The effect of investment intent on stock market - - an analysis based on cellular automaton

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A typical work in the field of complexity in the stock market is the agent-based model for Artificial Stock Market (ASM). This model can be classified as an adaptive nonlinear network. The modeling method based on interactions among agents by cellular automaton (CA) was suggested first by von Neumann and S.Wolfram. In fact, the agent-based model can become the CA model when some assumptions are made, and its final product is a series of computer programs. CA has appeared as an effective tool for simulating a complex system, and has been used widely.

From the view point of a complex adaptive system, an economy system includes not only physical elements such as the technical experts, all kinds of behaviors, markets, financial companies and factories, but also the psychological factors which is invisible but interact with the physical elements. In fact, the psychological factors impact the macro-economy behavior and introduce the emergency in finance market. Hence, studies into the investors' psychology as a key factor for the emergency of the stock market have become a focus problem in the present research of economics. It has been shown that the stock market could collapse in some cases and can show the GARCH behavior, which does not exist in equilibrium theory, that is, the continue turndown aberrance will appear as continue upswing aberrance ending. However, all those results are obtained by the qualitative analysis for the emergence curve, and there is no quantitative index to describe the characteristics of stock market behaviors.

Some models for herd behaviors have been developed to understand the herd behaviors in financial market. As for the behaviors of Chinese investors in securities, we can point out the usual investment prejudice psychology taken on by them such as determinately loss abhorring, policy depending, imitation. All these investment prejudices interact with each other in the market, hence lead to the excess of investors' behavior and speed up the vibration of security market. In this sense, all the above investment prejudices are the bad investment psychology.

In this paper, we consider mainly the herd behavior as the investment psychology and use the imitation probability to measure this behavior. Based on a cellular automaton model of the stock market proposed by us [1], we introduce some variables reflecting fractal and stability properties to describe complexity in stock market behavior, and investigate the dependence of market behavior complexity on the imitation degree which characterizes the investor's investment intent. The concept of discrete level is put forward to characterize the market stability. The results show that there is an obvious correlation between investor's imitation degree and the complexity of the market behavior.

Reference [1] Y. M. Wei, S. J. Ying, Y. Fan, Bing-Hong Wang, *The cellular automaton model of investment behavior in the stock market*, Physica A **325** (2003) 507-516