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Impact of margin-trading activities on stock market returns and volatility: Evidence from China

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ABSTRACT

This study employed a GARCH model for parameter estimation and incorporated the incremental variables of financing balance, securities lending balance, and margin trading balance into the mean and variance equations to explore the impact of margin-trading activities on stock market returns and volatility in China. The empirical results showed that financing balance; securities lending balance, and margin trading balance were all positively related to the returns of the CSI 300 Index. In contrast, these margin-trading activities were found to have a significantly negative effect on CSI 300 volatility, implying that they contribute to the mitigation of stock market fluctuations. Overall, the results suggest that the liberalization of margin-trading policies contributes to stock market stability.

Keywords: financing balance; securities lending balance; return and volatility; GARCH model.

1. Introduction

The rapid development of the Chinese stock market has been accompanied by the emergence of margin-trading activities. Subject to the provision of a required margin deposit, investors may conduct margin trading through qualified securities firms by borrowing funds to purchase securities or borrowing securities for short selling. When investors predict stock prices to increase, they can leverage borrowed funds to acquire additional shares at relatively low prices and subsequently realize higher returns by selling them at higher prices. Conversely, when a decline in stock prices is

anticipated, investors may borrow securities and sell them at higher prices before repurchasing the same quantity at lower prices, thereby generating profits from the price decrease and hedging the downside risk. Through this leveraged trading mechanism, which involves substantial capital movements and trading activities, margin-trading activities have the potential to exert a significant influence on stock market performance.

The existing literature provides mixed evidence on the impact of margin-trading activities on stock market returns and volatility. One strand of research argues that margin trading and short selling contribute to increased market volatility. Proponents of this view contend that rising stock prices encourage investors to expand their leveraged positions, whereas falling prices stimulate short-selling activity. Such trading behavior may amplify both upward and downward market movements, thereby increasing overall volatility. Using data from the Hong Kong stock market between 1994 and 2001, Henry and McKenzie (2006) documented higher levels of volatility during periods of short selling and reported that short selling intensified the asymmetric response of returns to positive and negative shocks. Their findings provide additional insights into investor behavior and portfolio adjustment strategies. Meanwhile, Haruvy and Noussair (2006) found that short selling could depress stock prices and, when sufficiently extensive, might drive prices below their fundamental values. Under more relaxed short selling regulations, asset prices may decline further, generating fluctuations that adversely affect market stability. Through an analysis of the distinctive features of short selling in the Hong Kong stock market, Chang et al. (2007) concluded that short sale restrictions might lead to stock market overvaluation. They further suggested that greater heterogeneity in investor beliefs intensified this overvaluation, resulting in higher individual stock volatility and larger fluctuations in stock market indices. More recently, Hansman et al. (2025) investigated the expansion of margin-trading activities in the Chinese stock market from 2010 to 2015 and found that margin-trading debt increased stock market volatility, thereby providing additional support for this perspective.

In contrast to the studies discussed above, another strand of literature argues that margin-trading activities contribute to stock market stability rather than volatility. Angel (1997) examined the short-selling behavior of more than 100 stocks listed on the New York Stock Exchange and reported that short selling did not exacerbate market volatility. Instead, it appeared to dampen market fluctuations and promote greater stability in the Dow Jones Industrial Average and other stock market indices. Drawing on the market crash hypothesis, Hong and Stein (2003) argued that negative return skewness became more pronounced when trading volume was high. Their findings imply that excessive restrictions on margin-trading activities may contribute to heightened market fluctuations. Similarly, Bris et al. (2007) used data from 46 stock markets and found that allowing short selling enables prices

to incorporate negative information more efficiently. Such informational efficiency may improve market functioning, reduce stock price volatility, and moderate fluctuations in stock market indices. Further evidence is provided by Sharif et al. (2014), who examined the removal of short-selling restrictions on selected stocks in China. They found that stocks eligible for short selling experienced lower average prices than comparable A-shares in mainland China and H-shares listed in Hong Kong, suggesting that short-selling effects were dominant while also contributing to lower stock price volatility. Overall, these studies provide supporting evidence for the argument that margin-trading activities can enhance stock market stability.

