Monte Carlo method for pricing complex financial derivatives: an innovative approach to the control of convergence

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Abstract

The global financial crisis of 2007-2008 has highlighted the importance of a correct pricing of the so-called financial derivatives. Analyzing the methodology of pricing of non-listed derivatives by using the Monte Carlo method, the Authors have realized that the determination of the sample size is not managed properly. This is because the research offices of banks rely on, as suggested by the literature of the field and technical manuals for practitioners, a standard number of simulation runs, by rules of thumb, between 1,000 and 10,000. The consequence is that financial institutions lead to financial statements fair values with no knowledge of its fluctuation band and the robustness of the result. Conscious of this practice, the Authors, dealing from a long time to the topic of output reliability in applications of discrete event simulation and Monte Carlo simulation, address the problem through the use of a methodology based on the control of Mean Pure Square Error (MSPE), already successfully tested in other contexts. Thanks to the proposed approach, applied for pricing complex derivatives, it is possible to determine the size of the experimental sample in order to ensure a pre-assigned degree of reliability of the output results.

Key words: Complex derivatives, Pricing, Monte Carlo simulation, Experimental error, Mean Square Pure Error

REFERENCES