

Does Margin Trading Enhance Information Efficiency of the Capital Market?

— Evidence from China

Yike Wang

SILC Business School, Shanghai University

†Email: 13918189996@139.com

Abstract

On March 31, 2010, China formally introduced a margin trading system, which announced that China's capital market has completed the transformation from a unilateral transaction model to a bilateral transaction model with a short-selling mechanism. However, the current development of China's margin trading and securities lending businesses is seriously unbalanced, and the scale of financing far exceeds the scale of securities lending. The short selling effect of securities lending exchanges is extremely limited, which to some extent violates the original intention of introducing the system. In order to help margin trading and securities lending to correct a healthy and sustainable development path, this article uses stock price synchronicity as a proxy indicator to measure the information efficiency of the capital market, explores the impact of the margin trading system on the information efficiency of the capital market, and study the detailed characteristics and economic consequences of the margin trading system. Aiming at this topic, this article analyzes the relationship between margin financing and securities lending and stock price synchronicity. Finally, it analyzes the influence of margin financing and securities lending system on stock price synchronicity from three dimensions of corporate governance, external supervision, and institutional environment mechanism. In terms of empirical research, this article takes advantage of the “quasi-natural experiment” provided by the gradual opening of margin trading and securities lending in China’s securities market, and selects listed companies on the Shanghai and Shenzhen stock exchanges from 2007 to 2019 as the research objects, starting from the perspective of stock price synchronicity, and passing The DID-FE model studies the impact of the margin trading and securities lending system on the information efficiency of the capital market. It uses three methods: parallel trend and dynamic testing, PSM-DID analysis, and placebo testing for robustness testing to solve the endogeneity problem of the experiment. This article also conducts deeper research on the subject based on the two dimensions of the impact mechanism of margin financing and securities lending and the size of the company, and finally discusses the economic impact of margin financing and securities lending on the level of company innovation.

Keywords: *Margin Trading; Stock Price Synchronicity; Capital Market Information Efficiency*

1 INTRODUCTION

With an emerging market economy, China's securities trading mechanism is not yet mature, and has been in the capital driven unilateral trading market for a long term, which situation exacerbates the imbalance between supply and demand of resources in the financial market, and thus leads to huge fluctuations in stock prices and a sudden increase in market systemic risks. In order to meet the needs of increased capital liquidity, China introduced the margin trading system in March 2010. Margin trading refers to the trading behavior in which investors are bullish (short selling) stock prices and borrow funds from securities companies with margin trading (short selling) business qualifications to buy the underlying stocks (borrowing the underlying stocks to sell).

Since its development from 2010 by far, margin and short selling system has experienced six times of expansion. On the day of the pilot of margin trading and short selling system, there were only 90 underlying stocks in Shanghai and

Shenzhen, and the total balance of margin trading and short selling was RMB 058.4 million. Subsequently, the two cities carried out the first expansion in December 2011, the total number of underlying stocks increased to 285, and then experienced five expansions until August 2019 until, however, July 2015, the margin and short selling scale shrank sharply, and the balance of margin and short selling returned to 1 trillion yuan at the end of 2016. This shows that the short selling mechanism in China's margin trading system did not play its positive role, but even magnified the risk. Therefore, China's margin trading market is in lack of the balance between financing scale and short selling scale, which is an urgent problem that should be dealt with.

To sum up, this paper will take the stock price synchronicity as an agent index to measure the information efficiency of the capital market to discuss the impact of margin and short selling on the information efficiency of the capital market, the institutional characteristics and economic consequences of China's margin trading businesses and to help the margin and short selling system step into a healthy development track.

The innovation of this paper mainly includes the following points: 1. Innovation of research perspective. This paper studies the impact of margin and short selling system on the information efficiency of the capital market from a new perspective. 2. Innovation of empirical methods. In order to reduce the influence of sample nature bias and heterogeneity bias, four robustness tests, such as parallel trend and dynamic test and propensity score matching analysis, are adopted in this paper to eliminate the interference of sample selectivity on the empirical results and provide more reliable evidence for the experimental results. 3. Innovation of research content. This paper also further analyzes the impact of margin trading on the information efficiency of the capital market from the three dimensions of the influence mechanism, property right nature and company size, to be more in-depth and thorough than previous related literature.

