

Empirical Research on the Impact of Margin Selling on the Volatility of China's Stock Market

Gao Xi
Guilin University of Electronic Technology
GuiLin, China
e-mail: 919784364@qq.com

Song Ruimin
Guilin University of Electronic Technology
GuiLin, China
919784364@qq.com

Abstract—In March 2010, China's securities market began the trial of margin trading and ended the unilateral trading system since the operation of the stock market in China. It is an important milestone in the development of China's securities market. From 2010 to now, the scale of margin trading continues to expand, the quality of the underlying stocks is getting higher and higher, the regulation of the market is becoming more and more perfect, but how does it affect the volatility of the stock market in China? So far there is no uniform conclusion.

This paper deals with the daily trading data of the Shanghai and Shenzhen 300 Index as an indicator of the volatility of the stock market, and uses the total financing balance and margin of the Shanghai and Shenzhen Stock Exchange as the margin trading index. This paper makes an empirical analysis of the impact of margin trading on the volatility of China's stock market. Samples range from March 31, 2010 to March 31, 2016, a total of 1643 trading days.

Keywords—component; VAR Model Volatility Stock Market Margin trading

I. INTRODUCTION

Since margin trading has a very mature trading system in foreign countries, the research based on the stock market has a certain system, while the development of margin selling trading in China is still immature. Therefore, the research based on China's stock market is relatively few. At present, scholars at domestic and foreign countries have not had a relatively consistent view on "the impact of margin trading on the stock market". The research conclusions are roughly divided into: 1. Margin trading will aggravate the stock market volatility; 2. Margin trading will inhibit the stock market volatility; 3. Margin selling has no impact on the stock market. The literature for these three different results is presented separately below:

II. RELATED THEORY

2.1 Relevant concepts of margin selling

2.1.1 The definition of margin selling, leverage

Margin selling trading is also credit trading, investors only pay a certain margin to enlarge their trading chips, but also expand the transaction of profits and losses several times. Investors through the judgment of the market, short buy short trading, although its own funds or securities is not much, but using the leverage of margin trading, investors only pay a small part of margin can obtain several times the number of investment funds or securities

2.1.2 The features of margin selling

(1) The flow of funds

As an organic part of the financial market, the money market and the capital market must maintain a smooth capital flow between the two markets to ensure the smooth operation of the financial market. If the circulation of funds between the two markets is blocked, it will inevitably have an impact on the function of the whole financial market. The margin trading mechanism determines its contribution to capital circulation.

(2) Leverage

The action mechanism of margin trading on stock market volatility. Margin trading is mainly through its leveragemechanism and short selling mechanism. Leverage mechanism means that investors get over a small percentage of trading chips to pay a margin, thus increasing the supply of the securities market. Short selling mechanism happens when investors borrow shares at high levels to sell when the stock price is above their intrinsic value.

(3) The forward mechanism of action

When the market is in a fully effective market, when the stock price is seriously overvalued, rational investors will use short selling, margin selling stock, increase the supply of stock, hinder the stock rise, buy securities to repay, and under the influence of sheep effect, other investors will sell stock at high.

(4) Negative action mechanism

In the case that the market is weak and effective, a large number of irrational investors do not grasp the internal information of listed companies, easy to produce overreaction, that is, investors show excessive optimism about good news, show extreme pessimism about negative news, resulting in a certain cognitive deviation. (1) Total ban phase (1990-2005)

III. EMPIRICAL STUDY ON THE EFFECT OF MARGIN ON STOCK MARKET VOLATILITY

3.1 Selection of samples and data sources

The starting date is the starting date, and the data interval from March 3 1-30-10 December 2016, a total of 1643 groups were selected as the empirical study samples. The data selected in this article are all obtained from the Resset financial database. Eviews software was used to construct a VAR vector autoregression model to test the experimental hypothesis. This paper sets the variables involved in the empirical study and selects the study indicators as follows:

