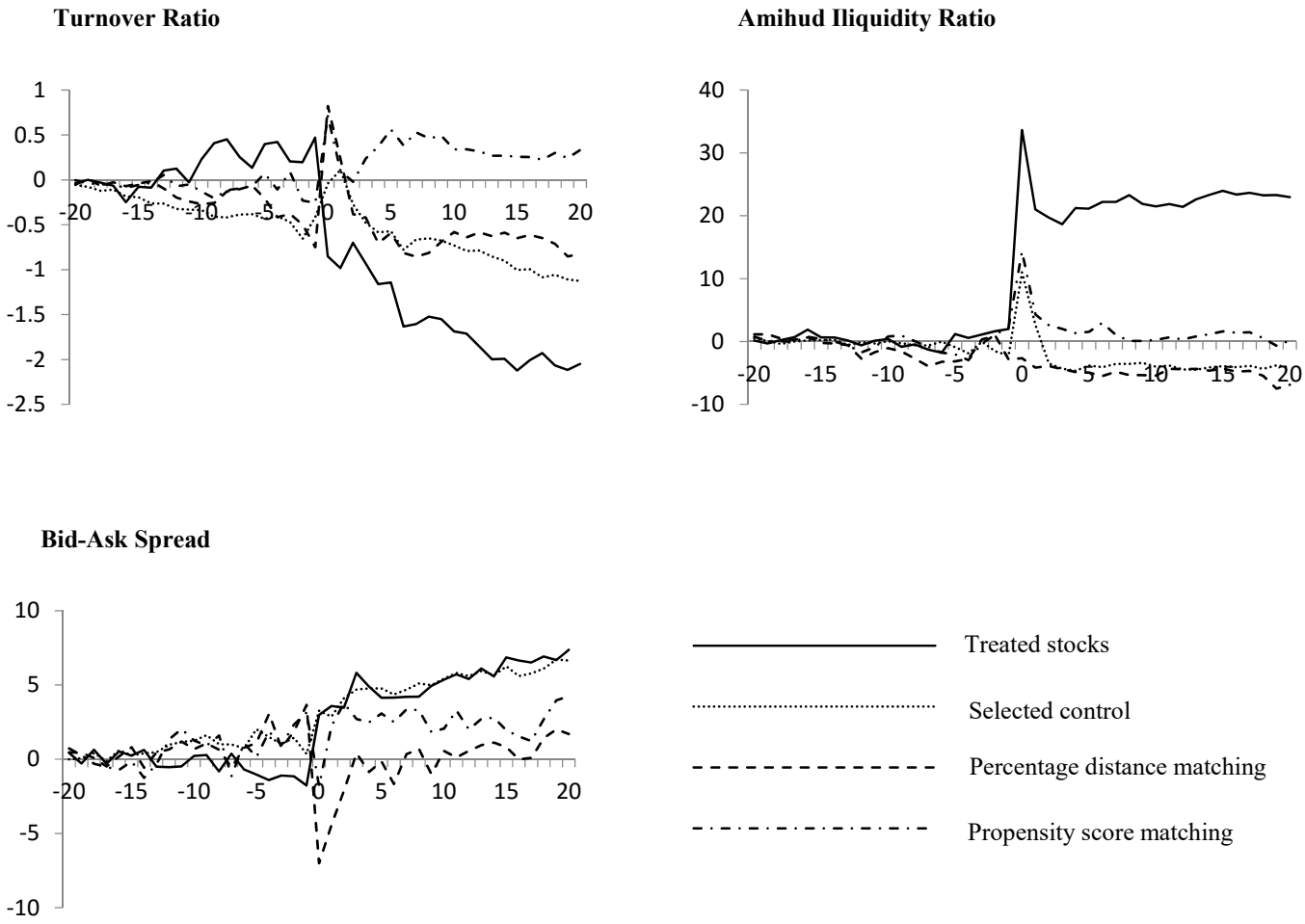

Table 1. Timeline of China's Margin-Trading and Short-Selling Program

This table reports the main revisions of China's margin-trading and short-selling program through the end of 2013. The information is from Shanghai Stock Exchange and Shenzhen Stock Exchange. Panel A reports the main four addition events in which new stocks are added into the eligible securities list for the program. Column 1 reports the date when each addition becomes eligible. Column 2 reports the date when each addition is announced by the Shanghai and Shenzhen Stock Exchanges. Column 3 reports the number of treated stocks that are studied in this paper. Panel B reports the announcement and effective date of the security lending business.

Effective Date	Announcement Date	Number of Treated Stocks
Panel A, Addition Event		
March 31, 2010	February 12, 2010	89
December 5, 2011	November 25, 2011	179
January 31, 2013	January 25, 2013	266
September 16, 2013	September 6, 2013	184
Cumulated		718
Panel B, Security lending business		
February 28, 2013	February 26, 2013	
		53 from March 31, 2010 addition event treated stocks
		23 from December 5, 2011 addition event treated stocks
		10 from January 31, 2013 addition event treated stocks
Cumulated		86
September 18, 2013	September 16, 2013	
		21 from March 31, 2010 addition event treated stocks
		64 from December 5, 2011 addition event treated stocks
		80 from January 31, 2013 addition event treated stocks
		42 from September 16, 2013 addition event treated stocks
Cumulated		207

Table 2. Summary Statistics

The table reports means of key variables with standard deviations in parenthesis, separately for the treated and the control stocks that are composed by three methods. The definition of these variables is given in Appendix. Column (1) is for the treated stocks from the addition events, Column (2) is for the selected control stocks, Column (3) is for the control stocks composed by percentage distance matching, and Column (4) is for the control stocks composed by propensity score matching. Panel A reports firm-level statistics on the characteristics of the stocks. Panel B reports the summary statistics of the three liquidity measurements separately during the periods before and after the treatment. Similarly, Panel C reports the summary statistics of the intra-day trading data of the investors whose trades are below 7776 RMB (which is in the bottom 25 percent of all the trades in the sample sorted by trading volume) and cause no impact on stocks' prices.

Variables	Treated Stocks (1)		Selected Control (2)		Percentage Distance (3)		Propensity Score (4)	
Panel A								
Ln(MV)	16.24		15.50		15.90		15.90	
	(0.98)		(0.57)		(0.77)		(0.76)	
Volatility (%)	2.41		2.34		2.30		2.27	
	(1.26)		(1.28)		(1.26)		(1.27)	
Volatility2 (%)	1.90		1.88		1.85		1.82	
	(1.21)		(1.22)		(1.20)		(1.21)	
Volatility3 (%)	1.83		1.84		1.81		1.78	
	(1.21)		(1.22)		(1.20)		(1.20)	
Funds' ownership (%)	1.91		0.55		1.68		1.74	
	(5.71)		(3.34)		(5.91)		(6.15)	
Fraction of stocks with analyst coverage (%)	83.78		79.19		82.35		84.62	
Fraction of stocks with cross-listed shares (%)	9.16		2.32		6.49		6.94	
	Before	After	Before	After	Before	After	Before	After
Panel B								
Turnover (%)	1.42	1.29	1.04	1.16	0.86	0.94	0.82	0.91
	(1.50)	(1.30)	(1.07)	(1.11)	(0.98)	(1.00)	(0.99)	(1.01)
Amihud illiquidity ratio	2.66	2.51	6.53	5.35	5.94	4.67	6.45	5.03
	(3.47)	(2.98)	(6.70)	(5.39)	(6.81)	(4.91)	(7.38)	(5.57)
Bid-ask spread (%)	12.92	13.11	14.90	14.30	14.67	14.15	15.06	14.53
	(8.28)	(8.38)	(8.99)	(8.79)	(9.01)	(9.20)	(9.72)	(9.79)
Panel C								
Ln(1+Volume)	6.28	6.37	6.16	6.25	5.99	6.08	5.93	6.03
	(1.20)	(1.21)	(1.06)	(1.03)	(1.18)	(1.15)	(1.15)	(1.15)
Ln(1+Volume in value)	13.42	13.49	13.26	13.35	13.19	13.29	13.18	13.30
	(0.65)	(0.54)	(0.55)	(0.49)	(0.62)	(0.54)	(0.61)	(0.54)
Ln(1+Number of trades)	5.26	5.33	5.11	5.22	5.04	5.15	5.04	5.16
	(0.65)	(0.55)	(0.54)	(0.50)	(0.59)	(0.55)	(0.59)	(0.55)

