Analyse the complexity of the financial time series using artificial market

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Abstruct

In financial time series, as you know, the distribution of the difference of time series do not obey normal distribution. Financial time series have hi-peak fat-tail distribution, and fat-tail has brought unstability to markets. In spite of appearance of hi-peak fat-tail distribution, we have treated financial time series as stochastic processes or deterministic chaos on the assumption of "Central Limit Theorem" and "Efficiency Market Hypothesis." The models which were made on these assumption cannot grasp the characteristics of the real markets. Therefore we must find the seeds of the hi-peak fat-tail distributions.

Then we analysed real financial time series, financial models, and artificial market by using Wavelet Multiresolution Analysis and Kurtosis Distribution. We recognized that there are obvious differences between financial time series and financial models in the behavior of high-frequency area, and the characteristics make time series financial time series.

Therefore, existing time series models cannot grasp the characteristics of financial time series, so those cannot manage market risks.

Then how about an artificial market? In the case of artificial market, according to the structure of agents, we obtain plenty of the component of high-frequency area. We can say that artificial market approachs have enough validity to examine financial time series.

Why does the construction of agents makes high level distribution in high-frequency area? Because the real and artificial market may be "Rugged Market." The real market is made from various orders, and these orders are NOT continuous. Then supply-demand curve is lack of smoothness. Therefore, the slight difference of orders affects the difference of the market prices.

We cannot analyse the characterisity of high level distribution in high-frequency area by using existing financial theory. We propose to use an artificial market to analyse rugged market.