2 LITERATURE REVIEW

This section reviews related literature on margin trading and capital market information efficiency.

2.1 Short Selling and Financing

Since the pilot of margin and short selling system in China in 2010, many scholars have taken advantage of this important "quasi-natural experiment" opportunity to study the effect of margin and short selling in China from different perspectives. Through the collation of relevant literature, it is found that the impact of margin trading on the capital market mainly covers two aspects: market information efficiency and corporate governance.

2.2 The Effect on Capital Market Information Efficiency

Although there are many indicators to measure the information efficiency of capital market in academic circles, in recent years, stock price synchronicity has been more and more favored by scholars. The synchronicity of stock price reflects the consistency of stock price and industry yield trend.

However, some scholars believe that margin trading system is not conducive to the improvement of market information efficiency, and even reduces the efficiency of market information. Jarrow (1980) believed that short selling represented by margin trading and short selling would have an impact on the pricing of the stock market, but due to the economic differences among countries and the uncertainty of the influence direction, stock prices might be undervalued.

The empirical conclusion of a few scholars is that there is no significant correlation between the two. For example, Liao (2011) proposed that China's margin trading system did not achieve the expected effect in terms of price discovery function and had little impact on market information efficiency

2.3 The Effect on Corporate Governance

The impact of margin and short selling system on corporate governance is mainly reflected in external supervision and enterprise innovation. 1. External supervision: As for the impact of margin trading on external supervision, most literatures have proved its positive effect on the level of corporate governance. Karpoffet (2010) found that short selling mechanism is helpful to improve the transparency of corporate information, thus increasing the cost of

management's violation, and has a certain inhibitory effect on the earnings management of enterprises. 2. Enterprise innovation: Most scholars believe that margin trading system has an incentive effect on the innovation ability of enterprises. He and Tian (2016) proposed that short selling mechanism can improve management's attention to patent issuance.

2.4 Stock Price Synchronicity

Although there are many indicators to measure the information efficiency of capital market in academic circles, in recent years, stock price synchronicity has been more and more favored by scholars. The synchronicity of stock price reflects the consistency of stock price and industry yield trend.

Roll (1988) first proposed the concept of stock price synchronicity. He found that the R extracted from the CAPM model, which was based on the simultaneous return rate of individual stock and market return rate, was very low. He believed that such low synchronization was not caused by macro factors such as industry or market, but caused by the relatively complete integration of enterprise characteristic information into individual stock price.

One of the theories based on the research of Roll (1988) is the "information efficiency view" represented by Morck and others. Morck et al (2000) believes that the degree of development of a country has a positive impact on the information transparency of the capital market, and the improvement of information transparency helps individual stock prices to fully absorb the heterogeneous information of the company, showing lower stock price synchronicity.

Because the academic circle has a high degree of acceptance for the concept of information efficiency, and its theoretical analysis and empirical test have formed a mature core system, this paper will discuss the margin trading system based on the "information efficiency view".

2.5 Influencing Factors of Stock Price Synchronicity

Many scholars have studied the influencing factors of stock price synchronicity. By combing the existing literature, this paper mainly analyzes from three dimensions: the first is corporate governance level, the second is regulatory level, and the third is institutional environment level. 1. Corporate governance: Corporate governance determines the timeliness and compliance of corporate information disclosure to a certain extent. Most existing studies investigate the impact of corporate governance on stock price synchronicity from three perspectives: board characteristics, financial indicators and ownership structure. Xiao and Xia (2011) concluded that the degree of board governance was negatively correlated with stock price synchronicity. 2. External supervision: In the aspect of external supervision, the mining of corporate information by external interest supervisors such as media and securities analysts is mainly considered. Xiao et al (2016) found that in the context of continuous optimization of external information environment, media reports are conducive to the absorption of stock price information on enterprise characteristics, and ultimately reduce stock price synchronicity. 3. Institutional environment: Strengthening the information transmission mechanism can improve the information efficiency of the capital market. You et al (2007) found that with the continuous improvement of China's securities market system, the information transparency of Chinese enterprises has been greatly improved, while the overall stock price synchronicity trend of the capital market has weakened.

