Economic Systems 39 (2015) 369–389

Contents lists available at ScienceDirect

Economic Systems

journal homepage: www.elsevier.com/locate/ecosys

# Position limit for the CSI 300 stock index futures market

Lijian Wei [a,d], Wei Zhang [b,c], Xiong Xiong [b,c,*], Lei Shi [d]

[a] Sun Yat-sen Business School, Sun Yat-sen University, Guangzhou 510275, PR China
[b] College of Management and Economics, Tianjin University, Tianjin 300072, PR China
[c] China Center for Social Computing and Analytics, Tianjin University, Tianjin 300072, PR China
[d] UTS Business School, University of Technology, Sydney, PO Box 123, Broadway, Ultimo 2007, NSW, Australia

ARTICLE INFO

*Article history:*
Received 28 June 2014
Received in revised form 28 January 2015
Accepted 29 January 2015
Available online 24 June 2015

*JEL classification:*
G14
C63
D44

*Keywords:*
Position limit
Stock index futures
Agent-based modeling
Market quality

ABSTRACT

The aim of this study was to find the optimal position limit for the Chinese stock index (CSI) 300 futures market. A low position limit helps to prevent price manipulations in the spot market, and thus keeps the magnitude of instantaneous price changes within the tolerance range of policymakers. However, setting a position limit that is too low may also have negative effects on market quality. We propose an artificial limit order market with heterogeneous interacting agents to examine the impact of different levels of position limits on market quality, measured as liquidity, return volatility, efficiency of information dissemination, and trading welfare. The simulation model is based on realistic trading mechanisms, investor structure, and order submission behavior observed in the CSI 300 futures market.

Our results show that on the basis of the liquidity status in September 2010, raising the position limit from 100 to 300 could significantly improve market quality and at the same time keep the maximum absolute price change per 5 s below the 2% tolerance level. However, the improvement becomes only marginal if the position limit is further increased beyond 300. Therefore, we believe that raising the position limit to a moderate level can enhance the functionality of the CSI 300 futures market, which should benefit the development of the Chinese financial system.



* Corresponding author at: College of Management and Economics, Tianjin University, Tianjin 300222, PR China. Tel.: +86 22 27891308; fax: +86 22 27891308.
*E-mail addresses:* weilijian1981@163.com (L. Wei), weiz@tju.edu.cn (W. Zhang), xxpeter@tju.edu.cn (X. Xiong), lei.shi@uts.edu.au (L. Shi).

http://dx.doi.org/10.1016/j.ecosys.2015.01.003
0939-3625/

## 1. Introduction

The Chinese economy is growing rapidly and is now the second largest economy in the world. However, the Chinese financial market remains underdeveloped and requires further improvements in functionality for comparability with other international financial markets. The Chinese stock index (CSI) 300 futures market was introduced on April 16, 2010, in an effort to improve the country's financial system. The CSI 300 futures market allows investors to take short positions on futures to provide a hedge against the risk arising from the Chinese stock market. The introduction of the futures market was considered a milestone that would bring the Chinese financial market into a new era.

However, during the first phase after its introduction, the CSI 300 futures market has not performed well because many of the market participants are individual investors who supply little liquidity to the market. One possible reason is that the position limit of the CSI 300 futures market was too conservative[1]. To ensure a safe launch and to prevent market manipulation, the initial position limit for the CSI 300 futures market was set to 100 contracts, which may have been insufficient for institutional investors[2]. The low position limit of 100 could potentially inhibit institutional investors from taking optimal positions and providing sufficient liquidity to the market, which would lead to a low trading volume and order depth. Thus, investors suffer from the poor market quality. Policymakers therefore face a trade-off between improving market quality (by increasing the position limit) and preventing market manipulation (by keeping a low position limit). The question that arises is: What is the optimal level for the position limit?

Here, we propose an agent-based model to simulate the changes in market quality given different levels for the position limit. The market design and investor structure used in our model are chosen to best mimic the CSI 300 futures market. We first conduct an empirical study and find that a position limit of 371 should be sufficient if policymakers want to prevent manipulation and keep the instantaneous price change within a tolerance range of 2%. Simulation results for the agent-based model then show that when the position limit is increased from 100 to 300, market quality improves significantly. However, increasing the position limit beyond 300 leads to much less improvement in market quality. Furthermore, our simulation results show that increasing the position limit to 300 does not lead to absolute price changes of more than 2%. Therefore, we find that a position limit of 300 is close to being optimal for the CSI 300 futures market. The study also shows that agent-based modeling can be very useful for policymakers who need to make decisions in a complex environment (such as financial systems).

To provide some background information to understand why the position limit for the CSI 300 futures market was initially set to such a conservative level of 100, we first briefly review some of the important market events that occurred before the introduction of the CSI 300 futures market. The most serious incidence of market manipulation was the so-called "3.27" treasury futures incident, which occurred on March 27, 1995. Before this incident, Wanguo Security (WS), the largest security company in China at that time, held a long position of approximately 2 million contracts in treasury futures, and Zhongjingkai Security (ZS) held a short position of similar size. Both companies were highly leveraged, so that a small price change could send either company to bankruptcy. On the afternoon of March 27, 1995, the Chinese Ministry of Finance decided to give a finance discount for treasuries, so that the futures price rapidly increased and WS experienced losses of more than 6 billion CNY, which was five times the WS market value[3]. However, WS manipulated the market and sold huge orders to push the market price down; the last sell market order had a quantity of 7.3 million[4]. This extreme trading behavior forced the Chinese treasuries futures market to close down and delayed the

[1] A position limit is the maximum unilateral position of a certain contract allowed to be held by members/customers. Security exchanges set position limits for two main reasons: (1) to prevent market manipulation by large institutions; and (2) to prevent the risk of a minority investor group holding a large unilateral position that might cause price fluctuations and defaults to spread to the entire market.

[2] Suppose the CSI 300 is at 2000; as the value of one index point is 300 CNY, one speculative account can only conduct trades within the 60 million CNY limit, which is rather low compared to the CSI 300 market capitalization, which is greater than 13,000 billion CNY.

[3] WS did not go bankrupt because profits and losses were only realized when a position was closed.

[4] The value of this order was 146 billion CNY. There was no margin requirement to prevent WS from opening such a huge short position.