The volatility of the stock market. The daily volatility of the CSI(China Securities Index) 300 index, namely the ratio between the daily highest and lowest price and the daily average daily price, is recorded as the calculation formula adopted by VOL(Volume), as follows:

$$VOL = 2(P_t^H - P_t^L) / (P_t^H + P_t^L) \quad (1)$$

P_t^H represents the highest price for the CSI 300 t rading on t-day, and P_t^L says the CSI 300 t rades at the lowest price on t daily

Financing transaction balance. The total financing balance of Shanghai and Shenzhen was selected. Due to the large transaction amount, in order to minimize the error of empirical analysis, the total financing balance was processed logarithmically treated here to eliminate heterovariance and recorded as $\ln MP$ (Financing transaction balance).

Margin trading balance. The total margin margin for each trading day between Shanghai and Shenzhen were selected, and the total margin was also log-treated to eliminate heterovariance and be recorded as $\ln SS$ (Margin trading balance).

3.2 Stability test

The stationarity of time series should first be considered first in the process of selecting variables, but in practice, time series variables are most likely to be unstable. If the regression of the data without stationarity test is conducted directly, it is easy to get false conclusions (pseudo-regression relationship). Therefore, when conducting the time-series study, the unit root test of the studied time-series variables should be first carried out to determine whether it is stable. This paper performs ADF (Augmented Dickey-Fuller test) tests for the data using Eviews9.0.

Variable name	ADF statistics	1% Critical value	5% Critical value	Pvalue	conclusion
VOL	-7.959608	-3.963656	-3.412555	0.0000	Refusing the original hypothesis, Smooth
LNMP	-5.236791	-3.963659	-3.412557	0.0001	Refusing the original hypothesis, Smooth
LNSS	-4.904297	-3.963662	-3.412558	0.0003	Refusing the original hypothesis, Smooth

Table-1

From Table -1 available at the 1% significance level, the absolute value of the ADF statistic of all three variables is significantly greater than the absolute value of the cutoff, so the null hypothesis can be rejected, all stationary number columns.

3.3 The VAR model was established and the optimal lag order was determined Estimation of the VAR model

1980, Sims proposed a vector autoregressive model, simply the VAR model. This model takes the form of multiple equations, in each equation of the model, the endogenous variable regressed the lag values of the model, which estimates the dynamic relationship of all endogenous variables. In this paper, a binary VAR model is established to regression analyze the relationship between stock market volatility and financing trading and

margin trading respectively. The expressions of the VAR model are as follows:

$$VOL_t = c_1 + \beta_1 VOL_{t-1} + \dots + \beta_k VOL_{t-k} + \alpha_1 LNMP_{t-1} + \dots + \alpha_j LNMP_{t-j} + \mu \quad (2)$$

$$LNMP_t = c_2 + \lambda_1 LNMP_{t-1} + \dots + \lambda_i LNMP_{t-i} + \theta_1 VOL_{t-1} + \dots + \theta_j VOL_{t-j} + \mu \quad (3)$$

$$VOL_t = c_3 + \alpha_1 VOL_{t-1} + \dots + \alpha_i VOL_{t-i} + \beta_1 LNSS_{t-1} + \dots + \beta_j LNSS_{t-j} + \mu \quad (4)$$

$$LNSS_t = c_4 + \lambda_1 LNSS_{t-1} + \dots + \lambda_i LNSS_{t-i} + \theta_1 VOL_{t-1} + \dots + \theta_j VOL_{t-j} + \mu \quad (5)$$

3.3.1 Determine the lag order of the VAR model

Before the final determination of the VAR model, the size of the lag order of the model will affect the accuracy of the model estimation results, if the selected lag order is small will make the autocorrelation of the model error term is relatively large, but if the lag order is too large will also reduce the degree of freedom of the model, so the lag order of the model should not be too large or too small.

In this paper, the Lag Length Criteria rule in the Eviews software, namely the LLC rule, is chosen to test the optimal lag period number of the VAR model. The optimal number of lag periods shown is 7, and the two metrics of FPE, AIC is 8, finally identifying the VAR model as 7 according to LLC's test rules.

