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Does Short Selling Disclosure Decrease the Liquidity of Individual Stocks?

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Abstract

This paper examines the short-term impact of short selling disclosure on individual stock liquidity and its mechanism using a dynamic panel regression model and Chinese Growth Enterprise Market data. The study results indicate that short selling disclosure reduces the short-term liquidity of stocks and has a significant impact on these stocks with high short selling ratio, high circulating market value, low turnover rate and large amplitude, while it has no significant impact on stocks with low short selling ratio, low circulating market value, high turnover rate and small amplitude. This indirectly proves that short selling trading is an informed transaction. These conclusions not only supplement empirical evidence about the impact of short selling disclosure on liquidity for the existing literature, but also provide some useful references for securities market regulators to develop the short selling market and improve the quality of the stock market.

Keywords

Information Disclosure, Short Selling, Liquidity, Chinese Growth Enterprise Market

1. Introduction

Short selling rules have become a common choice and an important component of capital markets in various countries. However, if short sellers abuse their short selling trading strategies, it will disrupt market stability and damage investors' confidence. Therefore, how to design an effective short selling regulatory system which the industry and academic circles are always concerned is an eternal topic.

Since Dutch businessman Isaac Le Maire shorted the stock of the Dutch East India Company in 1609 for the first time, institutional short sellers who profit

from market declines were always blamed as the chief culprits by decision-makers, Journalists and corporate executives, while short selling trading was also restricted or prohibited repeatedly by governments and regulatory agencies during every major economic or financial crisis in history, such as the collapse of the Dutch tulip market in 1637, the Great Depression in 1929, the 1997 Southeast Asian economic crisis, the 2007-2009 global financial crisis and so on. Until the restriction and ban measures on short selling trading during the global financial crisis period were questioned by the industry and academia, the disclosure of short positions, especially large positions, began to become a main regulatory measure to prevent short selling abuse and enhance market transparency in the developed securities markets such as the United States and the European Union and so on (Jones et al., 2016). Since then, some Western scholars began to conduct empirical research on the new regulatory system of short selling disclosure, and found that the short selling disclosure rules, especially for large short positions, reduce short selling activities and stock liquidity (Jones & Lamont, 2002; Duong et al., 2015; Jank et al., 2021). These findings are consistent with general information models, which suggest that if short selling trading is restricted, such as the disclosure of short positions, it will reduce short selling activity, increase bid-ask spread and reduce stock liquidity (Miller, 1977; Harrison and Kreps, 1978; Duffie et al., 2002). However, there is also theoretical evidence to support that short selling disclosure will increase liquidity due to the reduction of adverse selection (DeMarzo et al., 1998), or that short selling disclosure can coordinate predatory short selling, increase short selling activities and stock liquidity (Goldstein & Guembel, 2008; Brunnermeier & Oehmke, 2014).

In March 2010, China launched margin buying and short selling business and also implemented the position disclosure rules for margin buying and short selling trading at the same time. Due to the fact that China's stock market belongs to an emerging market, the Shanghai and Shenzhen Stock Exchange adopt strict disclosure measures in order to ensure the stability and development of the stock markets. Both stock exchanges daily publish the previous trading day's short position of every stock and the total short position of the whole market on the official websites. Thus, the effectiveness of short selling mechanisms and short selling disclosure rules provides new research topics for scholars. In recent years, scholars at home and abroad have conducted extensive research on the causal relationship between the introduction of short selling mechanisms in China and individual stock or market liquidity (Xie et al., 2018; Xie et al., 2019; Xie et al., 2021; Zhou et al., 2023), but few scholars have studied the impact of short selling disclosure rules in Chinese markets on stock liquidity. Then, what's the impact of short selling disclosure of Chinese markets on stock liquidity? Does it decrease the stock liquidity? Based on the above, this paper attempts to study the short-term impact of short selling disclosure rules in Chinese markets on individual stock liquidity and further explore its mechanism.

This paper has important theoretical and practical research significance. Firstly, it's the first time Chinese data studied the impact of short selling disclosure on stock liquidity and its mechanism. It can supplement empirical conclusions of emerging markets for the existing literature. Second, this study has important practical significance. Its results can provide useful references and reliable empirical support for improving China's short selling regulatory system and provide reference for promoting and deepening China's financial reform and innovation.

