

HYPOTHESES OF THE STATISTICAL TOOLKIT OF STOCK MARKET TECHNICAL ANALYSIS

Khadartsev Oleksandr

PhD, Associate Professor

National University «Yuri Kondratyuk Poltava Polytechnic»

Khadartsev Kostiantyn

complete secondary education student

Lyceum No33 of the Poltava City Council

Poltava, Ukraine

alexkhadarcev@ukr.net

Introductions. In the modern economic environment, exchanges and exchange-type trading platforms are characterized by the presence of practically all the principles of a free competitive market and transparent trading (none of the participants is able to influence the market situation), and the dynamics of the exchange market (especially financial instruments) is a barometer of the state of the economic environment. Technical analysis (TA) has long been used in such markets when making current decisions and has proven its significance, which is why there is a great scientific and practical interest of specialists and scientists in it. Thus, undiscovered opportunities and potential for the application of exchange technical analysis in other (except market) sectors of activity are seen.

Aim. To substantiate the scientific and methodological principles of alternative application of statistical tools of exchange technical analysis.

Materials and methods. The following methods of cognition were used, such as scientific abstraction, comparison and analogies, analysis and synthesis, mathematical statistics, formalization.

Results and discussion. Statistical tools of stock technical analysis are usually built either on the basis of various variations of average values (smoothing with their help), or as statistical oscillators. This will be justified if the studied phenomenon is

homogeneous, and the task is to obtain characteristics of potential quantitative changes in the development of the phenomenon, but not qualitative ones. Then the generalizing characteristic of the population by a certain statistical indicator is fair. From the standpoint of the theory of statistics, average values are essential for the study and analysis of mass economic and social phenomena, since they allow to take into account the variability of the population, and therefore to obtain quantitative characteristics that are most inherent in this population.

Thus, price fluctuations occur almost every moment and in different directions, which reflect specialized sources of information. For example, in the MetaTrader 5 program this is visible through the «Market Overview» module, or through the use of graphic display in Japanese candlesticks. Each candle is equal to a timeframe and contains information within this time interval, respectively 1 «monthly» candle = 30 «daily» = 4 «weekly» = 720 «hourly». Accordingly, statistical methods are an adequate tool for analyzing such a set, including analysis by average values. This also allows solving methodological problems of the quality of measuring big data, the limited scope of their application and the complexity of integrating information from sources of different origin [1, p. 79], through the use of smoothing (exponential or other types). Thus, the variation of the set is formed under the influence of the main factors (the nature of the phenomenon) and secondary (random), and therefore the deviation of individual values of the set from the typical does not affect the average value, so these principles are embedded in RSI and Stoch.

The smoothing of the dynamic series is carried out through moving averages, which suppress random deviations and form a new dynamic series, which is already typical and regular. A time series is the starting point for forecasting by projecting fixed past values into the future, or by integrating other time series [2], while the forecasting model includes:

- 1) time series, the values of which are forecasted;
- 2) forecast using information at a point in time;
- 3) forecasting error.

Thus, TA tools adjust for the appropriate type of error, which becomes a signal

of divergence, i.e., potential changes, and the essence of TA tools is to adjust the temporal dynamic heterogeneity to obtain an adequate forecast of price fluctuations.

Market price fluctuations are a discrete random variable. Scientists note that a random variable, as a function, describes the quantitative result of random events in a sample space [3, pp. 128-129]. At the same time, the distribution of most real phenomena and processes has an implicit regularity, and the theoretical distribution reflects an established, smooth regularity. For a generalized characteristic of a set of random variables, statistical averages are used: mathematical expectation, mode, median, standard deviation, variance, variation. Again, the methodology for implementing TA and making decisions reflects the analysis of variance, where for each discrete or continuous random variable, divided into several fixed intervals or levels, the total variance is equal to the sum of the variances caused by the action of each of the factors separately. In particular, the coincidence of estimates / forecasts of instruments (indicators) by timeframes enhances their significance, since the lower-level timeframes are integrated into the higher-level timeframes. Accordingly, high volatility over an ultra-short time interval is an insignificant correction on a daily scale, and indicates the contribution of subintervals to the overall price movement.

Market price fluctuations are mainly subject to a normal distribution, which makes the use of statistical tools (indicators) TA relevant in general. A statistical distribution is a list of observed options, their corresponding frequencies (relative frequencies) and can take on different forms, but it is for the normal distribution that oscillation occurs more or less symmetrically, and the average values (in general) most adequately characterize the population [4, pp. 27-52]. Here, too, there is a relationship with large numbers, since according to the central limit theorem, the normal distribution is a manifestation of a large number of independent random variables, which in turn are comparable in their impact on the total variance. The form of manifestation of this theorem can be different, which generates errors and deviations. It is also obvious that the BB tool is a reflection of the normal distribution, since it implements the action of the «68-95-99.7 rule», that is, if the random variable X is normally distributed, then its values are in the range around the mean with a width of

two, four and six standard deviations, respectively.

Conclusions. The results of the research have proven that the scientific and methodological basis of statistical tools of technical analysis relevantly reflects quantitative phenomena and processes (variability and dynamics) of the stock market, so it can be effectively tested in other sectors of activity. Therefore, the application of statistical tools for other sectors of activity is quite justified.

References

1. Zahal'na teoriya statystyky: pidruchnyk [The General Theory of Statistics: textbook]. Za red. A.V. Neprana, I.A. Dmytriyeva. Kharkiv: PP Ivanchenka, 2022. 720 p. (in Ukrainian).

2. Kushnir O.K., Chaplins'kyi V.R. Statystychni metody analizu velykykh danykh [Statistical Methods of Big Data Analysis]. Modern Economics. 2023. №39. Pp. 75-81. DOI: 10.31521/modecon.V39-11. (in Ukrainian).

3. Osnovy statystychnoho modelyuvannya: navch. Posibnyk [Fundamentals of Statistical Modeling: tutorial]. Za zah. red. S.V. Chuhayevs'koyi, N.V. Kovtun. Zhytomyr: vyd-vo PP «Ruta», 2022. 604 p. (in Ukrainian).

4. Payanok T.M., Zadorozhnyia T.M. Statystychnyy analiz danykh: navchal'nyy posibnyk [Statistical Data Analysis: tutorial]. Irpin': Universytet DFSU, 2020. 312 p. (in Ukrainian).