A third line of research suggests that the relationship between margin-trading activities and stock market volatility is weak or statistically insignificant. Using short-term position data from 342 stocks, Figlewski and Webb (1993) found no direct association between margin-trading activities and stock market volatility, implying a limited effect on changes in the Nasdaq Index. Additionally, based on a simple theoretical model, Kraus and Rubin (2003) argued that fluctuations in volatility were primarily driven by variations in information regarding future returns rather than by margin trading or short-selling activities. Consistent with this view, Saffi and Sigurdsson (2011) analyzed more than 12,600 stocks across nearly 26 countries and reported that relaxing short-sale restrictions neither increased stock price instability nor amplified extremely negative returns. Their findings suggest that short selling exerts only limited influence on stock market volatility. Further evidence is provided by Wang and Lee (2015), who examined the Korean stock market and found that short selling had no significant impact on volatility. Overall, these studies indicate that the effect of margin-trading activities on stock market volatility may be limited or statistically insignificant.

China's margin trading framework was largely established by 2008, and a pilot program for margin trading and securities lending was formally introduced in March 2010. As the market transitioned from the pilot stage to routine operations and the margin trading and securities lending system continued to evolve, the number of eligible securities listed on the Shanghai and Shenzhen stock exchanges expanded from 90 at the outset to 900 by September 2014. Exchange Traded Funds (ETFs) were also incorporated into the program for the first time, contributing to the continuous expansion of trading activity. Supported by favorable market conditions and a strong bull market, investor risk appetite increased substantially, attracting large amounts of margin-financed capital into the stock market and driving stock prices higher. Consequently, the margin trading balance reached a record high of 2.27 trillion yuan on June 18, 2015. However, the rapid expansion of leveraged trading also generated considerable asset bubbles and heightened market risk. During the sharp market downturn that occurred between late June and early July 2015, the forced liquidation mechanism associated

with margin-trading activities was widely viewed as a factor that accelerated the downward spiral in stock prices. Following this episode, the Chinese stock market entered a prolonged phase of adjustment and recovery. Regulatory reforms introduced a more flexible liquidation mechanism, coupled with regular reviews and dynamic adjustments of eligible securities and minimum margin requirements. Consequently, margin-trading activities have gradually evolved into a more mature and standardized market mechanism. By October 2022, the number of eligible securities increased to 2,200, while the margin trading balance recovered to 2 trillion yuan in 2025. Overall, these developments indicate that China's margin trading system has become increasingly mature over the past decade and continues to play an important role in the operation of the Chinese stock market.

Previous studies have documented the presence of idiosyncratic volatility effects among stocks participating in margin trading, providing further evidence of the relationship between margin-trading activities and stock market returns and volatility (Gui and Zhu, 2021). Despite this evidence, relatively limited attention has been devoted to examining how the margin trading system has affected the returns and volatility of the Chinese stock market over the past decade. Therefore, a more comprehensive investigation of this issue is necessary. Against this background, this study examined the evolution of margin-trading activities in China from 2016 to 2024 and analyzed their impact on the returns and volatility of the Chinese stock market, as represented by the CSI 300 Index. The empirical findings are expected to provide useful insights for investors, analysts, market practitioners, and regulators when making investment and policy decisions, thereby highlighting the practical relevance of this study.

To investigate the impact of margin-trading activities on stock market returns and volatility in China, this study employed a GARCH model and incorporated incremental measures of margin-trading activities into the empirical analysis. The results showed that financing balance, securities lending balance, and margin trading balance all exerted a significantly positive effect on Chinese stock market returns, suggesting that margin trading has contributed to return growth over the near past decade. Meanwhile, these margin-trading variables had a significantly negative effect on stock market volatility, indicating that the liberalization of margin trading policy contributes to market stabilization.

The remainder of this paper is organized as follows. Section 2 describes the dataset, methodology, and GARCH model specifications used in the empirical analysis. Section 3 presents and discusses the main empirical findings. Section 4 concludes the paper with a summary of the key findings.

2. Data and Research Methodology

As an emerging market, China's stock market differs from many mature international markets in terms of its development history and institutional framework. Against this background, examining the impact of margin-trading activities on stock market returns and volatility is particularly important. To this end, this study employed daily data obtained from the iFind database, including the CSI 300 Index, financing balance, securities lending balance, and margin trading balance. The empirical analysis covered the period from January 4, 2016 to December 31, 2024, providing a sample of 2,187 daily observations.

