THREE-DIMENSIONAL MODELING OF FINANCIAL ASSETS COURSES

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The modern unified network system of stock exchanges works in real time. In general, the behavior of stock markets is actually a real-time reaction to various forecasted and actual events. A standard reaction to so-called "black swans" can be a sharp change in the rates of financial assets and the collapse of stock markets.

This requires traders who wish to earn income by predicting the dynamics of stock exchange rates to do so in real time as well. Such forecasting is possible only at the expense of bots, which also work in real time mode. Therefore, the search for appropriate mathematical models is actively underway.

In general, any mathematical model of rate dynamics now considers the price of an asset as a function of time. We proposed a new approach - to consider a three-dimensional model where the process takes place in space. In our opinion, this allows us to take into account additional information that affects the decision-making of traders.

In our work, we relied on the ideology, approaches and methods of econophysics. In the modern sense, econophysics is a combination of achievements in natural and technical sciences, mathematics, information technologies, big data analysis for the study of complex systems of various natures that exhibit universal properties.

From this point of view, we paid attention to works [1,2] on electrochemistry regarding the evolution of intercrystalline corrosion of stainless steel. In these works, the authors used 3D models of cellular automata and compared the results of simulations with experimental data. These results were highly concordant.

We used this approach. An additional bonus of works [1,2] for us was that it is impossible to conduct experiments on the stock market. Modeling of dynamics using a cellular automaton is proposed. The basis of this method is the local p-odic solution of the reaction-diffusion fractal system, which determines the set of possible states of cellular automata, as well as the rules of change.

References:

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2. S. Guiso; N. Brijou-Mokrani; J. de Lamare; Dung Di Caprio; B. Gwinner; V. Lorentz; F. Miserque. Inter granular corrosion in evolving media: Experiment and modeling by cellular automata. Corrosion Science. Volume 205, 15 August 2022, https://doi.org/10.1016/j.corsci.2022.110457.