The Impact of Margin and Short Selling on Stock Pricing Efficiency – Based on the Growth Enterprise Market and the Science and Technology Innovation Board

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Abstract. This paper takes the margin and short selling targets of the science and technology innovation board and the growth enterprise board of China's stock market as the research object, and selects the sample interval from July 2019 to November 2020, Uses the unbalanced data panel model, discusses the effect of short selling and margin trading on the pricing efficiency of stock from the perspectives of the reaction speed and information content of stock information. The results show that margin trading is generally beneficial to the improvement of the pricing efficiency of the stock market; the effect of margin trading and short selling on the improvement of pricing efficiency of different stocks is different. The imbalance of power between margin trading and margin trading has a negative impact on the pricing efficiency of the stock market. The conclusion is helpful for subsequent scholars to continue to study the development level of the securities market and provide suggestions for the development direction of China's securities market.

1 The Introduction

Margin and short selling business was officially launched in China in 2010. Over the past decade, various data indicators of the business have grown rapidly. Due to the prevalence of speculation in China's capital market, the phenomenon of soaring and plummeting, rising and falling together is very obvious, which exposes the imperfection of China's capital market system. Both regulators and academics generally believe that the main reason for this phenomenon is the absence of short selling mechanism. Some scholars believe that the introduction of margin trading and short selling business has changed the history that the Chinese stock market can only make profits through unilateral long positions in the past, improved the efficiency of the market, and promoted the return of stock prices to the real value. Some scholars also believe that short selling is the product of the development of the securities market at a certain stage. For some countries, short selling mechanism will not improve the efficiency of stock pricing, but may promote speculative behavior. The study of the impact of margin trading on the efficiency of stock pricing in China's securities market can provide some theoretical evidence for the dispute.

2 Literature Review

Most domestic and foreign literatures evaluate the efficiency of price pricing based on the speed and degree of response of stock price to information under the short-selling mechanism.

2.1 Study on the reaction speed of stock prices to information

Diamond and Verrecchina [1] found that due to the restriction of short selling, stock prices have different speed of response to information. Diether, Lee and Werner [2] draw the conclusion that short selling can promote the adequate response of information by comparing the differences between the underlying and non-underlying stocks. Fang Libing and Liu Ye [3] found that the stock price adjusted information faster after margin and short selling expansion than before, and the pricing efficiency of the newly added underlying pool was improved.

2.2 Study on the degree to which stock prices respond to information

Miller [4] pointed out the existence of heterogeneous beliefs, which became a classic theory to study the reaction degree of stock prices to information. The research results of Yu Yiqing, Liu Chang and Lai Dengling [5] show that the emergence of margin trading makes stock prices reflect more adverse information, thus improving the efficiency of stock pricing. However, some studies have reached different views. For example, Chang, Cheng and Yu [6] concluded that short selling did not increase the return rate of individual stocks, but instead increased their volatility.

This paper takes the margin and short selling targets of the science and technology innovation board and the

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growth enterprise board in China's stock market as the research object, and uses the unbalanced panel data to discuss the impact of margin and short selling on the efficiency of stock pricing from the two perspectives of stock response speed and information content.

3 Research Design And Analysis

3.1 The data source

The research data in this paper comes from Wind database. Select the daily trading data of science and technology innovation board stocks, GEM margin and short selling underlying stocks and GEM margin and short selling non-underlying stocks on July 22, 2019 to November 30, 2020.

ST stocks, missing or suspended stocks and delisted stocks were excluded from all samples. Finally,50 stocks in each of the three sample groups were selected, with a total of 150 stocks and 258,466 sample records.

The data used in this study are all from Wind database, and the data processing software used are Excel2019 and Stata.

3.2 Indicators

Based on the research results at home and abroad, this paper will analyze the impact of margin trading on stock pricing efficiency from two aspects: the speed of stock price information reflection and the impact of stock price information content.

3.2.1 Indicators of Information response speed

Based on Hou & Moskowitz, this paper uses the relative efficiency of stock price to adjust the speed of market information to evaluate pricing efficiency. The auxiliary regression equation is:

$$r_{i,t} = a_i + \beta_i * r_{m,t} + \sum_{n=1}^{5} \delta_{i,t-n} * r_{m,t-n} + u_{i,t} \quad (1)$$

The coefficient of explanatory variable is used to measure the rate at which the stock absorbs market information, so the index TG1 of pricing efficiency is determined:

$$TG1_{i,t} = \frac{\sum_{n=1}^{5} |\delta_{i,t-n}|}{|Bi| + \sum_{n=1}^{5} |\delta_{i,t-n}|} \quad (2)$$

$TG1_{i,t}$ is the proportion of the regression coefficient of the lag market return rate in all the regression coefficients. The higher the value is, it means that the stock return rate is dependent on the lag market return rate, and the lower the pricing efficiency of the stock is.

3.2.2 Indicators of information response

Based on Bris [7], ρ is used to measure the current stock returns and past market returns of the correlation index. The auxiliary regression equation is:

$$r_{i,t} = a_i + \rho_i * r_{m,t} + u_{i,t} \quad (3)$$

ρ_i is the correlation coefficient between the daily return rate of stock I and the daily return rate of the market in the lag period. ρ_i represents the information content of the stock price.

$$TG2_{i,t} = \rho_{i,t} \quad (4)$$

The smaller the correlation coefficient between the current rate of return of an individual stock and the past market rate of return is, the higher the pricing efficiency is.