2.6 Review of Related Literature

The margin and short selling system made up for the vacancy of short selling mechanism in China's stock market, provided a leveraged financing mechanism, and improved the trading system of the stock market. However, scholars have mixed opinions on the effect of margin trading system. In terms of market information efficiency, the existing literature has not formed a unified view. In terms of corporate governance, this paper sorted out the relevant literature on the impact of margin trading on corporate governance from the perspectives of external supervision and enterprise innovation.

The influencing factors of stock price synchronicity is explored from the perspectives of corporate governance, supervision and institutional environment, so as to provide theoretical support for the selection of variables in subsequent empirical studies. Based on literature review, this paper proposes the following hypotheses.

H1: After the implementation of margin and short selling business, the stock price synchronicity of margin and short selling underlying stocks is higher than that of non-margin and short selling.

H2: Margin trading will increase the stock price synchronicity of the underlying securities, while short trading will reduce the stock price synchronicity.

H3: Margin trading system has a more significant impact on the stock price synchronicity of non-state-owned enterprises.

H4: Margin trading system has a more significant impact on the stock price synchronicity of small companies.

3 EMPIRICAL RESEARCH DESIGN

3.1 Sample Selection and Data Sources

This paper takes advantage of the "quasi-natural experiment" of margin trading in China's gradual expansion, and takes into account the new accounting standards adopted by listed companies since 2007. Therefore, 2007 is chosen as the starting year of the empirical study in this paper, which can ensure that the accounting treatment of listed companies in the sample period is generally consistent, and control the impact of accounting standard changes on the empirical results. Finally, this paper selects Shanghai and Shenzhen listed companies from 2007 to 2019 as the research object.

3.2 Definition of Key Variables

Explained Variable:

Stock price synchronization (*SYN*): a proxy measure of information efficiency in capital markets. The higher the stock price synchronization, the greater the proportion of market and industry information in the information reflected by the stock price, and the less individual heterogeneous information, which means that the information efficiency of the capital market will be lower.

The method used in this paper to measure the stock price synchronization is based on Roll (1988) and the goodness of fit extracted from *CAPM* model (Equation 1):

$$R_{i,t} = \alpha_i + \beta_i R_{M,t} + \varepsilon_{i,t} \quad (1)$$

Where, $R_{i,t}$ represents the weekly return rate of period t , $R_{M,t}$ represents the weekly return rate of the market after the weighted average of the current market value of period t , and $\varepsilon_{i,t}$ represents the residual, that is, the part that $R_{M,t}$ cannot explain $R_{i,t}$. The degree of company-level trait information determines the size of the residual error. The more company-level trait information contained in the stock price, the greater the $\varepsilon_{i,t}$, and the smaller the goodness of fit R^2 extracted.

After logarithmic processing of R^2 extracted from *CAPM* model with the following formula (Equation 2), the final OBTAINED *SYN* can explain the stock price synchronization of individual stocks. The larger the VALUE of *SYN*, the higher the stock price synchronization.

$$SYN_i = \ln \left(\frac{R_i^2}{1-R_i^2} \right) \quad (2)$$

Explanatory Variables:

(1) Time point differentiated variable (*Post*): dummy variable. If stock i is within the margin sample period, *Post* is 1; Before that, *Post* is 0.

(2) Group differentiated variables (*List*): dummy variables. If stock i belongs to margin lending, then *List* is 1; Otherwise, *List* is 0.

(3) Dummy variable cross term (*Post*List*): If stock i belongs to the underlying margin and short selling and is within the sample period of margin and short selling, it is 1; otherwise, it is 0.

Control Variables:

Based on existing literature, this paper summarizes the main factors affecting stock price synchronization and selects them as control variables. Table 1 below is the symbol and definition of the control variables in this paper.

