MARKET CRASH FORECASTING BY PERCOLATION METHOD

Gomozov Y.P., Mats V.I.

National Technical University «Kharkiv polytechnical institute», Kharkiv city

In today's global economy, the further, the more urgent the problem of predicting the crash of financial markets becomes. In terms of catastrophe theory, we are talking about bifurcations of a multi-parameter model. And also about the existence of "safe borders".

In terms of physics, we are talking about geometric phase transitions.

In a well-known work [1] of Didier Sornette proposed a methodology for predicting the crash of financial markets. He and his colleagues showed that log-periodic power laws adequately describe speculative "financial bubbles". Sornette also founded a scientific platform for "large-scale testing and quantification of the hypothesis that financial markets exhibit some degree of inefficiency and potential for predictability, especially during bubble regimes" [2].

However, at present, financial markets have a much more complex structure and a greater number of parameters.

Therefore, it seems to us more adequate to model the collapse of the financial market as a geometric phase transition.

Modeling of phase transitions within the framework of the percolation approach is considered in the works of many researchers, in particular [3], [4], [5].

Therefore, it seems to us more adequate to model the collapse of the financial market as a geometric phase transition.

We have considered a mathematical model of percolation clustering of major stock indices.

Percolation threshold separates two phases global financial market: in one phase there are "finite clusters", in the other phase there is one "infinite cluster".

The subject of our further research is the definition of a critical indicator, its mathematical model and computer implementation of this model.

References (translated):

1. Didier Sornette, Why Stock Markets Crash, Princeton University Press https://emeritus.er.ethz.ch/financial-crisis-observatory.html

2. Jimenez-Dalmaroni, Andrea. Directed percolation with incubation times / Andrea Jimenez-Dalmaroni И Phys. Rev. E. 2006. − Vol. 74.−№ 1.−P. 011123/1-011123/16

3. Ul.Sinha, Santanu. Directed spiral percolation hull on the square and triangular lattices / Santanu Sinha, S. B. Santra II Int. J. Mod. Phys. C. 2005. − Vol. 16.−№8.−P. 1251-1268.

4. Perlsman, E. Method to estimate critical exponents using numerical studies / E. Perlsman, S. Havlin II Europhys. Lett. 2002. − Vol. 58.−№ 2. − P. 176181.