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Short-term market reaction after trading halts in Chinese stock market

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HIGHLIGHTS

- We study the dynamics of several financial measures after the trading halts.
- The dynamics share the same pattern with a sharp peak and a power law relaxation.
- Inter-day halts are most effective, while one-day halts are least effective.
- In case of intraday halts and one-day halts, positive events decay faster.
- Conversely, in case of inter-day halts, negative events decay faster.

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ABSTRACT

In this paper, we study the dynamics of absolute return, trading volume and bid–ask spread after the trading halts using high-frequency data from the Shanghai Stock Exchange. We deal with all three types of trading halts, namely intraday halts, one-day halts and inter-day halts, of 203 stocks in Shanghai Stock Exchange from August 2009 to 2011. We find that absolute return, trading volume, and in case of bid–ask spread around intraday halts share the same pattern with a sharp peak and a power law relaxation after that. While for different types of trading halts, the peaks' height and the relaxation exponents are different. From the perspective of halt reasons or halt durations, the relaxation exponents of absolute return after inter-day halts are larger than those after intraday halts and one-day halts, which implies that inter-day halts are most effective. From the perspective of price trends, the relaxation exponents of excess absolute return and excess volume for positive events are larger than those for negative events in case of intraday halts and one-day halts, implying that positive events are more effective than negative events for intraday halts and one-day halts. In contrast, negative events are more effective than positive events for inter-day halts.

1. Introduction

Financial markets are complex systems characterized by emerging extreme events [1]. It is a meaningful thing to answer the question how financial market dynamics are affected when the system undergoes an extreme event, such as financial crash, interest rate shock, large price change or trading halt. In recent years, statistical physics are applied to understand these financial markets dynamics, which are discovered sharing the feature of power law distributions. Early works were done by Lillo and Mantegna, who focused on relaxation dynamics of aftershocks after a crash. They researched the 1-min logarithm changes of Standard and Poor's 500 index during 100 trading days after the Black Monday and discovered the

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decaying patterns in the rate of aftershocks larger than some threshold, as Omori's law after earthquakes [2,3]. Weber et al. further found after crash period is characterized by the Omori process on all scales [4]. They studied the 1-min return series of three different data sets: S&P 500 index in the 15 000 trading minutes after Black Monday on 19 October 1987; quotes of 100 most frequently traded stocks at NYSE, NASDAQ and AMEX in two months after the crash on 27 October 1997; return series of General Electric stock in three months after 11 September 2001. In addition, the relaxation dynamics of aftershocks after large volatilities rather than large crashes were also investigated and similarly decay as a power law [5,6]. Furthermore, the aftershocks dynamics after US Federal Open Market Committee meetings that will announce interest rate change was described as an analog of the Omori law [7]. It is an example of aftershock dynamics that is clearly due to an external event. Apart from the dynamic of occurrence rate of aftershocks, another related topic is the relaxation dynamics of some financial measures after large price change/large bid–ask spread change. Zawadowski et al. examined high frequency data from NYSE and NASDAQ to conclude that volatility, volume and in case of the NYSE bid–ask spread increase sharply at the large intraday price change and decay according to a power law [8,9]. Ponzi et al. studied the dynamics of the bid–ask spread and the mid-price after a sudden variation of spread, and then found that the spread decays as a power law to its normal value [10]. Moreover, the order flow measures, such as the volume of different types of orders and the volume imbalance, were also discovered to increase before extreme events and decay slowly as a power law [11,12]. These dynamics can also be viewed as a type of switching phenomena in financial markets [13–15]. These researches illustrate the scale-free behavior of trading volume both before and after the end of a trend [13,15]. A significant sudden jump of the volatility and then a power law decay can also be found for both microtrends in the German DAX future time series and macrotrends in the daily closing price time series of all S&P 500 stocks [14]. However, the discovery of Jiang et al. is a bit of different, that is, the volatility dynamics both before and after large fluctuations are symmetric in time scales of minutes, while asymmetric in daily time scales [16]. These analyses reveal that the asymmetry is mainly induced by exogenous shocks, whose precursory and relaxation dynamics in social systems have been studied by Refs. [17–21].

So far researchers have studied the dynamics around financial crash, large price changes or interest rate changes with the technique of statistical analysis in high-resolution data. This paper will study another kind of extreme events commonly occurred in stock markets, namely trading halts, from this point of view. Trading halt is one of microstructure mechanisms in equity market designed to temporarily stop trading during the period of extremely price movement or of the announcement of significant events. Some financial papers [22–32] have studied the effects of trading halts, such as price discovery, liquidity and volatility, from the perspective of information dissemination and transaction cost. While no unified pattern has been discovered and few studies focus on comparing the dynamics around different types of trading halts. Therefore, we attempt to find the unified behavior of different financial measures and to compare the relaxation dynamics around different trading halts.

In this work, we investigate the relaxation dynamics of several financial measures around different types of trading halts in Chinese stock market. This paper is organized as follows. The next section provides data description. Section 3 characterizes the dynamics of cumulative return. Section 4 investigates the relaxation dynamics of absolute return, trading volume and bid–ask spread after trading halts. Section 5 studies the power law behavior after trading halts. Conclusions are provided in Section 6.

2. Data sets

We analyze 1-min high-frequency trading data of 203 stocks traded on Shanghai Stock Exchange (SSE) between August 2009 and August 2011. These stocks are selected based on scale and liquidity and cover a variety of industry sectors. The tickers of these 203 stocks are listed in the Appendix. In this paper, we only consider the trading occurring in the continuous double auction (9:30 to 11:30 AM and 1:00 to 3:00 PM every day). In Shanghai Stock Exchange (SSE), trading halts can be generally divided into 3 types depending on suspension reasons: halts due to abnormal price fluctuations, which last for 1 h and here we call intraday halts; halts due to shareholders' meeting, which last for one day and we call one-day halts; halts due to announcement of significant events, which last for more than one day and we call inter-day halts. A detailed survey about circuit breakers in financial markets pointed out that the firm-specific trading halts could generally be classified into 2 types: order imbalance halts and news related halts [33]. In this paper, the intraday halts are more or less similar with the order imbalance halts considering the fact that abnormal price fluctuations should be associated with order imbalance. However, it is not exact to equal these two types of halts because the order imbalance halts are designed to protect specialists or market makers, while there are no specialists and market makers in Shanghai Stock Exchange. According to the definitions above, inter-day halts can be viewed as news related halts and one-day halts are routine suspensions. With the given sample stocks and periods, we find 1341 trading halts. After removing the cases like successive halts, ST stocks halts, halts lasting for more than one month and data error or missing, there are 640 eligible trading halts left. Table 1 gives the statistics of different types of trading halts, in which stock price shows an upward trend in the length of 240 min before the occurrence of halt is defined as a positive event, conversely is defined as a negative event.[1] We can find that the amount of one-day halts is much larger than that of intraday halts and inter-day halts. Meanwhile, the amount of negative events is more than that of positive events, which indicates that trading halts mostly occurs at the time when the company exist potential negative news.

[1] We chose $\Delta t = 60, 120, 180, 240$ min as the length of time windows to calculate the price trend and do the following analysis, respectively. We found the reaction patterns and the comparative analysis are robust. In this paper, we only display the results for $\Delta t = 240$ min.