TABLE 1 CONTROL VARIABLES AND DEFINITIONS

Variables	Symbols	The natural logarithm of total assets for the year
Company scale	Size	Total liabilities at the end of the year divided by total assets at the end of the year
Asset-liability ratio	Lev	Net profit/ Average balance of total assets
Net profit margin on total assets	ROA	Current year's revenue/ Last year's revenue
Operating revenue growth rate	Growth	(Market value of tradable shares + number of non – tradable share * Net assets per share + book value of liabilities) / Total assets
TobinQ amount	TobinQ	$\ln(\text{Current year} - \text{Listed year} + 1)$
Listed years	ListAge	State holding enterprises=1; others=0
Property rights	SOE	Average monthly turnover rate of stocks in current year – Average monthly turnover rate of stocks in last year
Monthly average excess turnover rate	Dturn	Number of shares held by institutional investors / The total number of shares
Shareholding ratio of institutional investors	INST	The number of shares held by the largest shareholder / The total number of shares
Shareholding ratio of the largest shareholder	Top1	Directors numbers=Natural logarithm
Directors numbers	Board	The independent directors / Directors
Proportion of independent directors	Indep	The chairman and the general manager are the same person=1; otherwise=0
Two positions integrated	Dual	The natural logarithm of total assets for the year

3.3 Empirical Model Design

This paper makes use of the advantages of the "quasi-natural experiment" introduced by the margin and short selling system, and refers to the previous scholars' treatment of variables related to stock price synchronization. In order to test hypothesis 1, the paper constructs a *DID-FE* model. The specific model can be seen in Equation (3):

$$SYN_{i,t} = \alpha + \beta List * Post_{i,t} + \gamma Controls_{i,t} + u_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

where, the explained variable *SYN* is the stock price synchronization; Explanatory variable *List * Post_{i,t}* is dummy variable, see 3.2 for the specific meaning; *Controls_{i,t}* represents control variables, including 13 control variables such as company Size (Size), financial leverage (Lev) and return on total assets (ROA); *u_i*, *λ_t* represent individual fixed effect and annual fixed effect of stock; *ε_{i,t}* is the random error term.

The core content of this paper is the regression coefficient of explanatory variable *List * Post_{i,t}*, which considers the impact of the implementation of margin trading system on the synchronicity of stock prices.

4 EMPIRICAL ANALYSIS

4.1 Descriptive Statistics

Based on the *DID-FE* model, this paper makes an empirical analysis of the relationship between margin trading system and stock price synchronization. Table 2 shows the descriptive statistics of the variables in the benchmark model.

TABLE 2 DESCRIPTIVE STATISTICS

Variables	Obs	Mean	Std.Dev.	Min	Max
SYN	26829	-.802	1.223	-14.442	2.346
List*Post	26829	.208	.406	0	1
Size	26829	22.003	1.43	18.203	27.303
Lev	26829	.455	.26	.027	3.52
ROA	26829	.042	.069	-.517	.449
Growth	26829	.225	.665	-.849	7.957
Board	26829	2.152	.207	1.609	2.833
Indep	26829	.372	.052	.25	.571
Dual	26829	.251	.434	0	1
TobinQ	26829	2.112	1.527	.815	17.729
SOE	26829	.395	.489	0	1
ListAge	26829	2.019	.907	0	3.296
Top1	26829	.349	.15	.083	.755
Dturn	26829	-.126	.492	-2.494 0	1.469
INST	26829	.358	.239	0	.892