The rest of this paper is organized as follows. Section 2 describes the research design, including the sources of data, the selection of samples and indicators and the construction of models. Section 3 analyzes the empirical results and makes a further exploration and analysis. And in section 4, a simple conclusion and perspectives for further study are made.

2. Research Design

2. 1. Data Sources and Sample Selection

The stock-related data used in this paper such as liquidity, turnover rate, amplitude and circulating market value etc., as well as the relevant data of short selling trading, are all from the CSMAR database. Due to the fact that the sample stocks are chosen from the Growth Enterprise Market (GEM) where began the margin buying and short selling business on January 31, 2013, the sample period starts from January 31, 2013 and ends on September 8, 2023. Considering that each stock's starting time of allowing short selling is inconsistent, and some stocks' observed numbers are too few, and these will affect the scientificity and accuracy of the empirical results, we delete such stocks if the trading time is less than 1 year or the observed number is below 250 in the full sample period. Thus there is a total of 248 stocks in the sample.

In addition, according to the descriptive statistical results in **Table 1**, it can be seen that the smallest value of liquidity indicator L is zero, and the sample size with L = 0 is 234. The value of the liquidity indicator L is too small, while comparatively, the value of the circulating market value is too large. Therefore, for the convenience of regression analysis, we delete the involved data when the value of L is equal to 0. At the same time, we expanded all the observed values of L by 1000 times and took the natural logarithm of the circulating market value.

2. 2. Indicator Selection and Model Construction

2. 2. 1. Liquidity Indicators

Liquidity generally refers to the ability to quickly conduct a large number of transactions at lower transaction costs, while having a relatively small impact on stock price (Liu (Liu, 2006)). According to this definition, liquidity can be measured from two aspects: transaction costs and price impact. In this paper, we measure the liquidity from the perspective of price impact, so we choose the liquidity indicator

defined by AMIHUD. The specific calculation formula is $L_{i,tn} = \frac{1}{N_{i,t}} \sum_{n=1}^{N_{it}} \frac{R_{i,n}}{V_{i,n}}$, where $L_{i,tn}$ is the value of the liquidity indicator of stock i on the nth trading day in month t. $R_{i,n}$, and $V_{i,n}$ respectively refer to the rate of return and trading amount (in millions of yuan) of stock i on the nth trading day every month, $N_{i,t}$ refers to the effective trading days of stock i from the first effective trading day to the present trading day in month t.

According to the formula of L and Liu's (Liu, 2006) definition of liquidity, the value of L is smaller, which means that the impact of unit trading volume on stock price is smaller, the liquidity is stronger.

2. 2. 2. Model Construction

The Shanghai and Shenzhen Stock Exchanges disclose regularly the short selling volume and the short selling volume (amount) balance of the previous trading day before the opening of the market. Of course, the Exchanges also disclose the relevant information about large short selling position. For example, the Shanghai Stock Exchange discloses large-scale trading information when the daily short selling amount of a single underlying stock reaches 50% of its daily trading volume and also publicly discloses the trading information of major member companies when certain stock's short-selling amount balance reaches 20% of its circulating market value. However, the amount of data related to large short selling disclosure is too small. For example, there are only 25 pieces of data about short selling amount exceeding 50% of the trading volume. So this paper mainly study the impact of short selling trading information daily disclosed on stock liquidity.

The margin buying volume and margin buying amount balance which also are daily disclosed may affect stock liquidity, so it is necessary to control these information disclosures' impact on liquidity. We adopt a dynamic panel regression model to mainly study the impact of disclosure of short selling on liquidity in this paper. The specific regression equations are as follows:

$$\begin{aligned} L_{i,d} &= \alpha_0 + \alpha_1 rqye_{i,d-1} + \alpha_2 rqye_{i,d-2} + \beta_1 rzye_{i,d-1} + \beta_2 rzye_{i,d-2} \\ &\quad + \gamma_1 \ln\left(ltsz\right)_{i,d} + \gamma_2 hsl_{i,d} + \gamma_3 zhf_{i,d} + u_i + \lambda_d + \varepsilon_{i,d} \end{aligned} \tag{1}$$

