MATHEMATICAL MODELS OF RISK IN FINANCIAL MARKET

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The study of financial risks has always been a necessary task, both for financial theories and for the practices of financial traders.

There are now a large number of different models for assessing financial risks. In modern conditions, modeling such estimates in the case of short investment horizons is very relevant.

However, almost all such models were built on the basis of some phenomenological approaches of an economic and psychological nature.

We conducted a study of hypotheses and assumptions on the basis of which this or that mathematical model was built.

Classic models are based on the hypothesis about the probabilistic nature of the stock market. Practice has shown that various models based on this hypothesis have not worked for a long time, although they are still used by many financial analysts. This is largely due to changes in the very structure of the global stock market.

More modern models are based on the hypothesis about the fractal nature of the stock market. This hypothesis uses information approaches and methods of analyzing fractal series.

It should be noted that we noted cases when some of the time series of stock prices of one type had a classical character, others had a fractal character, and one of the series was not identified from this point of view.

In principle, all mathematical models previously used classical analysis over the field of real numbers. When analyzing time series, we used the hypothesis that the processes under study are Markov processes. This same hypothesis actually underlies classical technical analysis.

In addition, there are software products for financial traders that use models based on cognitive psychology.

Nowadays, works on portfolio investment often appear that use models from the theory of dynamical systems, fractional derivative equations, p-adic analysis, etc. (for example, articles [1-3]).

Based on the above analysis, we used the approaches and methods of econophysics. As a result, a model was constructed in the form of a parametric family of equations in fractional derivatives using p-adic analysis. This family of equations, with adequate selection of parameters, allows for the numerical calculation of systematic financial risks.

References:

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