Table 3. Liquidity Impact

This table reports the impact of margin-trading and short-selling on liquidity. Three liquidity measurements --- *turnover ratio*, *Amihud illiquidity ratio* and *bid-ask spread* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Turnover Ratio							
	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.36***	0.28***	0.24***				
	(6.15)	(5.50)	(5.01)				
Post	0.11**	0.05	-0.02	0.15***	-0.17	-0.35***	-0.50***
	(2.39)	(1.17)	(-0.94)	(10.20)	(-1.64)	(-7.03)	(-10.95)
Post*Treat	-0.24***	-0.19***	-0.18***	-0.18***	-0.17***	-0.16***	-0.17***
	(-5.35)	(-4.95)	(-4.53)	(-4.54)	(-2.60)	(-3.93)	(-4.23)
Volatility		0.29***	0.35***	0.32***	0.27***	0.31***	0.31***
		(14.62)	(19.24)	(18.41)	(13.95)	(16.61)	(16.50)
Ln(MV)		0.32***	0.09	0.14**	0.34***	0.03	0.02
		(5.11)	(1.48)	(2.03)	(4.47)	(0.33)	(0.28)
Observations	101,985	100,652	100,652	100,652	100,652	51,580	51,499
Number of Stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.01	0.17	0.28	0.27	0.16	0.25	0.25

Panel B: Amihud Illiquidity Ratio

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-1.91***	-1.49***	-1.25***				
	(-6.05)	(-5.93)	(-3.93)				
Post	-1.18**	-0.87*	0.07	-0.22**	0.44	-0.24*	1.51***
	(-2.27)	(-1.89)	(0.54)	(-2.45)	(0.42)	(-1.87)	(6.00)
Post*Treat	1.02***	0.84**	0.74**	0.77**	0.26	0.78***	0.97***
	(2.83)	(2.56)	(2.25)	(2.31)	(0.39)	(2.91)	(3.07)
Volatility		0.40***	0.04	0.12***	0.50***	0.07*	0.08*
		(3.78)	(0.90)	(2.87)	(4.53)	(1.84)	(1.77)
Ln(MV)		-4.38***	-2.40***	-1.84***	-3.84***	-1.90***	-1.56***
		(-6.96)	(-7.38)	(-5.19)	(-5.37)	(-4.01)	(-4.13)
Observations	101,975	100,652	100,652	100,652	100,652	51,580	51,499
Number of Stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.02	0.06	0.30	0.30	0.05	0.25	0.25

Panel C: Bid-Ask Spread

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-0.27	0.20	-1.76***				
	(-0.77)	(0.62)	(-6.32)				
Post	-0.60*	-0.28	-0.35***	-1.07***	0.24	2.86***	2.79***
	(-1.68)	(-0.82)	(-2.93)	(-14.83)	(0.32)	(15.61)	(12.10)
Post*Treat	0.77***	0.59**	0.37**	0.42**	0.61*	0.49***	0.54***
	(3.17)	(2.45)	(2.13)	(2.49)	(1.84)	(2.59)	(2.83)
Volatility		-0.19***	-0.42***	-0.35***	-0.09	-0.29***	-0.28***
		(-3.10)	(-10.45)	(-9.48)	(-1.49)	(-7.53)	(-7.49)
Ln(MV)		-4.03***	-2.84***	-1.46***	-3.21***	-1.03***	-1.13***
		(-8.72)	(-8.40)	(-4.44)	(-6.49)	(-3.64)	(-3.57)
Observations	101,811	100,575	100,575	100,575	100,575	51,542	51,467
Number of Stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.002	0.02	0.13	0.11	0.01	0.11	0.11

Table 4. Test Pre-trend in Liquidity

This table reports the results of the tests for the pre-trend in the three liquidity measurements. Only the results from the most demanding model are reported. In all regressions, *Trend* is the time trend, *Treat* is the dummy variable for treated stocks, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

	Selected Control			Percentage Distance			Propensity Score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Turnover	Illiquidity	Spread	Turnover	Illiquidity	Spread	Turnover	Illiquidity	Spread
Trend	0.02	-0.48**	-0.99***	0.02***	-0.20***	-0.32***	-0.01	-0.55	-1.48***
	(0.43)	(-2.33)	(-13.94)	(7.42)	(-9.83)	(-13.96)	(-0.16)	(-1.35)	(-10.91)
Trend*Treat	0.01	-0.01	-0.06***	0.01**	-0.01	-0.04**	0.01**	0.01	-0.05***
	(1.56)	(-0.23)	(-3.49)	(2.05)	(-0.23)	(-2.31)	(2.18)	(0.21)	(-2.77)
Volatility	0.29***	0.20***	-0.28***	0.31***	0.08	-0.26***	0.31***	0.13*	-0.26***
	(11.84)	(3.59)	(-6.00)	(12.33)	(1.42)	(-5.17)	(13.29)	(1.93)	(-5.05)
Ln(MV)	-0.14*	-0.90**	-0.56	-0.22**	-1.40***	-0.39	-0.25***	-1.11**	-0.65**
	(-1.80)	(-2.28)	(-1.31)	(-2.48)	(-2.65)	(-1.21)	(-2.74)	(-2.37)	(-2.03)
Observations	50,755	50,755	50,709	25,936	25,936	25,911	25,901	25,901	25,884
Number of stocks	1,481	1,481	1,481	988	988	988	997	997	997
Stock*wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-week FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.27	0.31	0.10	0.26	0.24	0.10	0.25	0.25	0.10

Table 5. Liquidity Impact with Information Asymmetry, Funds' Ownership

This table reports the regression results investigating the mechanism underlying the negative liquidity impact of margin-trading and short-selling. Three liquidity measurements --- *turnover ratio*, *Amihud illiquidity ratio* and *bid-ask spread* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. *Asym* is the proxy of information asymmetry, which equals to (100-*Funds' ownership*). Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Turnover Ratio							
	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-0.48	0.03	0.46				
	(-0.31)	(0.02)	(0.35)				
Post	-0.44*	-0.52*	0.23	0.72***	-0.71***	-0.03	-0.43*
	(-1.92)	(-1.95)	(1.31)	(4.03)	(-2.61)	(-0.11)	(-1.68)
Asym	-0.01***	-0.01	0.01**				
	(-3.46)	(-1.54)	(2.06)				
Post*Treat	0.42	0.59**	0.85***	0.85***	0.59*	0.92***	1.13***
	(1.21)	(1.97)	(3.11)	(3.08)	(1.89)	(2.72)	(3.17)
Post*Asym	0.01**	0.01**	-0.00	-0.00*	0.01*	-0.00	-0.00
	(2.17)	(1.99)	(-1.42)	(-1.66)	(1.91)	(-1.07)	(-0.11)
Treat*Asym	0.01	0.00	-0.00				
	(0.55)	(0.17)	(-0.16)				
Post*Treat*Asym	-0.01*	-0.01**	-0.01***	-0.01***	-0.01**	-0.01***	-0.01***
	(-1.79)	(-2.44)	(-3.50)	(-3.48)	(-2.38)	(-3.03)	(-3.49)
Volatility		0.29***	0.34***	0.32***	0.27***	0.31***	0.31***
		(14.62)	(19.24)	(18.41)	(13.96)	(16.62)	(16.51)
Ln(MV)		0.32***	0.09	0.14**	0.34***	0.03	0.03
		(5.02)	(1.49)	(2.03)	(4.47)	(0.42)	(0.40)
Observations	101,985	100,652	100,652	100,652	100,652	51,580	51,499
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.01	0.17	0.28	0.27	0.16	0.25	0.25