The descriptive statistical results of the related variables show that the valid observed values of the samples from 2007 to 2019 are 26,829. The standard deviation of **SYN** reached 1.223, indicating that the stock price synchronization data of the sample enterprises were quite different. The average value of **Post*List** is 0.208, indicating that few data are in the sample period of margin trading. The maximum and minimum values of **Size** deviate greatly from the mean value, and the standard deviation is relatively high. Therefore, it can be concluded that the **Size** of companies in our selected research samples differs greatly. The mean value of **Lev** is 0.455, which is within the normal range of financial leverage indicator, indicating that most companies' financial conditions are normal. The lower standard deviation is 0.26, indicating that the financial leverage difference among companies is not large. The standard deviation of **ROA** is 0.069, and the mean value is 0.042, indicating that the selected sample companies have little difference in profit and loss, and the average profit level of the market is positive. The average value of **Growth** is 0.225, indicating that the sample listed companies are generally growing and their stock prices are generally rising. The standard deviation of **Board** is only 0.207, indicating that there is little difference in **Board** size among listed companies. The mean value of **Indep** is 0.372 and the standard deviation is 0.052, indicating that the proportion of independent directors in China's listed companies is stable at about 37.2% and the difference among companies is small. The mean value of **Dual** is 0.251, indicating that most listed companies have achieved the separation of two roles, and the separation of power between chairman and general manager is helpful to corporate information disclosure. The average **TobinQ** value was 2.112, indicating that the capital market valued most sample companies above their replacement cost. The mean value of **SOE** is 0.395, which means that most of the listed companies in the sample are non-state-owned enterprises. The mean value of **ListAge** is 2.019, and the standard deviation is 0.907, indicating that the average listed years of each listed company is 2.019 years, but the difference is relatively large. The average value of **Top1** is 0.349, indicating that the ownership concentration of listed companies in China is relatively high on the whole. The mean value of **Dturn** was -0.126, indicating that the transaction cost of most stocks was increasing and the transaction frequency was decreasing during the sample period. The mean value of **INST** is 0.358, indicating that the shareholding ratio of institutional investors in China is relatively low, only reaching 35.8%, which reflects the weak stock liquidity in general.

4.2 The Benchmark Return

This paper selects the monthly data of listed companies in Shanghai and Shenzhen stock Markets from 2007 to 2019 as the research sample, and uses the **DID-FE** model to test hypothesis 1, so as to explore the impact of margin trading system on stock price synchronization in China. Table 3 below shows the empirical test results of model (1).

TABLE 3 SHORT SELLING AND FINANCING ON THE IMPACT OF STOCK PRICE SYNCHRONIZATION

	(1) SYN1	(2) SYN1
Post*List	0.244*** (8.69)	0.198*** (6.98)
Control Variables		Yes
_cons	-0.884*** (-36.47)	-2.454*** (-4.79)
N	25932	23949
adj. R ²	0.384	0.421
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes

Note: T values are in parentheses, *, ** and *** indicate significant at the significance level of 10%, 5% and 1%, respectively.

According to the design of the **DID-FE** model and the research focus, it needs to focus on the regression coefficient of the cross-variable Post*List of margin and short selling, whose coefficient reflects the direct impact of margin and short selling on the synchronicity of stock prices. From column (2) of Table 5, it is demonstrated that the regression coefficient of Post*List is significantly positive at the significance level of 1%. The above empirical results verify hypothesis 1 of this paper, indicating that underlying stocks have higher stock price synchronization than non-underlying stocks after being included in the range of margin trading targets, indicating that margin trading system improves stock price synchronization and has a negative effect on the information efficiency of the capital market to a certain extent. Margin trading system to improve the synchronicity of stock prices are mainly due to two aspects: On the one hand is the size of the financing and borrowing scale development extremely unbalanced, as margin sixth expansion (2019.8.19) on the same day, the scale of financing balance for securities balance 72 times, short selling high transaction costs, the short selling poorly understood, short-selling admittance threshold higher limit reduces the characteristics information of motivation, market participants mining company Making short-selling mechanisms less effective; On the other hand, the large scale of financing transactions leads to the behavior of market participants to follow the trend, which promotes more market information into the stock price, and ultimately leads to the improvement of stock price synchronization. Therefore, to improve the impact of margin and short selling system on the efficiency of resource allocation in the stock market, it is necessary to reduce the development imbalance of margin and short selling system as far as possible, increase the source of securities for short selling, and reduce the trading cost of short selling.

4.3 Parallel Trend and Dynamic Test

After establishing the DID-FE model to test the impact of margin trading system on stock price synchronization, the parallel trend test was carried out and the dynamic effect of the impact was investigated. Based on the practice of Becketal (2010), multiple dummy variables were set and added into the regression model, as shown in Equation (4).

$$SYNCH_{i,t} = \alpha + \sum_{m=1}^3 \beta_m LIST * POST^{-m}_{i,t} + \sum_{n=1}^3 \theta_n LIST * POST^{+n}_{i,t} + \gamma Controls_{i,t} + u_i + \lambda_t + \varepsilon_{i,t} \quad (4)$$

Controls_{i,t}, **u_i**, **λ**, **ε_{i,t}** in the model have the same meanings as formula (4). Where, List and Post are dummy variables; If the year of the stock is in the first m period of the policy year, List is 1; otherwise, it is 0. If the year of the stock is in the last n period of the policy year, the VALUE of **Post⁺ⁿ** is 1; otherwise, it is 0.