3.3.2 The stability of the VAR model was tested

After the optimal lag order of the model is determined, the stability of the VAR model should be tested, generally taking the AR root test, whose principle is that the VAR model is considered stable if all the feature roots of the tested VAR model are within the unit circle, i. e., only if the absolute value of the feature root is less than 1.

Inverse Roots of AR Characteristic Polynomial

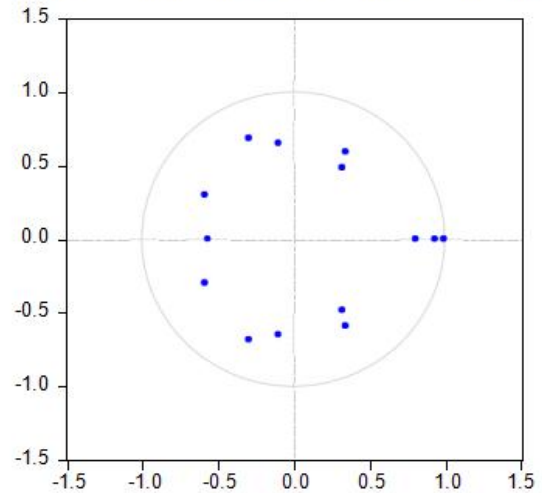


Figure-1

3.3.3 Establishment of the VAR model and the outcome analysis

From the regression coefficient and t values in the constructed VAR model, the volatility of the CSI 300 index is significantly related with its own lag period and shows positive correlation; the volatility of the CSI 300 index is subject to the logarithm of the total financing balance. The impact of a significant negative correlation between both 2 and 6 lag, indicating that the change in financing balance suppressed the wave of the stock market.

3.4 Granger causal test

Table-2

Dependent variable	Exclude	Chi-sq	df	Prob.
VOL	LNSS	6.15809	7	0.5263
LNSS	VOL	9.792104	7	0.2007
VOL	LNMP	13.17693	7	0.0198
LNMP	VOL	16.23778	7	0.0230

From the test results in the table, At the 5% significance level, Testing accepted "VOL is not Granger reason for LNSS" and "LNSS is not Granger reason for VOL", Also testing rejection of "VOL is not Granger reason for LNMP" and "LNMP is not Granger reason for VOL", That is, margin trading is not the Granger cause of stock market volatility, But financing deals are the Granger reason for stock-market volatility, And the volatility of the stock market is also the reason for margin trading.

3.5 Variance decomposition

Table-3

periods	VOL	LNMP	VOL	LNSS
1	100.0000	0.000000	100.0000	0.000000
2	99.99373	0.006270	99.89984	0.100157
3	99.69079	0.309210	99.62184	0.378161
4	99.68139	0.318606	99.61263	0.387372
5	99.66958	0.330416	99.62639	0.373614
6	99.66225	0.337750	99.58856	0.411440
7	99.67115	0.328849	99.59855	0.401452
8	99.68367	0.316328	99.60033	0.399668
9	99.69157	0.308426	99.59638	0.403625
10	99.69738	0.302619	99.59170	0.408299

Can be seen from the table, our stock market volatility is most affected by their own, its proportion of their interpretation accounted for more than 99%, and basically stable in the long term, and margin trading to stock market volatility is less than 1%, shows that margin trading on stock market volatility is not big, in the first ten lag period, the impact is not more than 1%, and margin trading than financing contribution to stock market volatility, this result is basically consistent with the results of the pulse response.

3.6 pulse response analysis

The pulse response is used to describe the response of an endogenous variable to the error impact, where he describing the impact on the current and future values of the endogenous variable after an impact of one unit on the random error term. The effect of the pulse is temporary and slowly approaches to zero over time.