Panel B: Amihud Illiquidity Ratio

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	14.96***	9.67	-0.81				
	(3.05)	(1.19)	(-0.16)				
Post	4.23**	4.28**	0.70	-1.02	5.41***	1.75*	3.28***
	(2.48)	(2.42)	(0.53)	(-0.80)	(3.03)	(1.68)	(3.13)
Asym	0.07***	0.01	-0.03				
	(2.69)	(0.60)	(-1.63)				
Post*Treat	-2.57**	-3.60**	-3.51**	-3.27**	-3.96**	-5.14***	-5.23***
	(-2.03)	(-2.19)	(-2.38)	(-2.26)	(-2.49)	(-3.39)	(-3.36)
Post*Asym	-0.05**	-0.05**	-0.01	-0.004	-0.05**	-0.02*	-0.02*
	(-2.53)	(-2.43)	(-0.47)	(-0.28)	(-2.36)	(-1.81)	(-1.90)
Treat*Asym	-0.17***	-0.11	-0.00				
	(-3.33)	(-1.36)	(-0.10)				
Post*Treat*Asym	0.04**	0.04**	0.04**	0.04**	0.04**	0.06***	0.06***
	(2.36)	(2.43)	(2.49)	(2.39)	(2.36)	(3.46)	(3.46)
Volatility		0.40***	0.04	0.12***	0.50***	0.07*	0.08*
		(3.78)	(0.90)	(2.87)	(4.52)	(1.86)	(1.79)
Ln(MV)		-4.39***	-2.41***	-1.84***	-3.83***	-1.93***	-1.60***
		(-6.94)	(-7.39)	(-5.19)	(-5.37)	(-4.06)	(-4.23)
Observations	101,975	100,652	100,652	100,652	100,652	51,580	51,499
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.02	0.06	0.30	0.30	0.05	0.25	0.24

Panel C: Bid-Ask Spread

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	12.53	6.49	-11.67				
	(1.15)	(0.75)	(-1.06)				
Post	6.63***	6.85***	-0.02	-1.59	7.22***	4.00*	3.96*
	(2.66)	(2.67)	(-0.01)	(-0.73)	(2.80)	(1.82)	(1.66)
Asym	0.08**	0.03	-0.08**				
	(2.04)	(0.82)	(-2.13)				
Post*Treat	1.43	0.21	-0.60	-0.19	0.48	-0.20	0.23
	(0.50)	(0.08)	(-0.26)	(-0.08)	(0.18)	(-0.08)	(0.09)
Post*Asym	-0.07***	-0.07***	-0.00	0.00	-0.07***	-0.01	-0.01
	(-2.80)	(-2.71)	(-0.15)	(0.12)	(-2.78)	(-0.52)	(-0.49)
Treat*Asym	-0.13	-0.06	0.10				
	(-1.18)	(-0.72)	(0.90)				
Post*Treat*Asym	-0.01	0.003	0.01	0.01	0.0003	0.01	0.003
	(-0.26)	(0.10)	(0.42)	(0.26)	(0.01)	(0.28)	(0.12)
Volatility		-0.19***	-0.42***	-0.35***	-0.09	-0.29***	-0.28***
		(-3.11)	(-10.44)	(-9.48)	(-1.50)	(-7.54)	(-7.50)
Ln(MV)		-4.03***	-2.84***	-1.45***	-3.20***	-1.03***	-1.13***
		(-8.71)	(-8.45)	(-4.44)	(-6.48)	(-3.64)	(-3.58)
Observations	101,811	100,575	100,575	100,575	100,575	51,542	51,467
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.003	0.02	0.13	0.11	0.01	0.11	0.11

Table 6. Liquidity Impact with Information Asymmetry, Analyst Coverage

This table reports the regression results investigating the mechanism underlying the negative liquidity impact of margin-trading and short-selling. Three liquidity measurements --- *turnover ratio*, *Amihud illiquidity ratio* and *bid-ask spread* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. *Asym* is the proxy of information asymmetry, which equals to 1 if the stock is not covered by any analyst, 0 otherwise. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Turnover Ratio

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.28***	0.22***	0.18***				
	(5.04)	(4.50)	(4.01)				
Post	0.10**	0.04	-0.03	0.14***	-0.18*	-0.33***	-0.49***
	(2.17)	(0.79)	(-1.17)	(8.63)	(-1.79)	(-6.31)	(-10.56)
Asym	0.09	0.09	0.05				
	(1.39)	(1.46)	(0.92)				
Post*Treat	-0.15***	-0.11***	-0.09***	-0.09***	-0.09	-0.09**	-0.08**
	(-3.80)	(-3.23)	(-2.61)	(-2.61)	(-1.43)	(-2.35)	(-2.40)
Post*Asym	0.06	0.09*	0.08**	0.07*	0.08*	0.01	0.12
	(1.21)	(1.86)	(2.01)	(1.81)	(1.68)	(0.17)	(1.34)
Treat*Asym	0.52***	0.39**	0.37**				
	(2.89)	(2.50)	(2.45)				
Post*Treat*Asym	-0.57***	-0.50***	-0.54***	-0.54***	-0.50***	-0.46***	-0.56***
	(-4.54)	(-4.49)	(-4.94)	(-4.90)	(-4.46)	(-3.84)	(-4.16)
Volatility		0.29***	0.34***	0.32***	0.27***	0.31***	0.31***
		(14.61)	(19.21)	(18.39)	(13.93)	(16.59)	(16.49)
Ln(MV)		0.32***	0.08	0.13*	0.33***	0.01	0.01
		(5.02)	(1.47)	(1.88)	(4.38)	(0.17)	(0.08)
Observations	101,985	100,652	100,652	100,652	100,652	51,580	51,499
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.01	0.18	0.28	0.27	0.16	0.26	0.25

Panel B: Amihud Illiquidity Ratio

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-1.82***	-1.44***	-1.23***				
	(-5.87)	(-5.72)	(-3.87)				
Post	-0.98*	-0.68	0.19	-0.13	0.61	-0.05	1.59***
	(-1.92)	(-1.50)	(1.50)	(-1.52)	(0.60)	(-0.35)	(6.98)
Asym	0.63	0.48	0.48				
	(1.64)	(1.31)	(1.64)				
Post*Treat	0.84**	0.67**	0.54*	0.56*	0.09	0.52**	0.76***
	(2.33)	(2.02)	(1.69)	(1.75)	(0.14)	(2.18)	(2.75)
Post*Asym	-0.96***	-0.94***	-0.44*	-0.38*	-0.89***	-1.05**	-0.69
	(-2.87)	(-2.95)	(-1.94)	(-1.66)	(-2.82)	(-2.18)	(-1.30)
Treat*Asym	-0.54	-0.21	-0.02				
	(-1.12)	(-0.48)	(-0.04)				
Post*Treat*Asym	0.89**	0.84**	1.16***	1.18***	0.85**	1.68***	1.37**
	(2.39)	(2.27)	(3.09)	(3.10)	(2.28)	(3.03)	(2.24)
Volatility		0.40***	0.04	0.12***	0.50***	0.07*	0.08*
		(3.79)	(0.91)	(2.90)	(4.54)	(1.86)	(1.82)
Ln(MV)		-4.38***	-2.38***	-1.83***	-3.85***	-1.85***	-1.53***
		(-6.96)	(-7.36)	(-5.15)	(-5.36)	(-4.03)	(-4.11)
Observations	101,975	100,652	100,652	100,652	100,652	51,580	51,499
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.02	0.06	0.30	0.30	0.05	0.25	0.24