The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model, developed by Bollerslev (1986) and Taylor (1986) as an extension of Engle's (1982) Autoregressive Conditional Heteroskedasticity (ARCH) framework, is widely employed in financial econometrics to model time-varying volatility. By incorporating lagged conditional variance terms, the model can capture key characteristics of financial time series, including volatility clustering, fat-tailed distributions, and conditional heteroskedasticity, while maintaining a relatively parsimonious specification. As a result, the GARCH model has become a standard approach for analyzing and forecasting financial market volatility. Following Bollerslev (1986) and Taylor (1986), this study specified a standard GARCH (1,1) model using daily data as follows:

$$r_t = c + \varepsilon_t \quad \text{With } t=1,\ldots, T \qquad (1)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \qquad (2)$$

Where c is a constant term and $\varepsilon_t = \sigma_t c_t$ represents the error term. In Equation (2), α_0 is a constant, and α_1 and β_1 denote the ARCH and GARCH coefficients, respectively. The variable r_t represents stock returns, and ε_t captures deviations of returns from their conditional mean. The term ε_{t-1} represents the disturbance term lagged by one period, and the influence of ε_{t-1}^2 on the current conditional variance σ_t^2 is measured by the coefficient α_1. The term σ_{t-1}^2 represents the conditional variance lagged by one period. The influence of σ_{t-1}^2 on the current conditional variance σ_t^2 is measured by the coefficient β_1. Equations (1) and (2) represent the mean and variance equations, respectively.

Fonseka et al. (2025) reported that both margin-trading activities and stock index futures in the Chinese stock market were positively associated with stock price synchronicity, a finding that is consistent with the results of Chen et al. (2016). Additionally, Li et al. (2024) extended the GARCH framework to investigate related market effects. Evidence from international markets further supports the application of GARCH-based approaches. Using several asymmetric GARCH specifications, Bohl

et al. (2012) found that short selling restrictions increased stock return volatility in the Taiwan stock market. Employing econometric methods and GARCH models, Bohl et al. (2016) subsequently reported that short selling restrictions exerted an unstable influence on stock return volatility in Germany. Patel and Guidi (2024) examined the short selling ban imposed on British stocks during the 2008–2009 financial crisis and found that the volatility of selected financial stocks declined during the restriction period. Similarly, Yang et al. (2024), using a GARCH-MIDAS model and regression analysis, examined Chinese stocks listed in Hong Kong during the period from 2015 to 2023 and concluded that short selling increased stock volatility, partly because of noise-driven short selling activities.

Given the widespread use of GARCH-type models in the existing literature, this study extended the standard GARCH framework by incorporating increments in the financing balance, securities lending balance, and margin trading balance into both the mean and variance equations. This specification allows us to examine the impact of margin-trading activities on the returns and volatility of the Chinese stock market. The model is expressed as follows:

$$r_t = c + \rho X_t + \varepsilon_t \quad (3)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \theta X_t \quad (4)$$

Where X represents the incremental value of margin trading balance in the CSI300 market.

3. Empirical Results

This section presents an empirical analysis of the impact of margin-trading activities on stock market returns and volatility in China. Table 1 reports the descriptive statistics of the changes in margin trading and short-selling balances, including the mean, median, maximum, minimum, standard deviation, skewness, and kurtosis.

Table 1 shows that the mean values of the increments in the financing balance (ΔFB), securities lending balance (ΔSLB), and margin trading balance (ΔMTB) were 0.0001, 0.0002, and 0.0001, respectively. The corresponding standard deviations were 0.0056, 0.0427, and 0.0057, respectively. For the CSI 300, the mean return was 0.0000, and the standard deviation was 0.0122.

Table 1 Descriptive statistics of the variations of margin trading and short selling balance for the China stock market

Parameter	Variables			
	ΔFB	*ΔSLB*	*ΔMTB*	*CSI 300*
Mean	0.0001	0.0002	0.0001	0.0000
Median	0.0001	-0.0012	0.0000	0.0001
Max.	0.0594	0.3597	0.0593	0.0814

Min.	-0.0297	-0.3518	-0.0296	-0.0821
Std. Dev.	0.0056	0.0427	0.0057	0.0122
Skew	0.7182	0.2675	0.719	-0.4146
Kurtosis	14.8674	10.4108	14.0675	8.7454

Notes: Δ*FB* denotes increment of financing balance; Δ*SLB* denotes increment of securities lending balance; Δ*MTB* denotes increment of margin trading balance; *CSI 300* denotes returns of Shanghai and Shenzhen 300 Index.