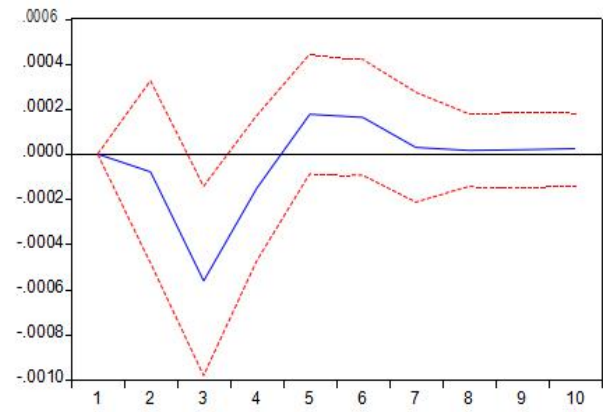


Figure-2 pulse response

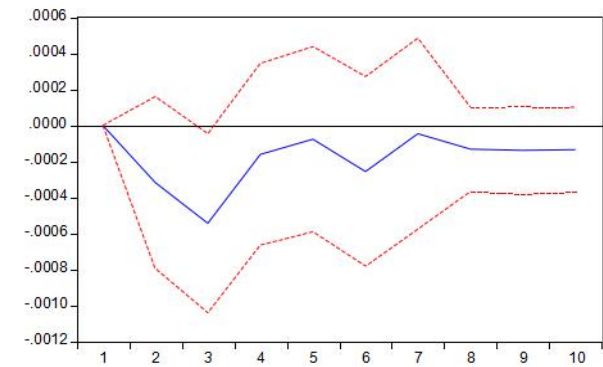


Figure-3 pulse response

After the positive impact of a unit of margin trading, the stock market showed a negative reflection in the first time, and gradually increased, gradually in the third period to the peak gradually reduced and fluctuated back and forth, and the final fluctuation gradually decreased and tends to stabilize. The above results show that margin trading will bring a negative impact on the stock market volatility of the stock market, that is, margin trading will inhibit the stock market volatility, but the effect will gradually decrease over time.

IV CONCLUSION AND POLICY SUGGESTIONS

Conclusions

This paper selects the margin trading data of CSI 300 index and CSI, selects appropriate variables, and constructs the VAR model to study the impact of margin trading on the volatility of the stock market. From the pulse response and variance decomposition, margin trading has a certain influence on the stock market volatility, in the whole research range, margin trading has suppressed the stock market volatility, namely the introduction of margin trading will reduce the volatility of the stock market, and margin trading on the stock market volatility is slightly greater than the impact of financing trading on the stock market volatility.

Suggestions

I. Further increase the securities and types of securities underlying margin selling. China's margin securities expanded four times to varying degrees from 2010 to 2016, but since the sharp fluctuations of the stock market in

2005, the CSRC has strengthened the regulation of securities.

II. Make flexible adjustments to the margin system for margin trading and securities. The development of margin trading and securities is mainly based on the margin system, and the margin ratio determines the level of leverage for short buying and selling. At the same time, the size of the margin ratio will also affect the investment choices of investors. If the regulator can adjust the margin ratio of margin trading and securities according to the current overall market operation, the market stability function of the two financial services will be greater.

REFERENCES

- [1]Li Z, Lin B, Zhang T, et al. Does short selling improve stock price efficiency and liquidity? Evidence from a natural experiment in China[J]. The European Journal of Finance, 2016: 1-23.
- [2]James[R], 1997.J Angel. Short selling on the NYSE[R],1997.
- [3]Chang EC, Bai Y,Wang J.Asset Prices under Short-Sales Constraints[J].Working Paper,2006(11):1-43.
- [4]Yang Deyong, Wu Qiong.Empirical Analysis of the Impact of Margin on Shanghai Securities Market — — Based on liquidity and volatility perspective [J].Journal of the Central University of Finance and Economics, 2011 (05): 28-34.
- [5]Liao Shiguang, Yang Chaojun.Short selling trading mechanisms, volatility and liquidity — — An empirical study based on the Hong Kong stock market [J].Managing World, 2005 (12): 6-13 + 171.
- [6]Xiao Wenyan, Wang Zihan.Influence of Margin Mechanism on Volatility of China Stock Market — — Based on Empirical Analysis of SSE 50 [J].China Securities and Futures, 2012 (05): 33-35.