Panel C: Bid-Ask Spread

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-0.26	0.16	-1.85***				
	(-0.73)	(0.48)	(-6.50)				
Post	-0.47	-0.14	-0.26**	-1.08***	0.36	2.94***	2.79***
	(-1.23)	(-0.39)	(-2.02)	(-13.41)	(0.47)	(14.67)	(11.57)
Asym	2.22***	2.19***	1.25***				
	(4.99)	(5.15)	(3.56)				
Post*Treat	0.82***	0.66***	0.41**	0.46**	0.69*	0.43**	0.55***
	(3.16)	(2.62)	(2.26)	(2.51)	(1.91)	(2.18)	(2.80)
Post*Asym	-0.66**	-0.68**	-0.05	0.05	-0.60**	-0.39	-0.01
	(-2.38)	(-2.55)	(-0.28)	(0.29)	(-2.23)	(-1.10)	(-0.03)
Treat*Asym	-0.58	-0.16	0.71				
	(-0.66)	(-0.20)	(1.03)				
Post*Treat*Asym	-0.51	-0.66	-0.24	-0.18	-0.66	0.33	-0.08
	(-1.15)	(-1.45)	(-0.62)	(-0.47)	(-1.51)	(0.69)	(-0.16)
Volatility		-0.19***	-0.42***	-0.35***	-0.09	-0.29***	-0.28***
		(-3.20)	(-10.52)	(-9.50)	(-1.55)	(-7.58)	(-7.52)
Ln(MV)		-4.03***	-2.78***	-1.46***	-3.24***	-1.02***	-1.14***
		(-8.68)	(-8.25)	(-4.43)	(-6.49)	(-3.60)	(-3.57)
Observations	101,811	100,575	100,575	100,575	100,575	51,542	51,467
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.01	0.03	0.13	0.11	0.01	0.11	0.11

Table 7. Liquidity Impact with Information Asymmetry, Cross-listed Shares

This table reports the regression results investigating the mechanism underlying the negative liquidity impact of margin-trading and short-selling. Three liquidity measurements --- *turnover ratio*, *Amihud illiquidity ratio* and *bid-ask spread* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. *Asym* is the proxy of information asymmetry, which equals to 1 if the stock has no cross-listed shares, 0 otherwise. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Turnover Ratio

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.02	0.00	0.07				
	(0.25)	(0.05)	(0.98)				
Post	-0.05	-0.07	-0.05	0.12**	-0.29***	-0.38***	-0.52***
	(-0.87)	(-1.25)	(-0.89)	(2.28)	(-2.81)	(-5.19)	(-8.31)
Post*Treat	-0.04	-0.03	-0.02	-0.01	-0.01	0.01	-0.003
	(-0.53)	(-0.46)	(-0.30)	(-0.20)	(-0.11)	(0.17)	(-0.05)
Post*Asym	0.17**	0.13**	0.03	0.04	0.13**	0.03	0.03
	(2.46)	(2.12)	(0.56)	(0.66)	(2.09)	(0.60)	(0.58)
Treat*Asym	0.36***	0.30***	0.18**				
	(3.74)	(3.60)	(2.46)				
Post*Treat*Asym	-0.21**	-0.17**	-0.18**	-0.18**	-0.17**	-0.18**	-0.18**
	(-2.48)	(-2.34)	(-2.50)	(-2.51)	(-2.27)	(-2.36)	(-2.43)
Volatility		0.29***	0.35***	0.32***	0.27***	0.31***	0.31***
		(14.63)	(19.24)	(18.42)	(13.95)	(16.63)	(16.52)
Ln(MV)		0.32***	0.09	0.14**	0.34***	0.02	0.02
		(5.10)	(1.48)	(1.98)	(4.47)	(0.30)	(0.24)
Observations	101,985	100,652	100,652	100,652	100,652	51,580	51,499
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.01	0.17	0.28	0.27	0.16	0.25	0.25

Panel B: Amihud Illiquidity Ratio

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-0.67	-0.42	-0.87**				
	(-1.37)	(-0.85)	(-2.05)				
Post	0.21	0.78*	0.81*	0.53	2.06**	-0.01	1.91***
	(0.44)	(1.65)	(1.89)	(1.22)	(2.10)	(-0.02)	(5.91)
Post*Treat	-0.24	-0.42	-0.26	-0.31	-1.00	0.17	0.15
	(-0.51)	(-0.83)	(-0.61)	(-0.66)	(-1.34)	(0.47)	(0.42)
Post*Asym	-1.42***	-1.69***	-0.75*	-0.77	-1.67***	-0.26	-0.44
	(-2.64)	(-3.09)	(-1.73)	(-1.63)	(-2.96)	(-0.83)	(-1.31)
Treat*Asym	-1.29**	-1.10**	-0.40				
	(-2.43)	(-2.14)	(-1.04)				
Post*Treat*Asym	1.28**	1.26**	1.06**	1.13**	1.27**	0.67*	0.89**
	(2.43)	(2.26)	(2.11)	(2.12)	(2.21)	(1.81)	(2.23)
Volatility		0.40***	0.04	0.12***	0.50***	0.07*	0.08*
		(3.80)	(0.91)	(2.88)	(4.54)	(1.85)	(1.78)
Ln(MV)		-4.39***	-2.41***	-1.84***	-3.85***	-1.89***	-1.55***
		(-6.96)	(-7.35)	(-5.18)	(-5.38)	(-3.99)	(-4.11)
Observations	101,975	100,652	100,652	100,652	100,652	51,580	51,499
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.02	0.06	0.30	0.30	0.05	0.25	0.24

Panel C: Bid-Ask Spread

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	2.65**	2.93***	-0.19				
	(2.05)	(2.59)	(-0.18)				
Post	1.24**	1.71***	0.42	-0.44	2.14***	3.24***	3.26***
	(2.06)	(3.14)	(0.88)	(-0.92)	(2.69)	(5.40)	(5.79)
Post*Treat	-0.39	-0.52	-0.50	-0.48	-0.49	-0.19	-0.17
	(-0.62)	(-0.87)	(-1.02)	(-0.97)	(-0.76)	(-0.33)	(-0.32)
Post*Asym	-1.89***	-2.03***	-0.79*	-0.64	-1.95***	-0.42	-0.51
	(-3.10)	(-3.64)	(-1.67)	(-1.30)	(-3.47)	(-0.74)	(-0.97)
Treat*Asym	-3.05**	-2.84**	-1.62				
	(-2.29)	(-2.45)	(-1.58)				
Post*Treat*Asym	1.13*	1.07*	0.91*	0.95*	1.07*	0.74	0.77
	(1.70)	(1.67)	(1.72)	(1.79)	(1.70)	(1.21)	(1.37)
Volatility		-0.19***	-0.42***	-0.35***	-0.09	-0.29***	-0.28***
		(-3.08)	(-10.45)	(-9.48)	(-1.47)	(-7.53)	(-7.47)
Ln(MV)		-4.04***	-2.86***	-1.46***	-3.24***	-1.02***	-1.13***
		(-8.77)	(-8.44)	(-4.43)	(-6.54)	(-3.60)	(-3.55)
Observations	101,811	100,575	100,575	100,575	100,575	51,542	51,467
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	997
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.003	0.02	0.13	0.11	0.01	0.11	0.11

