

Collective behaviors of market participants during special quote in stock market crashes and jumps

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Abstract

We analyze the quotations of market participants in the framework of a decision making model by Bayesian estimation using the personal information and the observation of the decisions of the other participants as a social information. This model well describe the collective behavior of market participants in the market crashes and jumps during the last decade.

Keyword: Decision making of participants, Bayesian estimation

1 Collective behavior of stock prices

2 Collective behavior of participants

In the earlier paper [1], the author analyzes the multivariate time-series of stock returns of the constituents of the FTSE100 listed on the London Stock Exchange for the period from May 2007 to January 2009 to study precursors to the global market crashes in 2008. He reported that a sharp rise in a measure of the collective behavior of stock prices was observed before the market crash. It was shown to be associated with a series of news including the words "financial crisis." They did not impact stock prices severely alone, but they exacerbated the pessimistic mood that prevailed among stock market participants. Such news increased after the Lehman shock preceding the market crash.

It was followed by the paper studying market-wide price co-movements around crashes by analyzing a dataset of high-frequency stock returns of the constituent issues of Nikkei 225 Index listed on the Tokyo Stock Exchange for the three years during 2007 - 2009[2]. Results of day-to-day principal component analysis of the time series sampled at the 1 min time interval during the continuous auction of the daytime reveal the long range up to a couple of months significant auto-correlation of the maximum eigenvalue of the correlation matrix, which express the intensity of market-wide co-movement of stock prices. They also study the market mode (the first principal component) in the framework of Multi-fractal random walk model, and that a measure of the collective behavior of stock prices grows before almost all large intraday price declines of less than -5%.

The large intraday stock price changes around crashes occurred intermittently, which are mainly created during the opening of trading of the morning and afternoon sessions. If a large imbalance between asked and bid quotation creates at a certain moment transaction is interrupted by the market rule, and the market control the quotation price. The market send down (or up) the quotation price (special quotation price) gradually at a fixed time interval. If the buyer (or seller) accept the special quotation price, transaction resumes. This process is called special offer quote".

In this paper, we study the collective behaviors of market participants during special quote in stock market crashes and jumps with the amplitudes of daily returns lager than 5% during the last decade. We analyze the quotations of market participants in the framework of a decision making model by Bayesian estimation using the personal information and the observation of the decisions of the other participants as a social information. This model well describe the collective behavior of market participants during special quote. We find that the information about the acceptance of the special quotation price by the other participants is more significant than the personal information and the information about the nonacceptance.

References

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