The parallel trend hypothesis stipulates that the experimental group and the control group have a common trend before the policy intervention, which is specifically manifested as the value should fluctuate around 0 before the

policy. The policy intervention only affected the experimental group, but had no effect on the control group. Specifically, the experimental group was significantly negative one year after the policy, while the control group still fluctuated around 0. If the test meets the expectation, it indicates that the comprehensive policy will only affect the experimental group, and the control group will not be affected by the policy, but the policy effect may have a lag effect.

Corresponding to the research in this paper, the policy effect should only affect the stocks with margin and short selling qualification, and should not affect the stocks that are not the target of margin and short selling. In order to check the trend before and after the implementation of the two-in-one policy, the data in advance and behind should be added to the differential model.

In this paper, it is assumed that the listed companies are included in margin selling and short selling in " $LIST*POST^0$ " year, that is, the base year. Parallel trend tests were conducted in the three years before and three years after the policy shock. As can be seen from Table 4, the correlation coefficient of the three years before the implementation of margin and short selling policy and the base year fluctuated around 0, indicating that the synchronicity of stock prices was not significantly affected. However, from the first year to the third year after the implementation of the policy, the difference between the two groups of stocks increased significantly, indicating that in the three years after the implementation of margin trading, the synchronicity of stock prices increased due to its influence. This is because of the lag effect after the policy takes place, in line with the "parallel trend" assumption. To sum up, margin trading system on the whole leads to the increase of stock price synchronization, the conclusion is basically consistent with the results of benchmark regression.

TABLE 4 PARALLEL TREND AND DYNAMIC TEST

	(1) SYN1
$LIST*POST^{-3}$	-0.0604 (-1.59)
$LIST*POST^{-2}$	0.0300 (0.79)
$LIST*POST^{-1}$	-0.0240 (-0.55)
$LIST*POST^0$	-0.0720 (-1.26)
$LIST*POST^{+1}$	0.292*** (5.77)
$LIST*POST^{+2}$	0.292*** (6.11)
$LIST*POST^{+3}$	0.272*** (5.98)
Control Variables	Yes
_cons	-2.632*** (-5.11)
N	23949
adj. R ²	0.424
Firm fixed effect	Yes
Year fixed effect	Yes

Note: T values are in parentheses, *, ** and *** indicate significant at the significance level of 10%, 5% and 1%, respectively.

4.4 PSM Analysis

Table 5 below uses three matching methods to analyze the impact of margin trading system on stock price synchronization, and the simultaneous use of the three methods can also test the robustness of the results. Through the regression results of *PSM-DID* model, it was found that under the three matching modes, the regression coefficients of $Post*List$ were 0.196, 0.198 and 0.198 respectively, which were all significant at the 1% confidence

level. It was found that the results obtained by the three matching methods were highly consistent. Therefore, *PSM-DID* regression results show that margin trading significantly improves stock price synchronization, consolidating the conclusion of benchmark regression, and testing the sample bias and heterogeneity.

TABLE 5 REGRESSION RESULTS OF PSM-DID

	(1) SYN1 Nearest neighbor matching	(2) SYN1 Nuclear matching	(3) SYN1 Radius matching
Post*List	0.196*** (6.92)	0.198*** (6.98)	0.198*** (6.98)
Control Variables	Yes	Yes	Yes
_cons	-2.393*** (-4.61)	-2.454*** (-4.79)	-2.454*** (-4.79)
N	23850	23949	23949
adj. R ²	0.423	0.421	0.421
Firm fixed effect	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes

Note: T values are in parentheses, *, ** and *** indicate significant at the significance level of 10%, 5% and 1%, respectively.