Table 8. Liquidity Impact on Exchange Traded Funds

This table reports the impact of margin-trading and short-selling on the liquidity of exchange traded funds (ETFs). Panel A compares the treated ETFs with the control ones. In Panel B, the treated ETFs are divided into the active and passive funds, and are compared with the control ones separately. Three liquidity measurements --- *Ln(volume)*, *Amihud illiquidity ratio* and *bid-ask spread* --- are used. Similar to the regressions of stocks, I first check the simplest regression model, and then add fund-level control as well as time fixed effect. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily fund raw returns. Standard errors are clustered by both fund and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Average Effect

VARIABLES	(1) Ln(Volume)	(2) Ln(Volume)	(3) Ln(Volume)	(4) Illiquidity	(5) Illiquidity	(6) Illiquidity	(7) Spread	(8) Spread	(9) Spread
Post	-0.56***	-0.53***	-4.15***	2.84***	2.63***	42.81***	24.00***	22.86***	128.36***
	(-3.95)	(-3.67)	(-18.31)	(3.20)	(3.27)	(5.32)	(4.08)	(3.92)	(17.97)
Post*Treat	0.76***	0.73***	0.72***	-2.70***	-2.51***	-2.54***	-20.90***	-19.92***	-20.54***
	(4.09)	(3.90)	(3.83)	(-3.03)	(-2.94)	(-2.92)	(-3.30)	(-3.12)	(-3.11)
Volatility		0.06	0.01		1.60**	1.61		10.18***	10.87***
		(1.41)	(0.34)		(2.30)	(1.32)		(4.71)	(3.34)
Observations	1,163	1,156	1,156	1,157	1,154	1,154	1,163	1,156	1,156
Number of funds	35	35	35	35	35	35	35	35	35
Fund FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-week FEs	-	-	Yes	-	-	Yes	-	-	Yes
R^2	0.07	0.07	0.24	0.01	0.01	0.12	0.04	0.07	0.15

Panel B: Active Funds & Passive Funds

VARIABLES	(1) Ln(Volume)	(2) Ln(Volume)	(3) Ln(Volume)	(4) Illiquidity	(5) Illiquidity	(6) Illiquidity	(7) Spread	(8) Spread	(9) Spread
Post	-0.56***	-0.53***	-4.14***	2.84***	2.63***	42.80***	24.00***	22.86***	128.33***
	(-3.95)	(-3.67)	(-18.15)	(3.20)	(3.26)	(5.32)	(4.08)	(3.92)	(17.81)
Post*Passive	0.93***	0.89***	0.88***	-2.85***	-2.70***	-2.73***	-23.87***	-23.19***	-23.83***
	(6.75)	(6.53)	(6.44)	(-3.21)	(-3.16)	(-3.19)	(-3.94)	(-3.83)	(-3.87)
Post*Active	0.35	0.32	0.30	-2.33**	-2.03**	-2.06***	-13.46	-11.73	-12.29
	(1.06)	(0.95)	(0.89)	(-2.48)	(-2.41)	(-2.74)	(-1.33)	(-1.20)	(-1.19)
Volatility		0.06	0.01		1.60**	1.61		10.21***	10.93***
		(1.39)	(0.27)		(2.30)	(1.32)		(4.73)	(3.38)
Observations	1,163	1,156	1,156	1,157	1,154	1,154	1,163	1,156	1,156
Number of funds	35	35	35	35	35	35	35	35	35
Fund FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-week FEs	-	-	Yes	-	-	Yes	-	-	Yes
R^2	0.08	0.08	0.25	0.01	0.01	0.12	0.04	0.07	0.15

Table 9. Impact on Uninformed Investors

This table reports the impact of margin-trading and short-selling on the trading of uninformed investors. Three measurements --- *volume*, *volume in value* and *number of trades* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Ln(1+Volume)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.31***	0.34***	-0.02				
	(6.85)	(7.58)	(-0.47)				
Post	0.09***	0.10***	-0.09***	-0.11***	-0.03	-0.04*	-0.13***
	(2.94)	(3.34)	(-5.74)	(-8.12)	(-0.62)	(-1.65)	(-3.54)
Post*Treat	-0.01	-0.02	-0.09***	-0.08***	0.02	-0.06*	-0.06*
	(-0.20)	(-0.38)	(-3.09)	(-2.86)	(0.48)	(-1.88)	(-1.72)
Volatility		0.04***	0.04***	0.03***	0.04***	0.01**	0.01*
		(7.79)	(9.04)	(8.83)	(7.79)	(2.47)	(1.66)
Ln(MV)		-0.37***	-0.46***	-0.23***	-0.26***	-0.28***	-0.32***
		(-6.62)	(-9.05)	(-6.57)	(-5.80)	(-5.70)	(-6.29)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of Stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.03	0.06	0.21	0.14	0.03	0.15	0.15

Panel B: Ln(1+Volume in Value)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.20***	0.18***	0.09***				
	(8.11)	(7.83)	(3.69)				
Post	0.10***	0.08***	-0.04***	0.04***	-0.00	-0.01	0.03
	(4.63)	(4.34)	(-3.75)	(4.41)	(-0.04)	(-0.51)	(1.19)
Post*Treat	-0.03	-0.02	-0.06***	-0.06***	-0.00	-0.06**	-0.06**
	(-1.15)	(-0.81)	(-2.75)	(-2.76)	(-0.03)	(-2.14)	(-2.25)
Volatility		0.05***	0.06***	0.05***	0.05***	0.03***	0.02***
		(10.51)	(13.24)	(12.45)	(9.88)	(4.93)	(4.23)
Ln(MV)		0.04	-0.03	-0.02	0.03	-0.08**	-0.10***
		(1.12)	(-1.21)	(-0.61)	(0.86)	(-2.21)	(-2.66)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of Stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.03	0.06	0.14	0.12	0.04	0.10	0.10

Panel C: Ln(1+Number of Trades)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.21***	0.21***	0.07***				
	(8.70)	(8.60)	(2.92)				
Post	0.10***	0.10***	-0.04***	0.03***	0.01	-0.01	0.02
	(5.68)	(5.57)	(-4.34)	(4.17)	(0.35)	(-0.37)	(0.95)
Post*Treat	-0.03	-0.02	-0.07***	-0.07***	0.004	-0.05**	-0.06**
	(-1.00)	(-0.77)	(-2.99)	(-2.97)	(0.09)	(-2.15)	(-2.30)
Volatility		0.05***	0.05***	0.04***	0.04***	0.02***	0.02***
		(10.69)	(12.83)	(12.27)	(10.26)	(4.55)	(3.77)
Ln(MV)		-0.02	-0.08***	-0.04*	-0.01	-0.11***	-0.13***
		(-0.64)	(-3.02)	(-1.71)	(-0.44)	(-2.93)	(-3.45)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of Stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.04	0.06	0.16	0.13	0.05	0.12	0.12

Table 10. Impact on Uninformed Investors with Information Asymmetry, Funds' Ownership