$$\begin{aligned} L_{i,d} &= \alpha_0^1 + \alpha_1^1 rqyl_{i,d-1} + \alpha_2^1 rqyl_{i,d-2} + \beta_1^1 rzye_{i,d-1} + \beta_2^1 rzye_{i,d-2} \\ &\quad + \gamma_1^1 \ln\left(ltsz\right)_{i,d} + \gamma_2^1 hsl_{i,d} + \gamma_3^1 zhf_{i,d} + u_i^1 + \lambda_d^1 + \varepsilon_{i,d}^1 \end{aligned} \tag{2}$$

where $rqye_{i,d-1}$ refers to the growth rate of the short selling amount balance of stock i on day $d-1$, and its calculation formula is $rqye_{i,d-1} = \ln\left(\frac{rqye_{i,d-1}}{rqye_{i,d-2}}\right)$; $Rqyl_{i,d-1}$ refers to the growth rate of short selling volume balance of stock i on day $d-1$, and its calculation formula is $rqyl_{i,d-1} = \ln\left(\frac{rqyl_{i,d-1}}{rqyl_{i,d-2}}\right)$; $Rzye_{i,d}$ is the growth rate of margin buying amount balance of stock i on day $d-1$, which is a

control variable, and its calculation formula is $rzye_{i,d-1} = \ln\left(\frac{rzye_{i,d-1}}{rzye_{i,d-2}}\right)$. Due to the data of the margin buying volume balance is not disclosed by the stock exchanges, the data of the margin buying amount balance was used in Equation (2). Other control variables include circulating market value *ltsz*, turnover rate *hsl*, and amplitude *zhf*. u_i refers to the fixed effect for the company, λ_d refers to the fixed effect for time, and $\varepsilon_{i,d}$ is a random disturbance term.

3. Empirical Results and Analysis

3. 1. Descriptive Statistics of Variables

Table 1 presents the descriptive statistical results of variables, including sample size, mean, standard deviation, maximum and minimum values and so on.

3. 2. Empirical Results Analysis

3. 2. 1. The Overall Impact of Short Selling Disclosure on Liquidity for Full Sample

Table 2 shows the empirical results estimated respectively based on the dynamic panel regression models (1) and (2). From Table 2, it can be seen that the coefficients of the lagged 1 and 2 periods of *rqye (rqyl)* are not significant without controlling the variable *rzye*. But after controlling *rzye*, the coefficients of the lagged 1 and 2 periods of *rqye* are respectively 0. 0115 (0. 0093) and 0. 0099 (0. 0079), which correspondingly are significant at the 1% (5%) and 5% (10%) levels; and the coefficients of the lagged 1 and 2 periods of *rqyl* are 0. 0093 and 0. 0079, respectively, which correspondingly are significant at the 5% and 10% levels. It's obvious that the estimation results of models (1) and (2) are very consistent, which fully indicates that there is a negative correlation between the growth rate of short selling balance and the liquidity of individual stock. That is to say, the more the short selling balance increases, the more the liquidity of stocks decreases on the following second and third days. The short-term response of liquidity to the disclosed information of short selling trading is negative. This is because short

Table 1. Descriptive statistics of variables.

Variables	number	Mean	Std_dev	Min	Max
L	248, 253	0. 0001557	0. 0010586	0	0. 202711
rqye	248, 253	3. 44e+07	1. 58e+08	28	5. 12e+09
Rqyl	248, 253	1042360	3092473	1	5. 38e+07
Rzye	248, 253	7. 91e+08	1. 07e+09	1. 65e+07	1. 55e+10
hsl	248, 253	0. 029101	0. 0312138	0. 00004	0. 51111
ltsz	248, 253	2. 15e+10	5. 66e+10	5. 02e+08	1. 40e+12
zhf	248, 253	0. 0001552	0. 0338978	−0. 68021	0. 20158

Note: The sample size with L = 0 is 234.

Table 2. Overall impact of short selling disclosure on liquidity (full sample).

