

An agent-based order-driven market model with calibration by scaling analysis

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Extended abstract:

As a new approach, other than the mainstream theoretical and empirical ones, agent-based and HAMS model of financial markets are gaining more and more attention. And how precisely a model can fit to real markets is one of the most important issues in financial modeling, especially in agent-based modeling. This paper focus on modeling the continuous double auction stock market, which is similar to Chinese stock market and used by nearly all the exchanges' electronic markets around world. And then we propose one method to calibrate our artificial stock market by scaling analysis.

As there are many characters in the real stock markets, such as fat-tails, clustering, etc. which called stylized facts, the common methods to calibrate an agent-based stock market are testing those stylized facts. However, more complex attributions in the real stock markets are discovered by econo-physicists, as Mantegna & Stanley (1995,1996)'s work show that there are some nonlinear dynamic scale characters in the stock market as

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well as in the nature system. Furthermore, Pasquini & Serva (1999)'s work shows that this scaling character follows multiscale behavior.

Based on these ideas, we built up an agent-based continuous double auction stock market with abundant bounded rationality heterogeneous agents, and test the endogenous evolutionary data from this agent-based market by scaling analysis. Simultaneously, empirical data from real Chinese stock market (Hu-Shen 300 index, China Vanke CO.,LTD and PetroChina CO., LTD) are tested comparatively. The results show that the volatility correlations are power-laws both in the agent-based market and the real stock market. More important is that the power-law exponent is not unique, and all of them following a multiscale behavior which supports the results of Pasquini & Serva (1999). Then we conclude that the scaling character maybe an intrinsic behavior in the stock markets' data, which can reveal more than the traditional statistical results. Also it can be used to calibrate the financial markets' models more precisely.

Keywords: agent-based modeling, order-driven, calibration, power-law, multiscale behavior