This table reports the regression results investigating the mechanism underlying the negative impact of margin-trading and short-selling on uninformed investors trading. Three measurements --- *volume*, *volume in value* and *number of trades* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. *Asym* is the proxy of information asymmetry, which equals to (100-*Funds' ownership*). Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Ln(1+Volume)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	2.21	1.80	0.10				
	(1.33)	(1.01)	(0.07)				
Post	0.80*	0.82*	-1.38***	-1.11**	0.67	-1.93***	-1.98***
	(1.68)	(1.75)	(-2.65)	(-2.04)	(1.36)	(-3.28)	(-3.30)
Asym	0.01	0.01	-0.01				
	(1.36)	(0.89)	(-1.17)				
Post*Treat	1.91***	1.81***	1.17**	1.25**	1.89***	1.93***	1.81***
	(2.77)	(2.73)	(2.13)	(2.15)	(2.74)	(3.35)	(3.01)
Post*Asym	-0.01	-0.01	0.01**	0.01**	-0.01	0.02***	0.02***
	(-1.50)	(-1.52)	(2.47)	(2.48)	(-1.41)	(3.23)	(2.94)
Treat*Asym	-0.02	-0.01	-0.00				
	(-1.14)	(-0.82)	(-0.08)				
Post*Treat*Asym	-0.02***	-0.02***	-0.01**	-0.01**	-0.02***	-0.02***	-0.02***
	(-2.83)	(-2.80)	(-2.29)	(-2.30)	(-2.78)	(-3.49)	(-3.15)
Volatility		0.04***	0.04***	0.03***	0.04***	0.01**	0.01*
		(7.88)	(9.05)	(8.86)	(7.87)	(2.49)	(1.66)
Ln(MV)		-0.37***	-0.46***	-0.22***	-0.25***	-0.28***	-0.31***
		(-6.45)	(-9.03)	(-6.56)	(-5.74)	(-5.68)	(-6.24)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.04	0.06	0.21	0.14	0.04	0.16	0.16

Panel B: Ln(1+Volume in Value)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.36	0.46	0.81				
	(0.40)	(0.55)	(0.79)				
Post	0.13	0.12	-1.31***	-1.17***	0.03	-1.60***	-1.64***
	(0.41)	(0.37)	(-3.17)	(-2.81)	(0.10)	(-3.49)	(-3.56)
Asym	0.004	0.01*	-0.004				
	(1.17)	(1.65)	(-1.10)				
Post*Treat	1.53***	1.52***	1.01**	1.02**	1.54***	1.51***	1.44***
	(2.86)	(2.87)	(2.24)	(2.25)	(2.89)	(3.27)	(3.06)
Post*Asym	-0.0004	-0.004	0.01***	0.01***	-0.0003	0.02***	0.02***
	(-0.11)	(-0.11)	(3.09)	(3.11)	(-0.10)	(3.50)	(3.37)
Treat*Asym	-0.002	-0.002	-0.01				
	(-0.17)	(-0.32)	(-0.70)				
Post*Treat*Asym	-0.02***	-0.02***	-0.01**	-0.01**	-0.02***	-0.02***	-0.02***
	(-2.98)	(-2.97)	(-2.39)	(-2.40)	(-2.97)	(-3.43)	(-3.23)
Volatility		0.05***	0.06***	0.05***	0.05***	0.03***	0.02***
		(10.62)	(13.27)	(12.49)	(9.99)	(4.96)	(4.25)
Ln(MV)		0.05	-0.03	-0.01	0.03	-0.08**	-0.09**
		(1.37)	(-1.16)	(-0.54)	(0.96)	(-2.09)	(-2.53)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.03	0.06	0.14	0.13	0.05	0.11	0.11

Panel C: Ln(1+Number of Trades)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.49	0.55	0.60				
	(0.59)	(0.68)	(0.64)				
Post	0.35	0.34	-1.19***	-1.08***	0.26	-1.57***	-1.57***
	(1.29)	(1.26)	(-3.24)	(-2.91)	(0.95)	(-3.87)	(-3.79)
Asym	0.01***	0.01***	-0.003				
	(2.68)	(2.95)	(-0.76)				
Post*Treat	1.39***	1.39***	0.87**	0.88**	1.41***	1.47***	1.40***
	(2.83)	(2.83)	(2.15)	(2.15)	(2.85)	(3.49)	(3.24)
Post*Asym	-0.002	-0.002	0.01***	0.01***	-0.002	0.02***	0.01***
	(-0.90)	(-0.90)	(3.12)	(3.15)	(-0.90)	(3.90)	(3.57)
Treat*Asym	-0.003	-0.003	-0.01				
	(-0.33)	(-0.42)	(-0.56)				
Post*Treat*Asym	-0.01***	-0.01***	-0.01**	-0.01**	-0.01***	-0.02***	-0.01***
	(-2.94)	(-2.93)	(-2.32)	(-2.32)	(-2.92)	(-3.66)	(-3.42)
Volatility		0.05***	0.05***	0.04***	0.04***	0.02***	0.02***
		(10.84)	(12.86)	(12.30)	(10.39)	(4.58)	(3.79)
Ln(MV)		-0.01	-0.08***	-0.04*	-0.01	-0.10***	-0.12***
		(-0.30)	(-2.99)	(-1.66)	(-0.34)	(-2.84)	(-3.35)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.04	0.07	0.16	0.13	0.05	0.13	0.13

Table 11. Impact on Uninformed Investors with Information Asymmetry, Analyst Coverage

This table reports the regression results investigating the mechanism underlying the negative impact of margin-trading and short-selling on uninformed investors trading. Three measurements --- *volume*, *volume in value* and *number of trades* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. *Asym* is the proxy of information asymmetry, which equals to 1 if the stock is not covered by any analyst, 0 otherwise. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Ln(1+Volume)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.33***	0.35***	-0.02				
	(6.60)	(7.27)	(-0.34)				
Post	0.12***	0.13***	-0.07***	-0.09***	0.01	-0.03	-0.13***
	(3.74)	(4.10)	(-4.48)	(-5.82)	(0.12)	(-1.13)	(-3.30)
Asym	0.28***	0.27***	0.07*				
	(5.83)	(6.09)	(1.75)				
Post*Treat	0.00	-0.00	-0.08***	-0.08**	0.04	-0.05	-0.04
	(0.04)	(-0.11)	(-2.59)	(-2.40)	(0.66)	(-1.32)	(-1.07)
Post*Asym	-0.15***	-0.16***	-0.07***	-0.06***	-0.15***	-0.01	0.03
	(-5.77)	(-5.95)	(-3.11)	(-2.98)	(-6.78)	(-0.31)	(0.49)
Treat*Asym	-0.14	-0.12	-0.01				
	(-1.60)	(-1.44)	(-0.17)				
Post*Treat*Asym	-0.11**	-0.11**	-0.05	-0.04	-0.11**	-0.09	-0.14**
	(-2.08)	(-2.22)	(-1.15)	(-0.98)	(-2.34)	(-1.57)	(-1.99)
Volatility		0.04***	0.04***	0.03***	0.04***	0.01**	0.01
		(7.84)	(9.02)	(8.82)	(7.87)	(2.41)	(1.60)
Ln(MV)		-0.37***	-0.46***	-0.23***	-0.26***	-0.29***	-0.32***
		(-6.64)	(-9.07)	(-6.68)	(-5.90)	(-5.75)	(-6.37)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.04	0.07	0.21	0.14	0.04	0.16	0.16

Panel B: Ln(1+Volume in Value)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.20***	0.18***	0.10***				
	(7.43)	(7.21)	(3.40)				
Post	0.11***	0.09***	-0.03***	0.05***	0.01	-0.01	0.03
	(5.04)	(4.78)	(-2.78)	(4.78)	(0.22)	(-0.38)	(1.09)
Asym	0.05*	0.05**	-0.01				
	(1.66)	(1.99)	(-0.19)				
Post*Treat	-0.02	-0.01	-0.05**	-0.05**	0.01	-0.04	-0.04
	(-0.55)	(-0.31)	(-2.11)	(-2.11)	(0.24)	(-1.27)	(-1.34)
Post*Asym	-0.05***	-0.05***	-0.03*	-0.03**	-0.05***	0.02	0.05
	(-2.78)	(-3.08)	(-1.92)	(-2.00)	(-3.11)	(0.62)	(1.15)
Treat*Asym	0.01	-0.01	-0.01				
	(0.13)	(-0.28)	(-0.10)				
Post*Treat*Asym	-0.11***	-0.10***	-0.06*	-0.06**	-0.10***	-0.12***	-0.16***
	(-3.07)	(-2.66)	(-1.93)	(-1.99)	(-2.76)	(-2.76)	(-2.98)
Volatility		0.05***	0.06***	0.05***	0.05***	0.02***	0.02***
		(10.44)	(13.22)	(12.43)	(9.82)	(4.89)	(4.18)
Ln(MV)		0.04	-0.04	-0.02	0.03	-0.09**	-0.11***
		(1.11)	(-1.33)	(-0.76)	(0.77)	(-2.32)	(-2.80)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.03	0.06	0.14	0.12	0.05	0.10	0.10