Variables	Coefficient (1)	Coefficient (2)	Variables	Coefficient (3)	Coefficient (4)
L1. rqye	0. 0075 (1. 75)	0. 0115*** (2. 45)	L1. rqyl	0. 0063 (1. 34)	0. 0093** (1. 97)
L2. rqye	0. 005 (1. 19)	0. 0099** (2. 12)	L2. rqyl	0. 0049 (1. 04)	0. 0079* (1. 67)
L1. rzye		−1. 3997*** (−21. 51)	L1. rzye		−1. 3970*** (−21. 48)
L2. rzye		−0. 9414*** (−14. 60)	L2. rzye		−0. 9404*** (−14. 58)
ln (ltsz)	−0. 0351*** (−6. 37)	−0. 0326*** (−5. 92)	ln (ltsz)	−0. 0351*** (−6. 37)	−0. 3255*** (−5. 91)
zhf	0. 7461*** (11. 36)	0. 6560*** (9. 99)	zhf	0. 7457*** (11. 35)	0. 6553*** (9. 98)
hsl	−1. 0429*** (−12. 86)	−0. 6723*** (−8. 18)	hsl	−1. 0396*** (−12. 83)	−0. 6671*** (−8. 12)
cons	0. 9966*** (7. 84)	0. 9296*** (7. 32)	cons	0. 9963*** (7. 83)	0. 9291*** (7. 32)
Company/time fix effect	control	control	Company/time fix effect	control	control
R^2	0. 024	0. 024	R^2	0. 024	O. 027
N	245, 663	245, 663	N	245, 663	245, 663
id	248	248	id	248	248

selling trading is generally informed trading (Diamond and Verrechia (1987)), and liquidity providers are likely to use short selling trading data published by Stock Exchanges to determine whether they hold the stock. The large growth of short selling balance expects that the stock price will decline in the future. Then, liquidity providers will sell the stock or not buy the stock, which results in selling more and buying less. Thus the bid and ask spread of the stock will increase and trading volume will decrease, and finally the short-term stock liquidity will decrease.

From Table 2, it also can see that the coefficients of the lagged 1 and 2 periods of *rzye* are all significantly negative, which indicates that there is a positive relation between the disclosure of margin buying trading information and short-term liquidity. This is because the growth of margin buying transactions expects a positive return for the stocks in the future, an increase in buyer numbers, a decreased bid and ask spread and an increased short-term liquidity. The coefficients of circulating market value (or turnover rate) are all significantly negative, which shows positive correlations between stock liquidity and circulating market value (or turnover rate). This is consistent with that the higher the circulating market value (or the higher turnover rate) is, the stronger the liquidity is. The positive coefficient of the amplitude indicates a negative correlation between stock liquidity and stock price volatility, which is consistent with that the larger the stock volatility is, the smaller the liquidity is.

3. 2. 2. The Impact of Short Selling Disclosure on the Liquidity for Different Subsamples

In this section we first arrange all the stocks in the full sample in descending or-

der of short selling ratio, and then divide them evenly into two groups in numbers, which is the high short selling ratio group and the low short selling ratio group, and finally further analyze the short-term impact of short selling disclosure on the liquidity of stock with different level of short selling ratio using models (1) and (2). Using the same method, we also analyze such impacts with different level of circulating market values, amplitudes and turnover rates. Generally speaking, the larger the absolute value of the coefficient of the growth rate of short selling balance is, the greater the impact of short selling disclosure on liquidity is. Tables 3-6 respectively present the short-term impact of short selling

Table 3. Impact of short selling disclosure on liquidity (Subsample: Grouped by short selling ratios).

Variables	Low (1)	High (1)	Variables	Low (2)	High (2)
L1. rqye	0. 0069 (0. 91)	0. 0172*** (3. 10)	L1. rqyl	0. 0047 (0. 62)	0. 0149*** (2. 67)
L2. rqye	0. 0077 (1. 03)	0. 0129** (2. 35)	L2. rqyl	0. 0062 (0. 82)	0. 0102* (1. 84)
L1. rzye	−1. 2491*** (−11. 95)	−1. 6032*** (−21. 07)	L1. rzye	−1. 2473*** (−1193)	−1. 5590*** (−21. 02)
L2. rzye	−0. 8792*** (−8. 48)	−1. 0390*** (−13. 77)	L2. rzye	−0. 8785*** (−8. 48)	−1. 0374*** (−13. 75)
cons	0. 6599*** (3. 18)	1. 1185*** (7. 00)	cons	0. 6595*** (3. 18)	1. 181*** (7. 00)
Control variables	control	control	Control variables	control	control
Company/time fix effect	control	control	Company/time fix effect	control	control
R^2	0. 031	0. 036	R^2	0. 031	0. 036
N	121, 538	124, 120	N	121, 538	124, 120
id	138	110	id	138	110

Note: The short selling ratio is the ratio of daily short selling balance to daily trading volume.