4.5 Placebo Test

Placebo test refers to shifting the study interval forward or backward to the interval where the policy has not changed. If the regression result of *DID* estimators is still significant under this circumstance, it indicates that the original regression result is not robust and has bias. The placebo test is a robust method specifically designed to test the effectiveness of policy implementation in a do model. The study interval of the main empirical part of this paper is 2007-2019, so the design of the placebo test is as follows: The overall study interval and policy implementation time were both tested three years and four years earlier, respectively. If the regression coefficient sign of explanatory variable (*List*Post*) did not change under the conditions of fictitious study interval and policy implementation time, and the results were still significant, it showed that the regression results of the empirical part were unreliable. The regression in this part is based on the *DID-FE* model, and the following equations (5) and (6) are the regression models with the event years advanced by three years and four years respectively:

$$SYNCH_{it} = \alpha + \beta LIST * POST_{it+3} + \gamma Controls_{it} + u_i + \lambda_t + \varepsilon_{it} \quad (5)$$

$$SYNCH_{it} = \alpha + \beta LIST * POST_{it+4} + \gamma Controls_{it} + u_i + \lambda_t + \varepsilon_{it} \quad (6)$$

Here, the only difference between the two models and Formula (3) lies in the change of policy time nodes, that is, the change during the value of explanatory variable *LITS*POST*, while other variables remain unchanged.

TABLE 6 PLACEBO TEST

	(1)SYN1 Event year 3 years earlier	(2)SYN1 Event year 4 years earlier
<i>LIST*POST</i> ₃	0.0522 (1.62)	
<i>LIST*POST</i> ₄		-0.0305 (-0.83)
Control Variables	Yes	Yes
_cons	-2.716*** (-5.28)	-2.818*** (-5.49)
N	24428	24428
adj. R ²	0.418	0.418
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes

Note: T values are in parentheses, *, ** and *** indicate significant at the significance level of 10%, 5% and 1%, respectively.

The placebo test results showed that the cross-term coefficients of *Post*List3* and *Post*List4* were 0.052 and -0.0305, respectively, but were not significant, which was in line with expectations. Therefore, it shows that it is ineffective to implement the policy three or four years in advance, and the regression results under the main empirical design are reliable, that is, the margin and short selling mechanism in China does improve the synchronicity of stock prices, but reduces the information efficiency of the capital market. It was not any other system in place or any other event occurring during the observation period that contributed to the increase in stock price synchronization.

5 FURTHER ANALYSIS

In this section, from the perspective of the actual size of margin and short selling, the proportion of margin balance (*RZYE*) and proportion of margin and short selling balance (*RQYE*) are introduced as indicators to measure the activity of short and short selling in the market, and the underlying stocks of margin and short selling in the whole sample are taken as the research samples in this section. The differential effects of margin trading and short trading on stock price synchronization are quantitatively differentiated and compared.

TABLE 7 THE INFLUENCE OF FINANCING BALANCE AND MARGIN BALANCE ON STOCK PRICE SYNCHRONIZATION

	(1) SYN1
RZYE	0.352*** (2.63)
RQYE	-49.15 (-1.44)
POST	0.172*** (5.67)
Control Variables	Yes
_cons	-0.884*** (-36.47)
N	23949
adj. R ²	0.422
Firm fixed effect	Yes
Year fixed effect	Yes

Note: T values are in parentheses, *, ** and *** indicate significant at the significance level of 10%, 5% and 1%, respectively.

The regression results of the impact of margin financing and short selling on stock price synchronization show that the correlation coefficient of margin balance (*RZYE*) is 0.352, which is significantly positively correlated with stock price synchronization. The correlation coefficient of margin balance (*RQYE*) is -49.15, but the regression result is not significant. The empirical results show that financing transaction improves stock price synchronization and deteriorates the information efficiency of the capital market, while short selling transaction has no significant impact and fails to play the expected role of reducing stock price synchronization. The reason may be that the transaction structure of China's margin trading markets is seriously unbalanced. On the one hand, investors are accustomed to long trading and choose short trading prudently based on risks; on the other hand, the threshold of short trading is relatively high, with high standards for investors' capital volume and account flow, and most retail investors cannot participate in short trading. These two factors lead to the failure of short selling mechanism to play its role in optimizing the allocation of market resources, which is not conducive to the full expression of bearish sentiment of pessimistic investors, seriously hindering the transmission of bad news into stock prices, and reducing the information efficiency of the capital market.