Table 2 reports the estimation results of the baseline GARCH model for the CSI 300. The standard GARCH specification was used as the benchmark model. In the variance equation, both the ARCH parameter (α_1) and the GARCH parameter (β_1) were statistically significant at the 1% level. In addition, the sum of α_1 and β_1 was 0.9788, a value very close to 1, indicating strong volatility persistence in the CSI 300 return series.

Table 2 Results of estimates using GARCH model of the CSI 300

Equation	Parameters	CSI 300	
GARCH model:	$r_t = c + \varepsilon_t$	$\sigma_t^2 = \alpha_0 + \alpha_1 * \varepsilon_{t-1}^2 + \beta_1 * \sigma_{t-1}^2$	
Mean Equation	c	0.0002	(0.0002)
Variance Equation	α_0	0.0000***	(0.0000)
	α_1	0.0917***	(0.0057)
	β_1	0.8871***	(0.0070)

Notes: CSI 300 denotes returns of Shanghai and Shenzhen 300 Index. Figures in parentheses are standard error. *** indicates significance at the 1% level; ** indicates significance at the 5% level; and * indicates significance at the 10% level.

To examine the impact of margin-trading activities on stock market returns, the independent variable X was incorporated into the mean equation of the GARCH model. As shown in Table 3, the increments of ΔFB, ΔSLB, and ΔMTB were introduced separately, with the coefficient ρ measuring their respective effects on CSI 300 returns. The estimation results indicate that the coefficients of ΔFB, ΔSLB, and ΔMTB were all positive and statistically significant at the 1% level. Specifically, the estimated values of ρ were 0.5460 for ΔFB, 0.1083 for ΔSLB, and 0.6730 for ΔMTB. The findings suggest that both margin purchases and short-selling activities may increase market trading volume

and improve market liquidity. Enhanced liquidity can attract additional investor participation, thereby generating a positive feedback effect that may support stock price growth. Furthermore, among the margin-trading variables, the estimated effect of the increment in the financing balance on returns was larger than that of the increment in the securities lending balance. The variance equation results were also statistically significant at the 1% level. For all three model specifications, the sum of α_1 and β_1 was close to 1, indicating strong volatility persistence. This result is consistent with the stationarity condition of the GARCH model. In addition, volatility shocks displayed long-memory characteristics and decayed gradually over time, supporting the reliability of the estimation results.

Table 3 Results of estimates the impact of margin trading and short selling on CSI 300

Equation	parameters	Variables(X)					
		ΔFB		ΔSLB		ΔMTB	
	GARCH-type model: $r_t = c + \rho * X_t + \varepsilon_t \ \sigma_t^2 = \alpha_0 + \alpha_1 * \varepsilon_{t-1}^2 + \beta_1 * \sigma_{t-1}^2$						
Mean Equation	c	0.0000	(0.0002)	0.0000	(0.0000)	0.0000	(0.0002)
	ρ	0.5460***	(0.0302)	0.1083***	(0.0039)	0.6730***	(0.0286)
Variance Equation	α_0	0.0000***	(0.0000)	0.0000***	(0.0000)	0.0000***	(0.0000)
	α_1	0.0907***	(0.0066)	0.0841***	(0.0076)	0.0904***	(0.0070)
	β_1	0.8835***	(0.0086)	0.8617***	(0.0098)	0.8787***	(0.0094)

Notes: X denotes independent variables, including ΔFB, ΔSLB, *and* ΔMTB. ΔFB denotes increment of financing balance; ΔSLB denotes increment of securities lending balance; ΔMTB denotes increment of margin trading balance. Figures in parentheses are standard error. *** indicates significance at the 1% level; ** indicates significance at the 5% level; and * indicates significance at the 10% level.

The empirical results presented in Table 3, based on data from the near past decade, indicate that financing balance, securities lending balance, and margin trading balance all exerted a significantly positive effect on Chinese stock market returns. This finding is consistent with the existing literature documenting a positive relationship between margin-trading activities and stock market performance, including the evidence reported by Chang et al. (2014). From the perspective of market performance, the CSI 300 Index experienced fluctuations between 2016 and 2024, reaching a peak in 2021 before subsequently retreating. Despite these short-term fluctuations, the overall trend remained positive during the sample period, which is consistent with the positive relationship between margin-trading activities and stock market returns identified in our empirical analysis.