Table 4. Impact of short selling disclosure on liquidity (Subsample: Grouped by circulating market values).

Variables	Low (1)	High (1)	Variables	Low (2)	High (2)
L1. rqye	0. 0093 (1. 36)	0. 0188*** (3. 02)	L1. rqyl	0. 0058 (0. 83)	0. 0195*** (3. 10)
L2. rqye	0. 0101 (1. 49)	0. 0104* (1. 68)	L2. rqyl	0. 0072 (1. 04)	0. 0095 (1. 52)
L1. rzye	−1. 4980*** (−12. 60)	−0. 7870*** (−13. 24)	L1. rzye	−2. 1111*** (−17. 56)	−0. 7854*** (−13. 22)
L2. rzye	−0. 0697*** (−5. 13)	−0. 4717*** (−7. 99)	L2. rzye	−1. 4961*** (−12. 58)	−0. 4716*** (−7. 99)
cons	1. 8023*** (5. 93)	0. 5755*** (5. 24)	cons	1. 8016*** (5. 93)	0. 5746*** (5. 24)
Control variables	control	control	Control variables	control	control
Company/time fix effect	control	control	Company/time fix effect	control	control
R^2	0. 030	0. 030	R^2	0. 033	0. 033
N	122, 521	123, 126	N	122, 521	123, 126
id	145	103	id	145	103

Table 5. Impact of short selling disclosure on liquidity (Subsample: Grouped by amplitudes)

Variables	Low (1)	High (1)	Variables	Low (2)	High (2)
L1. rqye	0. 0071 (1. 06)	0. 0171*** (2. 53)	L1. rqyl	0. 006 (0. 90)	0. 0137** (2. 02)
L2. rqye	0. 0072 (1. 09)	0. 0130** (1. 94)	L2. rqyl	0. 0067 (1. 01)	0. 0094 (1. 40)
L1. rzye	−1. 5656*** (−16. 53)	−1. 2467*** (−13. 75)	L1. rzye	−1. 5642*** (−16. 52)	−1. 2424*** (−13. 70)
L2. rzye	−1. 1093*** (−11. 81)	−0. 8060*** (−8. 96)	L2. rzye	−1. 1090*** (−11. 81)	−0. 8041*** (−8. 94)
cons	1. 4947*** (6. 66)	0. 4214** (2. 44)	cons	1. 4938*** (6. 66)	0. 4214** (2. 44)
Control variables	control	control	Control variables	control	control
Company/time fix effect	control	control	Company/time fix effect	control	control
R^2	0. 028	0. 037	R^2	0. 028	0. 037
N	124, 666	120, 819	N	124, 666	120, 819
id	140	108	id	140	108

Table 6. Impact of short selling disclosure on liquidity (Subsample: Grouped by turnover rates).

Variables	Low (1)	High (1)	Variables	Low (2)	High (2)
L1. rqye	0. 0126** (2. 48)	0. 0121 (1. 60)	L1. rqyl	0. 0131*** (2. 61)	0. 0072 (0. 95)
L2. rqye	0. 0078* (1. 66)	0. 0125 (1. 55)	L2. rqyl	0. 0078 (1. 53)	0. 0083 (1. 10)
L1. rzye	−0. 7823*** (−12. 73)	−2. 0097*** (−17. 33)	L1. rzye	−0. 7817*** (−12. 73)	−2. 0041*** (−17. 29)
L2. rzye	−0. 4593*** (−7. 52)	−1. 4237*** (−12. 42)	L2. rzye	−0. 4597*** (−7. 53)	−1. 4207*** (−12. 40)
cons	1. 2414*** (993)	0. 5989*** (2. 72)	cons	1. 2408*** (9. 93)	0. 5986*** (2. 72)
Control variables	control	control	Control variables	control	control
Company/time fix effect	control	control	Company/time fix effect	control	control
R^2	0. 040	0. 031	R^2	0. 040	0. 031
N	122, 872	122, 775	N	122, 872	122, 775
id	120	128	id	120	128

disclosure on the liquidity of stocks with different levels of short selling ratios, circulate market values, amplitudes and turnover rates.