3.3 Model design

3.3.1 The horizontal model

Based on the theory of margin trading and short selling, the introduction of margin trading and short selling increases the channel of short selling and speeds up the speed of stock prices reflecting information. Theoretically, the improvement of pricing efficiency has positive effects. Therefore, the horizontal model is designed as follows:

$$TG_{i,t} = a_0 + B_1 * Matter_{i,t} + rControls_{i,t} + v_i + e_i + \varepsilon_{i,t} \quad (5)$$

$TG_{i,t}$ denotes the pricing efficiency of stock i at t; $Matter_{i,t}$ is the dummy variable. When t, the stock i is the target of margin trading and the value is 1; otherwise, the value is 0; $Controls_{i,t}$ represents the control variable.

3.3.2 Longitudinal model

This paper takes margin trading on the science and technology innovation board and the growth enterprise board as samples to study the influencing factors of margin trading on the pricing efficiency of stocks in different sectors. The longitudinal model is as follows:

$$TG_{i,t} = a_0 + B_1 * RZ + B_2 * RQ + B_3 * MBS + B_4 * TURN + rControls_{i,t} + v_i + e_i + \varepsilon_{i,t} \quad (6)$$

$TG_{i,t}$ denotes the pricing efficiency of stock i at t; MBS is the strength comparison index of margin trading; TURN is a measure of heterogeneous beliefs.

3.4 Empirical results and analysis

3.4.1 Horizontal model results

Before the specific panel regression analysis of the horizontal model, the Hausman test was first carried out. The test results rejected the null hypothesis of the random effects model, so this paper used the fixed effects model to verify the horizontal model.

Table 1. Horizontal model sample panel regression results.

	TG1	TG2
Matter	-0.027*** (-17.939)	-0.016*** (-5.093)
LNMV	-0.027*** (-30.274)	0.013*** (-6.918)
PE	0.000*** (-6.926)	0.000*** (-14.857)
PB	0.002*** (-19.776)	-0.002*** (-9.190)
N	38413	38413
adj. R-sq	0.042	0.008

In this paper, non-equilibrium panel regression analysis is carried out on the samples to make a horizontal comparison of the impact of the selected underlying stocks and non-underlying stocks on the pricing efficiency in the two markets of the science and technology innovation board and the growth enterprise board. From the regression situation, the estimated regression coefficient of Matter and TG1 is -0.027, indicating that the underlying stocks carrying out margin trading have a faster response to information than the non-underlying stocks at the significance level of 1%.

3.4.2 Longitudinal model results

Similarly, in the longitudinal model panel regression, this paper uses the fixed-effect model.

Table 2. Longitudinal model sample panel regression results.

	TG1	TG2
RZ	-6.87E-05*** (-9.396)	-2.03E-05 (-1.274)
RQ	7.81E-04*** (-5.05)	4.04E-04 (-1.201)
MBS	0.981*** (-3.719)	8.865*** (-15.061)
TURN	0.003*** (-17.169)	-0.006*** (-15.931)
LNMV	-0.015*** (-4.095)	0.196*** -23.991
PE	-0.000*** (-7.552)	0.001*** (-14.278)
PB	0.005*** (-27.499)	-0.010*** (-25.080)
N	25442	25442
adj. R-sq	0.055	0.067

From the vertical regression results, the explanatory variables of the sample stock are different from the empirical results of the regression of different pricing efficiency indicators.

The regression coefficient of RZ to TG1 and TG2 of pricing efficiency is negative, but only TG1 is significant at the confidence level of 1%, which indicates that the RZ has a certain improvement to the stock speed efficiency index, but has no obvious response to the information content efficiency of the sample stock price.

The regression coefficient between short selling amount (RQ) and the index of pricing efficiency TG1 is significantly positive, and the regression coefficient between short selling amount (RQ) and TG2 is negative but not significant, which proves that the increase of short selling amount (RQ) does not lead to the improvement of stock pricing efficiency. Marching and short selling strength comparison indicators (MBS) are all positive data, which indicates that when the difference between the financing and short selling strength is larger, the stock pricing efficiency will decline.

4 Conclusions and Suggestions

On the basis of the literature, this paper uses the sample stock data of the science and technology innovation board and the growth enterprise board in the last 2 years to conduct horizontal and longitudinal model test of relevant data, in order to get the degree of impact of margin trading on the pricing efficiency of stock prices in the new stage of business development.

First of all, according to the regression results of the horizontal model samples, margin trading can speed up the adjustment of the stock price to the market information and increase the information content in the stock price, and improve the overall efficiency of market pricing.

Secondly, according to the repurchase results of the longitudinal model samples, the amount of financing transactions is still higher than the trading volume of short selling, and the imbalance of financing and short selling brings a negative impact on the improvement of the efficiency of stock pricing.

Finally, heterogeneous belief, namely, stock turnover rate, contributes to the increase of information content in stock prices, but does not have a positive impact on the response speed in stock prices.

Margin and short selling has a positive impact on China's stock market, the launch of margin and short selling business makes the securities bidding in the environment of market decline can also reflect their own bad news. Margin and short selling business is also faced with many problems in the rapid development, such as the scale of financing is far higher than the scale of margin and investors have a high threshold to enter margin and short selling. Based on the results of empirical analysis, this paper puts forward the following policy recommendations:

First of all, under the condition that risks are controllable and small, margin trading and short selling

business should be promoted to all stock markets in China, more stock targets should be included, and the publicity to investors should be intensified. The underlying stocks of margin trading and short selling should be continuously increased, so that investors can have more choices for margin trading and short selling business and increase stock market liquidity.

Secondly, all kinds of access conditions for margin trading should not be relaxed. Strengthening market supervision, paying close attention to investors' trading behavior and improving investors' risk awareness are of positive significance for stabilizing China's stock market and giving better play to margin trading and short selling functions.

Finally, Regulators should make rules to improve disclosure of the market. Insufficient information disclosure will lead to the risk of insider information trading in the market, and reduce the enthusiasm of small and medium investors due to information asymmetry, so that the blind followers will suffer losses, which is not conducive to the development of the whole market.

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