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Statistical properties of short-selling and margin-trading activities and their impacts on returns in the Chinese stock markets

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HIGHLIGHTS

- Collective behaviors of leverage trading are detected based on the Chinese data.
- The index cohesive force is more obvious in margin-trading than in short-selling.
- Finance industry is more influential in the co-movements of returns.
- It is probably due to the short-selling of finance industry by information channel.
- The interactions of leverage trading with return and volatility are also detected.

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ABSTRACT

We investigate the collective behaviors of short-selling and margin-trading between Chinese stocks and their impacts on the co-movements of stock returns by cross-correlation and partial correlation analyses. We find that the collective behaviors of margin-trading are largely attributed to the index cohesive force, while those of short-selling are mainly due to some direct interactions between stocks. Interestingly, the dominant role the finance industry plays in the collective behaviors of short-selling could make it more important in affecting the co-movement structure of stock returns by strengthening its relationship with the market index. By detecting the volume–return and volume–volatility relationships, we find that the investors of the two leverage activities are positively triggered by individual stock volatility first, and next, at the return level, margin-buyers show trend-following properties, while short-sellers are probably informative traders who trade on the information impulse of specific firms. However, the return predictability of the two leverage trading activities and their impacts on stock volatility are not significant. Moreover, both tails of the cumulative distributions of the two leverage trading activities are found following the stretched exponential law better than the power-law.

1. Introduction

The impacts of short-selling and margin-trading on stock markets are controversial. Particularly for short-selling, various regulations such as the strict ban, limited supplies of underlying stocks, high security-lending fees, and up-tick rules vary widely across countries and with time. For example, during the 2007 financial crisis, many countries such as the United

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States imposed a strict ban on the short-selling of financial stocks to try to stop the declining markets, but just after a few months, the ban was lifted due to its uselessness and costs.

Academic researches detect the effects of short-selling and margin-trading on stock markets primarily from three aspects—price discovery and efficiency [1–9], market liquidity [6,10–12] and market stability [7,8,10,13,14]. However, debates still exist on all the three aspects. Theoretical studies mostly focus on one stock, and different assumptions of investors' rationality could bring different conclusions [4,6]. However, the interactions between different stocks, which may affect the conclusions, are ignored [5]. Empirical studies also have limitations. Firstly, the volume data of short-selling and margin-trading are private in most countries. Secondly, the various countries implement different forms of short-selling and margin-trading constraints. Therefore, most empirical studies identify and measure the extent of short-selling constraints in indirect ways (such as the short interest), which may add potential confusions and induce different conclusions [9].

As one of the most important emerging stock markets, Chinese Mainland markets gradually lifted the restricted ban on short-selling and margin-trading only for the stocks on a designated list that has been revised over time since March 2010. This structure could provide cleaner data by controlling stocks' other characteristics and reducing the potential confounding effects of other concurrent events [9]. Moreover, the data of short-selling and margin-trading are public on the website of the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE), which provides the condition of being able to detect the statistical properties in a direct way. Based on the cleaner and more direct data, this paper detects the statistical properties of short-selling and margin-trading on Chinese stock markets in an econophysics view. Since the pioneering work of Mantegna and Stanley in 1995 [15], econophysicists have been devoted to exploring the universal law of financial markets to understand the underlying complex behaviors, and numerous stylized facts have been discovered, such as the "inverse cubic law" of return distributions [16,17], long memory in volatility [18,19], leverage effect [20,21] and so on.

Following these findings, this paper first focuses on the interactions of short-selling (and margin-trading) activities between stocks that are ignored by the previous theoretical and empirical studies. Analyses of cross-correlations between stock returns are widely applied for detecting the interactions between stocks and understanding the co-movements in financial markets [22–29]. Moreover, since the 2007 financial crisis, the dynamic evolution of cross-correlations has attracted more studies, and relevant indicators are proposed to detect the systemic risk in financial markets [30–34] and housing markets [35]. The co-movements of stock prices are due to the collective behaviors of investors. In addition, leverage trading activities could magnify the collective behaviors of investors and intensify the co-movements of stock prices, which imply more risk. In this paper, we analyze the cross-correlations of short-selling (and margin-trading) activities between stocks and detect their impacts on the cross-correlation structure between stock returns. Moreover, we apply a partial correlation analysis [35–38] to discriminate between the role of stock in a specific business sector and that of the stock index, which commonly affects the entire market, in affecting the correlation structure of the leverage activities between stocks.

Second, this paper focuses on the distributions of short-selling (and margin-trading) and their correlations with stock returns and volatility. The topic of the volume–return relationship has a long history in finance [39]. Recently, more empirical evidences have been revealed not only at the aggregated level longer than one minute but also at the transaction level, such as the power-laws in both the distributions of trading volume and returns [40] and the positive correlations of volume with return and volatility [39,41,42]. Based on these evidences, the scaling behaviors of the volume–return functions are proposed [40,43–45]. Meanwhile, liquidity is also found important [46] and employed to explain the immediate price impacts with volume [47]. In this paper, we complement the previous empirical studies by detecting the distribution of the two leverage-trading volumes as well as their correlations with return and volatility. In addition, these explorations could also give some insights into the strategies that the leverage investors take during their trading.

The paper is organized as follows. Section 2 gives a general introduction to the short-selling and margin-trading activities in the Chinese stock markets, and describes the data we analyzed. Section 3 presents the cross-correlation and partial correlation analyses for the short-selling (and margin-trading) activities between stocks and their impacts on the co-movements of stock returns. Section 4 analyzes the distributions of the two leverage trading activities and investigates their correlations with stock returns and volatility. Section 5 summarizes our findings.

2. Data

Short-selling and margin-trading activities were strictly prohibited in the Chinese Mainland security market before March 2010. Since the first designated list including 90 stocks was effective on March 31, 2010, the China Securities Regulatory Committee (CSRC) has revised the list several times and expanded it to include 700 stocks and 10 exchange-traded-funds (ETFs) by September 2013. Table 1 presents the timeline of the main revisions of the stock list. According to the implementation rules of the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE), eligible stocks must satisfy size, liquidity and volatility requirements. In addition, investors should meet several criteria to be qualified to buy stocks on margin and sell stocks short, such as the requirements of capital, trading experiences and so on. Naked short-selling is strictly prohibited, and the up-tick rule is strictly implemented. Moreover, the relatively high lending fees are charged differently by different brokers. For example, China Merchants Securities charge 8.6% for margin-buying and 10.6% for short-selling, while Everbright Securities charge 8.6% for both leverage trading activities. Due to these constraints, the scope of the two leverage activities in China is limited. Relative to the total trading volume of the entire market, the average daily market proportions of margin-buying and short-selling were, respectively, 13.58% and 1.36% in 2013.