From Table 3, it can be seen that for the stock group with high short selling ratio, the coefficients of the lagged 1 and 2 periods of *rqye* (rqyl) are respectively 0. 0172 (0. 0149) and 0. 0129 (0. 0102), which correspondingly are significant at the 1% (5%) and 1% (10%) level, and for the stock group with low short selling ratio, the coefficients of *rqye* (rqyl) are positive but not significant. This means that the short selling disclosure information has a significant impact on the short-term liquidity for stocks with high short selling ratios, while has no significant impact for stocks with low short selling ratios. That is to say, the higher the short selling ratios of stocks are, the more the liquidity decreases. This is because

that a high short selling ratio may indicate that there are more short sellers with larger positions for the stock, and these short sellers are generally institutional investors who are more likely to obtain some basic private information. Therefore, liquidity providers (usually are individual investors) will more convinced the expectation of future negative returns from short selling trading information, and thus more liquidity providers will choose not to hold these stocks, which leads to a more significant decrease in stock liquidity. This indirectly proves that the short selling trading is an informed transaction.

From Table 4, it can be seen that for the stock group with high circulating market value, the coefficients of the lagged 1 and 2 periods of *rqye* (rqyl) are respectively 0. 0171 (0. 0195) and 0. 0130 (0. 0095), which correspondingly are significant at the 1% (10%) and 1% level, and for the stock group with low circulating market value, the coefficients of *rqye* (rqyl) are positive but not significant. As shown in Table 5, for the stock group with high amplitude, the coefficients of the lagged 1 and 2 periods of *rqye* (rqyl) are respectively 0. 0188 (0. 0137) and 0. 0104 (0. 0094), which correspondingly are significant at the 1% (5%) and 5% level, and for the stock group with low amplitude, the coefficients of *rqye* (rqyl) are positive but not significant. It's the same it can be seen from Table 6 that for the stock group with high turnover rate, the coefficients of the lagged 1 and 2 periods of *rqye* (rqyl) are respectively 0. 0126 (0. 0131) and 0. 0078 (0. 0078), which correspondingly are significant at the 5% (10%) and 1% level, and for the stock group with low turnover rate, the coefficients of *rqye* (rqyl) are positive but not significant.

From the analysis above, it's obvious that there are significant impacts of the short selling disclosure information on the short-term liquidity for the stocks with high circulating market value, high amplitude and low turnover rate, while there are no significant impacts for the stocks with low circulating market value, low amplitude and high turnover rate. According to relevant literature (Xie et al., 2018; Xie et al., 2019; Xie et al., 2021), institutional investors generally engage in short selling activities, and they usually prefer stocks with high circulating market value, low turnover rate, and high volatility. Therefore, the proportions of institutional investors among the holders of stocks with large market value, low turnover rate, and large amplitude are higher. So it's not surprising that these results are consistent with Table 3. Because the proportion of institutional investors is higher, increased short selling trading can better predict the future negative returns of stocks. The disclosure of short selling trading information lets more liquidity providers not hold these stocks, and these results in a greater reduction in short-term liquidity.

4. Conclusion and Perspectives for Further Study

Using dynamic panel regression models, this paper first studies the overall impact of short selling disclosure on short-term liquidity of individual stocks using Chinese Growth Enterprise Market data, then studies the impacts on stocks with

different level of short selling ratio, circulating market value, amplitude, and turnover rate, and makes a further exploration and mechanism analysis. The study results shows that short selling disclosure reduces the short-term liquidity of stocks for full sample. There is a significant impact of short selling disclosure on the short-term liquidity for the stocks with higher short selling ratio, higher circulating market value, lower turnover rate, and higher amplitude, while there is no significant impact for stocks with lower short selling ratio, lower circulating market value, higher turnover rate, and lower amplitude. This indirectly proved that short selling trading is an informed transaction. The research conclusion of this paper not only supplements empirical evidence on the impact of short selling disclosure on individual stock liquidity for the existing literature, but also provides a certain reference for the manager of securities market to develop the short selling market and improve the quality of the stock market.

It's useful to study the short-term impact of daily short selling disclosure on individual stock liquidity using dynamic panel regression models in this paper. However, there still exist some problems that need further study. For example, it's important and scientific to expand the sample range to all stocks allowing short selling trading in Chinese market. Of course, It is still worth studying the impact of large short selling positions disclosure on stock liquidity using the event study method when the related data data expands to a certain scale.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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