Similarly, Table 4 presents the results obtained by incorporating the independent variable X into the variance equation of the GARCH model. The increments of ΔFB, ΔSLB, and ΔMTB are introduced separately, with the coefficient θ measuring their respective effects on CSI 300 volatility. The estimation results indicate that the θ coefficients associated with ΔFB, ΔSLB, and ΔMTB were all negative and statistically significant at the 5% level. Specifically, the estimated values were −0.0002 for ΔFB, −0.00003 for ΔSLB, and −0.0002 for ΔMTB. These findings suggest that increases in financing balance, securities lending balance, and margin trading balance were associated with lower volatility in the CSI 300. This result is consistent with the findings of Bris et al. (2007), who reported that margin-trading activities contributed to market stabilization, as well as with the evidence provided by Wang and Zhou (2017). Under the volatility-reducing effect of margin-trading activities, the impact of the increment in the financing balance was greater than that of the increment in the securities lending balance. In addition, the ARCH parameter α_1 was significant at the 1% level, indicating that past shocks have a significant effect on current volatility. The GARCH parameter β_1 was also significant at the 1% level, suggesting a high degree of volatility persistence in the CSI 300 return series.

Table 4 Results of estimates the impact of margin trading and short selling on volatility of CSI 300

Equation	parameters	Variables(X)					
		ΔFB		ΔSLB		ΔMTB	
	GARCH-type model: $r_t = c + \varepsilon_t \quad \sigma_t^2 = \alpha_0 + \alpha_1 * \varepsilon_{t-1}^2 + \beta_1 * \sigma_{t-1}^2 + \theta * X_t$						
Mean Equation	c	0.0002	(0.0002)	0.0002	(0.0002)	0.0002	(0.0002)
Variance Equation	α_0	0.0000***	(0.0000)	0.0000***	(0.0000)	0.0000***	(0.0000)
	α_1	0.0953***	(0.0060)	0.0906***	(0.0059)	0.0951***	(0.0060)
	β_1	0.8825***	(0.0073)	0.8886***	(0.0071)	0.8830***	(0.0073)
	θ	-0.0002**	(0.0000)	-0.00003**	(0.00001)	-0.0002**	(0.0000)

Notes: X denotes independent variables, including Δ*FB, Δ*SLB, and* Δ*MTB*. Δ*FB* denotes increment of financing balance; Δ*SLB* denotes increment of securities lending balance; Δ*MTB* denotes increment of margin trading balance. Figures in parentheses are standard error. *** indicates significance at the 1% level; ** indicates significance at the 5% level; and * indicates significance at the 10% level.

Based on the empirical results reported in Table 4 and the data from the near past decade, financing balance, securities lending balance, and margin trading balance all exhibited a significantly negative relationship with the volatility of the Chinese stock market. One possible explanation is related to investor behavior. As the Chinese stock market has developed, investors may have become increasingly rational in their investment decisions and less inclined to engage in momentum-driven trading behavior. Under such circumstances, more rational participation in margin-trading activities may contribute to greater market stability and lower volatility. An alternative explanation is that the observed reduction in volatility is associated with the continuous development of the margin trading system itself. Over time, China's margin trading framework has become increasingly mature, and the design, adjustment, and implementation of related policies may have played an important role in shaping market dynamics. Consequently, the gradual improvement in the margin trading system may have contributed to the mitigation of stock market volatility. These findings are consistent with previous studies, suggesting that margin-trading policies play an important role in influencing the volatility of the Chinese stock market (Li et al., 2022; Chen, 2025).

4. Conclusions

This study investigates the impact of margin-trading activities on stock market returns and volatility in China by incorporating increments in financing balance, securities lending balance, and margin trading balance into a GARCH framework. Using data from the CSI 300 over the period 2016–2024, the analysis provided empirical evidence on the role of margin-trading activities in shaping stock market performance.

The empirical findings can be summarized in three respects. First, financing balance, securities lending balance, and margin trading balance all exerted a significantly positive effect on CSI 300 returns. Second, these variables exhibited a significantly negative relationship with CSI 300 volatility. Third, this study contributes to the literature by examining the effects of the margin trading system on the returns and volatility of the Chinese stock market over the near past decade.

These findings provide useful insights for investors, analysts, market practitioners, and regulators when making investment and policy decisions. Collectively, the results suggest that the development of margin-trading activities is associated with higher stock market returns and lower volatility in China, underscoring the importance of margin-trading policies in the evolution of the Chinese stock market.

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