Panel C: Ln(1+Number of Trades)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.22***	0.21***	0.08***				
	(8.19)	(8.15)	(2.80)				
Post	0.12***	0.11***	-0.03***	0.04***	0.03	-0.004	0.02
	(6.30)	(6.20)	(-3.19)	(4.86)	(0.78)	(-0.20)	(0.91)
Asym	0.08***	0.08***	-0.00				
	(2.79)	(2.99)	(-0.01)				
Post*Treat	-0.02	-0.01	-0.06**	-0.06**	0.01	-0.04	-0.04
	(-0.54)	(-0.38)	(-2.47)	(-2.46)	(0.29)	(-1.36)	(-1.46)
Post*Asym	-0.07***	-0.07***	-0.04**	-0.04***	-0.07***	0.01	0.04
	(-4.11)	(-4.31)	(-2.51)	(-2.62)	(-4.46)	(0.40)	(0.89)
Treat*Asym	-0.04	-0.05	-0.02				
	(-0.66)	(-0.94)	(-0.38)				
Post*Treat*Asym	-0.09**	-0.08**	-0.04	-0.04	-0.08**	-0.11**	-0.13***
	(-2.52)	(-2.23)	(-1.35)	(-1.34)	(-2.31)	(-2.42)	(-2.58)
Volatility		0.05***	0.05***	0.04***	0.04***	0.02***	0.02***
		(10.62)	(12.81)	(12.24)	(10.20)	(4.51)	(3.72)
Ln(MV)		-0.02	-0.09***	-0.05*	-0.02	-0.11***	-0.13***
		(-0.65)	(-3.15)	(-1.86)	(-0.54)	(-3.03)	(-3.57)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.04	0.06	0.16	0.13	0.05	0.12	0.13

Table 12. Impact on Uninformed Investors with Information Asymmetry, Cross-listed Shares

This table reports the regression results investigating the mechanism underlying the negative impact of margin-trading and short-selling on uninformed investors trading. Three measurements --- *volume*, *volume in value* and *number of trades* --- are used in Panel A, Panel B and Panel C respectively. From the column (1) to (5), the selected control stocks are compared with the treated stocks. I first check the simplest regression model, and then add stock-level controls as well as different fixed effects. In column (5), different time trend between treated and control stocks are further allowed as a robustness check. Column (6) and (7) compare the control stocks from percentage distance matching and propensity score matching with the treated stocks respectively. To save space, only the results from the most demanding model are reported. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. *Asym* is the proxy of information asymmetry, which equals to 1 if the stock has no cross-listed shares, 0 otherwise. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A: Ln(1+Volume)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	0.04	0.06	-0.42***				
	(0.28)	(0.51)	(-3.84)				
Post	0.15**	0.19***	-0.26***	-0.29***	0.06	-0.16**	-0.27***
	(2.20)	(2.77)	(-4.40)	(-4.63)	(0.77)	(-2.47)	(-4.27)
Post*Treat	0.28**	0.27**	0.21**	0.22**	0.30**	0.21**	0.23**
	(2.45)	(2.42)	(2.25)	(2.20)	(2.56)	(2.15)	(2.45)
Post*Asym	-0.07	-0.09	0.17***	0.19***	-0.09	0.13**	0.15**
	(-0.90)	(-1.23)	(2.93)	(3.01)	(-1.25)	(2.02)	(2.53)
Treat*Asym	0.30**	0.31***	0.42***				
	(2.30)	(2.75)	(3.83)				
Post*Treat*Asym	-0.32***	-0.32***	-0.32***	-0.31***	-0.31***	-0.29***	-0.32***
	(-2.81)	(-2.88)	(-3.36)	(-3.18)	(-2.81)	(-3.07)	(-3.39)
Volatility		0.04***	0.04***	0.03***	0.04***	0.01**	0.01
		(7.90)	(9.05)	(8.83)	(7.91)	(2.46)	(1.63)
Ln(MV)		-0.38***	-0.45***	-0.23***	-0.26***	-0.29***	-0.33***
		(-6.68)	(-8.95)	(-6.50)	(-5.86)	(-5.73)	(-6.30)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.03	0.06	0.21	0.14	0.04	0.16	0.16

Panel B: Ln(1+Volume in Value)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-0.07	-0.08	-0.21***				
	(-1.04)	(-1.11)	(-2.89)				
Post	0.09*	0.07	-0.17***	-0.10**	-0.01	-0.08**	-0.07*
	(1.96)	(1.45)	(-3.57)	(-2.08)	(-0.10)	(-2.05)	(-1.68)
Post*Treat	0.24**	0.25**	0.20**	0.20**	0.26**	0.18**	0.19**
	(2.40)	(2.53)	(2.31)	(2.28)	(2.55)	(2.14)	(2.34)
Post*Asym	0.001	0.01	0.14***	0.14***	0.004	0.08**	0.11***
	(0.03)	(0.18)	(2.90)	(2.84)	(0.08)	(2.11)	(2.75)
Treat*Asym	0.29***	0.28***	0.32***				
	(4.35)	(4.07)	(4.45)				
Post*Treat*Asym	-0.30***	-0.30***	-0.28***	-0.28***	-0.29***	-0.26***	-0.28***
	(-3.11)	(-3.11)	(-3.22)	(-3.18)	(-3.05)	(-3.15)	(-3.46)
Volatility		0.05***	0.06***	0.05***	0.05***	0.03***	0.02***
		(10.60)	(13.28)	(12.48)	(9.97)	(4.95)	(4.23)
Ln(MV)		0.03	-0.03	-0.02	0.03	-0.09**	-0.11***
		(1.02)	(-1.11)	(-0.65)	(0.72)	(-2.30)	(-2.74)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.03	0.06	0.14	0.13	0.05	0.10	0.10

Panel C: Ln(1+Number of Trades)

	Selected Control					Percentage Distance	Propensity Score
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES							
Treat	-0.03	-0.03	-0.23***				
	(-0.40)	(-0.40)	(-3.20)				
Post	0.11**	0.11**	-0.18***	-0.11**	0.03	-0.08*	-0.08*
	(2.12)	(1.99)	(-3.57)	(-2.16)	(0.47)	(-1.90)	(-1.89)
Post*Treat	0.22**	0.23**	0.18**	0.18**	0.25**	0.16**	0.18**
	(2.34)	(2.37)	(2.13)	(2.09)	(2.43)	(2.04)	(2.26)
Post*Asym	-0.01	-0.01	0.14***	0.14***	-0.02	0.08**	0.11***
	(-0.17)	(-0.23)	(2.79)	(2.74)	(-0.32)	(2.02)	(2.68)
Treat*Asym	0.26***	0.25***	0.32***				
	(3.77)	(3.64)	(4.45)				
Post*Treat*Asym	-0.28***	-0.27***	-0.26***	-0.26***	-0.27***	-0.24***	-0.26***
	(-2.98)	(-2.93)	(-3.11)	(-3.04)	(-2.84)	(-3.05)	(-3.39)
Volatility		0.05***	0.05***	0.04***	0.04***	0.02***	0.02***
		(10.80)	(12.86)	(12.29)	(10.38)	(4.57)	(3.77)
Ln(MV)		-0.02	-0.08***	-0.04*	-0.02	-0.11***	-0.13***
		(-0.72)	(-2.92)	(-1.72)	(-0.57)	(-3.00)	(-3.51)
Observations	101,985	100,652	100,652	100,652	100,652	51,564	48,315
Number of stocks	1,481	1,481	1,481	1,481	1,481	988	955
Stock FEs	Yes	Yes	Yes	-	-	-	-
Stock*wave FEs	-	-	-	Yes	Yes	Yes	Yes
Year-week FEs			Yes	Yes	-	Yes	Yes
Different time trend	-	-	-	-	Yes	-	-
R^2	0.04	0.07	0.16	0.13	0.05	0.13	0.13

