UDC 519.2

FEATURES OF THE APPLICATION OF THE LAW OF LARGE NUMBERS IN THE ECONOMY

Taisia Havrylenko, Yeva Kandaurova
National Aviation University, Kyiv

Supervisor - Victoria Trofymenko, Ph.D, associate professor

Keywords: law of large numbers, economics, forecasting, regularity.

The law of large numbers is one of the fundamental mathematical provisions, which is widely used in various fields of science and life. This law plays a key role in helping us analyze data, make predictions and make informed decisions. The essence of the law is that regardless of the fact that each of the independent random variables Xi can get a value far from the mathematical expectation M (Xi), the arithmetic mean of a sufficiently large number of random variables is very likely close to the arithmetic mean of their mathematical expectations.

Therefore, this law has important practical significance. In economics, it is used to predict the average outcome of a large number of random events, such as changes in commodity prices or fluctuations in the stock market [1].

This work considers a number of economic problems that are solved using the law of large numbers. Consider one such problem: the sum of all deposits in the bank is \$2,000, and the probability that a randomly taken deposit does not exceed \$100 is 0.8. What can be said about the number of depositors of this bank?

The solution. Let X - the value of a randomly selected deposit, N - the total number of depositors. From the problem statement, we have M(X) = $\frac{2000}{\mathrm{N}}$.

Since the probability (X < 100) = 0.8, and by Markov's inequality $\rho(\mathrm{X} < \varepsilon) \geq 1 - \frac{\mathrm{M(X)}}{\varepsilon}$, then $0{,}8 \geq 1 - \frac{2000}{100\mathrm{N}}$. Hence $\frac{2000}{100\mathrm{N}} \geq 0{,}2$. Therefore N ≤ 100.

An example of the practical application of the law of large numbers is also the development and implementation of statistical modeling methods (for example, the Monte Carlo method), forecasting, which are widely used in economics and technology.

In this case, we make objective conclusions about the life parameters of the system at the project stage. Thus, the law of large numbers tells how and when randomness in mass phenomena turns into regularity [2, 3].

Conclusion

The law of large numbers has, as it were, two interpretations. One is mathematical, related to specific mathematical models, and the second is more general, which goes beyond these frameworks.

The second interpretation is related to the phenomenon of formation, which is often observed in practice, in one or another degree of directed action against the background of a large number of hidden or visible active factors, which outwardly do not have such continuity. There are many examples related to the second interpretation, if you turn to the economy (the phenomenon of pricing in the free market), the social sphere (the formation of public opinion on one or another issue), etc.

References:

1. Y. Koshevnik. Probability and statistics for management and economics. Cognella, ITP (10th edition). 2015. 207 p.

2. Kuybida M. State regulation of socio-economic development of regions / M. Kuybida, K. Chernitsyna. [Electronic resource] – Access mode: http://www.lvivacademy.com

3. D. Forsyth. Probability and statistics for computer Science. Springer International Publishing. 2018. 367 p.