Therefore, it can be concluded that margin trading inhibits the improvement of information efficiency of capital market, while short selling has no significant impact. This confirms the assumption in hypothesis 2 of this paper that the policy effect of margin trading is mainly dominated by the negative impact of margin trading.

Finally, it is concluded that compared with state-owned enterprises, margin trading system has a more significant impact on the stock price synchronization of non-state-owned enterprises, which is consistent with hypothesis 3 of this paper.

5.2 Further Analysis on Firm Size

In order to verify hypothesis 4 (*H4*), this paper divided large companies and small companies according to the median of company size in each year, and then carried out the regression of the two companies with the *DID-FE* model respectively.

TABLE 8 THE INFLUENCE OF FINANCING BALANCE AND MARGIN BALANCE ON STOCK PRICE SYNCHRONIZATION

	(1) SYN1	(2) SYN1
Post*List	0.150** (2.44)	0.155*** (4.14)
Control Variables	Yes	Yes
_cons	-2.099** (-2.11)	- 4.272*** (-5.07)
N	12302	11647
adj. R ²	0.421	0.458
Firm fixed effect	Yes	Yes
Year fixed effect	Yes	Yes

Note: T values are in parentheses, *, ** and *** indicate significant at the significance level of 10%, 5% and 1%, respectively.

According to the regression results of small companies and large companies, the correlation coefficients of Post*List of both companies are 0.150 and 0.155, respectively, and both are significant at the 1% significance level. It shows that the size of margin does not have a significant impact on the degree of stock price synchronization. However, the correlation coefficient between the two is very close, so it is impossible to make a direct judgment on hypothesis 4, and hypothesis 4 is not supported.

Therefore, it can be concluded that there is no significant difference in the impact of margin trading on stock price synchronization between large-scale enterprises and small-scale enterprises.

6 CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Conclusions

In the empirical part, this paper takes stock price synchronicity as indicators of the efficiency of the capital market information, with the help of a margin for many times expanding to form the advantages of "natural experiment", to distinguish between the experimental group and control group, and it builds DID - FE model as a benchmark regression model, making an empirical analysis on the margin and capital market information efficiency. The main conclusions of this paper are as follows: 1. Through benchmarked regression and a series of robustness tests, it is concluded that the margin and short selling system initiated in China has significantly improved the synchronicity of stock prices at the present stage, but it has a negative effect on the information efficiency of the capital market, failing to achieve the expected policy purpose. Therefore, it is concluded that China's securities margin trading system reduces the information efficiency of the capital market. 2. Short selling can reduce stock price synchronization, but because of its small scale, it has little impact on the information efficiency of the capital market, and fails to play the expected role of promoting the incorporation of corporate characteristic information into stock prices. However, margin trading improves the stock price synchronization of the underlying stock, which has a negative effect on the information efficiency of the capital market. Moreover, the policy effect of margin trading system is dominated by the negative effect of margin trading. 3. Compared with state-owned enterprises, margin

trading system has a more significant impact on the stock price synchronization of non-state-owned enterprises. However, there is no significant difference in the impact of margin trading on stock price synchronization between large-scale enterprises and small-scale enterprises.

6.2 Policy Implications

In China, there is a serious asymmetry in the scale of margin trading. The financing scale is more than a hundredfold of the scale of margin trading in the long term. At the present stage, the friction of short selling greatly restrains the positive effect of margin trading, thus causing chaos in capital markets. Therefore, combined with empirical conclusions, the following policy suggestions is put forward on how to improve the margin lending mechanism to improve the information efficiency of the capital market: 1. Standardize the two-finance transaction system. China should summarize the experience of foreign countries in implementing the margin and short reading system and actively promote the balance of supply and demand in the capital market. 2. Lower the threshold of access to short trading. Regulators can appropriately lower the trading threshold of the margin system to encourage retail investors to actively express bearish sentiment. 3. Cultivate investors' awareness of two-way trading. Departments at all levels in China should help investors establish a sense of two-way trading and encourage investors to profit from shorting stock prices. 4. Cultivate rational thinking in investors. Chinese relevant departments should continue to cultivate investors' rational thinking and improve their rational analysis ability of various heterogeneous information.

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