Table 13. Impact on Volatility

This table reports the impact of margin-trading and short-selling on stock return volatility. As Foucault, Sraer and Thesmar (2011), three measurements of stock return volatility are used. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *MV* is market capitalization of stocks. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

	Selected Control			Percentage Distance			Propensity Score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Volatility	Volatility2	Volatility3	Volatility	Volatility2	Volatility3	Volatility	Volatility2	Volatility3
Post	0.32***	0.21***	0.18***	0.44***	0.32***	0.29***	0.44***	0.34***	0.32***
	(13.21)	(8.08)	(7.25)	(15.30)	(8.91)	(8.09)	(10.53)	(7.54)	(7.50)
Post*Treat	-0.12***	-0.14***	-0.14***	-0.14***	-0.16***	-0.16***	-0.14***	-0.17***	-0.17***
	(-3.57)	(-4.09)	(-4.07)	(-3.89)	(-4.34)	(-4.45)	(-4.00)	(-4.66)	(-4.74)
Ln(MV)	0.51***	0.53***	0.50***	0.42***	0.41***	0.40***	0.45***	0.43***	0.41***
	(6.90)	(8.35)	(8.14)	(5.83)	(6.70)	(6.72)	(5.81)	(6.36)	(6.36)
Observations	100,452	100,452	100,452	51,580	51,580	51,580	51,499	51,499	51,499
Number of stocks	1,476	1,481	1,481	988	988	988	997	997	997
Stock*wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-week FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.18	0.06	0.05	0.18	0.06	0.05	0.18	0.06	0.05

Table 14. Impact of Security Lending Business

This table reports the impact of the security lending business on liquidity. Three liquidity measurements --- *turnover ratio*, *Amihud illiquidity ratio* and *bid-ask spread* --- are used. The treated stocks are those that are already eligible for the margin-trading and short-selling program and become eligible for the security lending business during the period studied by this test. In Panel A, the treated stocks are compared to the stocks that are ineligible for the margin-trading and short-selling program. In Panel B, the treated stocks are compared to the stocks that are eligible for the margin-trading and short-selling program but not eligible for the security lending business. In all regressions, *Treat* is the dummy variable for treated stocks, *Post* is the dummy variable for the period when margin-trading and short-selling are implemented, *Volatility* is the standard deviation of daily stock raw returns and *MV* is market capitalization of stocks. Standard errors are clustered by both stock and week. t statistics are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level respectively.

Panel A

	Selected Control			Percentage Distance			Propensity Score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Turnover	Illiquidity	Spread	Turnover	Illiquidity	Spread	Turnover	Illiquidity	Spread
Post	0.23***	-1.53***	-1.13***	0.31***	-1.99***	-1.41***	0.30***	-1.90***	-1.38***
	(4.79)	(-5.31)	(-3.72)	(8.15)	(-8.73)	(-5.97)	(8.45)	(-8.27)	(-5.75)
Post*Treat	-0.21***	1.12***	0.40	-0.24***	1.32***	0.82***	-0.22***	1.07***	0.85***
	(-3.55)	(3.73)	(1.13)	(-4.92)	(4.21)	(2.67)	(-4.81)	(3.37)	(2.89)
Volatility	0.25***	0.04	-0.32***	0.26***	0.04	-0.36***	0.25***	0.05	-0.31***
	(12.97)	(0.68)	(-5.44)	(13.19)	(0.68)	(-5.78)	(12.84)	(0.69)	(-4.90)
Ln(MV)	0.01	0.05	-3.54***	0.22*	-2.19***	-2.76***	0.08	-3.39***	-2.36***
	(0.16)	(0.13)	(-5.57)	(1.78)	(-3.55)	(-4.90)	(0.72)	(-3.48)	(-4.83)
Observations	13,741	13,741	13,730	18,444	18,444	18,426	18,425	18,425	18,406
Number of stocks	352	352	352	474	474	474	474	474	474
Stock*wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-week FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.26	0.11	0.08	0.27	0.17	0.08	0.27	0.18	0.08

Panel B

	Selected Control			Percentage Distance			Propensity Score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Turnover	Illiquidity	Spread	Turnover	Illiquidity	Spread	Turnover	Illiquidity	Spread
Post	0.20***	-0.39***	-0.05	0.19***	-0.48***	-0.07	0.21***	-0.51***	-0.32**
	(5.40)	(-4.37)	(-0.20)	(6.54)	(-4.51)	(-0.41)	(7.25)	(-5.08)	(-1.96)
Post*Treat	-0.18***	-0.03	-0.10	-0.12***	-0.05	-0.17	-0.13***	0.01	-0.03
	(-3.57)	(-0.29)	(-0.32)	(-2.63)	(-0.37)	(-0.69)	(-3.01)	(0.09)	(-0.10)
Volatility	0.27***	0.07**	-0.36***	0.29***	0.09***	-0.33***	0.29***	0.10***	-0.31***
	(11.65)	(2.43)	(-5.27)	(13.80)	(3.39)	(-6.04)	(13.49)	(3.79)	(-5.79)
Ln(MV)	-0.02	-0.47***	-2.63***	0.14**	-0.87***	-3.07***	0.16**	-0.84***	-3.04***
	(-0.26)	(-4.01)	(-4.81)	(2.32)	(-5.88)	(-6.16)	(2.26)	(-5.35)	(-6.29)
Observations	15,827	15,827	15,823	18,535	18,535	18,530	18,540	18,540	18,536
Number of stocks	405	405	405	474	474	474	474	474	474
Stock*wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-week FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.28	0.16	0.11	0.29	0.16	0.10	0.29	0.19	0.10

Appendix: Definitions of the Variables

In this appendix, I define the variables used in the empirical tests.

- *MV* is the stock's market capitalization, which is in thousand RMB.
- *Volatility* is the weekly standard deviation of daily raw returns.
- *Volatility2* is the weekly standard deviation of the daily difference between the raw return and the market return.
- *Volatility3* is the weekly standard deviation of the residual of the time series regression of the daily excess return for a stock on the daily excess market return.

Three liquidity measurements are defined as follows:

- *Turnover Ratio* is defined as the weekly averaged ratio of daily trading volume divided by common shares outstanding.
- *Amihud illiquidity ratio* is defined as the absolute value of daily stock returns divided by trading volume in value and then averaged over one week, which is in basis point per million RMB.
- *Bid-ask spread* is the averaged daily percentage bid-ask spread within one week, which is recorded as a percentage.

Three variables are used to measure the behavior of uninformed investors.

- *Volume* is weekly average value of the total daily trading volume by the investors whose trades are less than 7776 RMB (which is in the bottom 25 percent of all the trades in the sample sorted by trading volume), and cause no impact on stocks' prices.
- *Volume in value* is weekly average value of the total daily trading volume in value by the investors whose trades are less than 7776 RMB (which is in the bottom 25 percent of all the trades in the sample sorted by trading volume) , and cause no impact on stocks' prices.
- *Number of trades* is weekly average value of the number of the trades by the investors whose trades are less than 7776 RMB (which is in the bottom 25 percent of all the trades in the sample sorted by trading volume) , and cause no impact on stocks' prices.