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The cooling-off effect of price limits in the Chinese stock markets

Yu-Lei Wan [a,b], Gang-Jin Wang [c,d], Zhi-Qiang Jiang [b,e], Wen-Jie Xie [b,e], Wei-Xing Zhou [a,b,e,*]

[a] Department of Mathematics, East China University of Science and Technology, Shanghai 200237, China
[b] Research Center for Econophysics, East China University of Science and Technology, Shanghai 200237, China
[c] College of Business Administration, Hunan University, Changsha 410082, China
[d] Center of Finance and Investment Management, Hunan University, Changsha 410082, China
[e] Department of Finance, East China University of Science and Technology, Shanghai 200237, China

HIGHLIGHTS

- We investigate the cooling-off effect (opposite to the magnet effect) of Chinese stocks.
- The existence of the cooling-off effect is observed through logit regression.
- The cooling-off effect emerges for both up-limit hits and down-limit hits and is stronger for down-limit hits.
- The difference of the cooling-off effect between bullish period and bearish period is quite modest.

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ABSTRACT

The price limit trading rule is one of the most widely adopted measures on restricting stock price volatilities in some stock markets. It is expected to stabilize the stock markets and enhance the efficiency of the market allocations. The existence of the cooling-off effect or the magnet effect, induced by the price limit trading rule, is the main controversy of this policy. In this paper, we investigate the cooling-off effect (opposite to the magnet effect) from two aspects. Firstly, from the viewpoint of dynamics, we study the existence of the cooling-off effect by following the dynamical evolution of some financial variables over a period of time before the stock price hits its limit. Secondly, from the probability perspective, we investigate, with the logit model, the existence of the cooling-off effect through analyzing the high-frequency data of all A-share common stocks traded on the Shanghai Stock Exchange and the Shenzhen Stock Exchange from 2000 to 2011 and inspecting the trading period from the opening phase prior to the moment that the stock price hits its limits. A comparison is made of the properties between up-limit hits and down-limit hits, and the possible difference will also be compared between bullish and bearish market state by dividing the whole period into three alternating bullish periods and three bearish periods. We find that the cooling-off effect emerges for both up-limit hits and down-limit hits, and the cooling-off effect of the down-limit hits is stronger than that of the up-limit hits. The difference of the cooling-off effect between bullish period and bearish period is quite modest. Moreover, we examine the sub-optimal orders effect, and infer that the professional individual investors and institutional investors play a positive

* Correspondence to: 130 Meilong Road, P.O. Box 114, School of Business, East China University of Science and Technology, Shanghai 200237, China.
E-mail address: wxzhou@ecust.edu.cn (W.-X. Zhou).

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role in the cooling-off effects. All these findings indicate that the price limit trading rule exerts a positive effect on maintaining the stability of the Chinese stock markets.

1. Introduction

The price limit trading rule, as a widely used method in some stock markets, aims to prevent the excessive fluctuations of stock prices. The limit price is usually set as a fixed fluctuated percentage of the previous trading day's closing price. The price limit trading rule is expected to reduce the volatility of the stock prices and have a cooling-off effect on the stock market [1]. However, the rule may cause a magnet effect at the same time, which means that the limit price acts as a magnet to attract more trades to concentrate around the limit. The magnet effect will result in a higher trading intensity and stronger price volatility when the price is close to the limit price [2]. From the behavioral side, the magnet effect occurs when the traders are in fear of the lack of liquidity and the possible position lock caused by imminent price limit hits. In this case, the traders choose to protect themselves by submitting aggressive sub-optimal orders, which usually induces wide price variations and heavy trading volumes.

Previous literature offers controversial empirical evidence on the effectiveness of the price limit trading rule. A large number of papers have been published about the effectiveness of the price limit trading rule [3]. Here, we refer to the most recent papers about it with the aim of providing new evidence about the price limit trading rule. Li et al. examined the effectiveness, cause and impact of price limits by comparing cross-listed stocks on the Chinese stock markets, Hong Kong stock market and New York stock market. They found the price limits have some effectiveness in preventing price discovery; however, the price limit is ineffective in either volatility spillover or trading interference [4]. Similarly, Lu examined the effectiveness of the price limit trading rule by using cross-listed stocks in the Chinese stock markets and Hong Kong stock market and found that the influence of price limits becomes weaker as limit-hitting stocks are traded more actively. They also concluded that excessive trading activities on individual stocks delay the process of price discovery and aggravate the volatility spillover [5]. Zhang et al. investigated the inter-day effects of price limits policies that are employed in agent-based simulations. The trading mechanisms in this market are the same as those in China's stock markets. The results of these simulations demonstrate that both upper and lower price limits can cause a volatility spillover effect and a trading interference effect [6]. Wu et al. provided a detailed analysis of the price dynamics after the hits of up-limit or down-limit. They showed that the expected return is found to be a "W" shape, which reveals high probability of a continuous price limit hit on the following day [7]. Lin et al. investigated whether and how price limits are related to the cross-section of stock return by using the data from the Taiwan Exchange. They showed that the value premium is stronger among stocks with lower limit-hit frequency [8]. Chen et al. focused on the futures price distribution to investigate how to set an appropriate daily margin level in Taiwan. They concluded that the legal margin for single stock futures set at 13.5% by the Taiwan Futures Exchange to prevent default risk appears too broad [9]. Shams et al. studied the existence of the magnet effect on the Tehran stock exchange and also investigated the role of the active investors in the stock market. They found that the role of institutional investors in the magnet effect is more significant than that of non-institutional investors [10]. However, contradictory conclusions are still in existence. Deb et al. provided new evidence on the effectiveness of the price limit trading rule with the data from the Tokyo Stock Exchange over a period of 5 years from January 2001 to December 2005. They concluded that the price limit trading rule works quite efficiently for lower limit hits as there is no evidence of volatility spill-over [11].

2. Descriptions of the Chinese stock markets and Data sources

The Shanghai Stock Exchange and the Shenzhen Stock Exchange are the two stock exchanges in mainland China. There are 1374 A-shares companies listed on the Shanghai Stock Exchange, and 2766 A-shares companies listed on the Shenzhen Stock Exchange by 2017/12/05. The Shanghai Stock Exchange (SHSE) was established on 1990/11/26 and started its operation on 1990/12/19. Shortly afterwards, the Shenzhen Stock Exchange (SZSE) was established on 1990/12/01, and started its operation on 1991/07/03. The range of price limits changed several times on both Shanghai Stock Market and Shenzhen Stock Market. In the case of the Shanghai Stock Exchange, the price limits were $\pm 1\%$ in the initial operation stage, shortly afterwards, the price limits were $\pm 0.5\%$. Between 1992/5/21 and 1996/12/15, the Shanghai Stock Exchange canceled the price limit trading rule. Similar changes have occurred on the Shenzhen Stock Exchange. Since 1996/12/16, the price limits are $\pm 10\%$ for all common stocks and $\pm 5\%$ for specially treated (ST and ST*) stocks traded on both two exchanges.

Our data come from RESSET (http://resset.cn/), which includes all A-share stocks traded on the Shanghai Stock Exchange and the Shenzhen Stock Exchange. The length of time in our sample is a total of 12 years which covers the period from 2000/01/04 to 2011/12/30. The lengths of time on different stocks vary due to different IPO dates on stocks. The quote frequency is about 5s before 2011/6/27 and 3s afterwards.

The Shanghai Stock Exchange Composite (SSEC) Index is a representative measure of the status in Chinese stock markets. In our last paper, we divide the time period from 2000 to 2011 into alternating periods of bullish and bearish states. The