Meixner Processes in Finance*

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Abstract

In the Black-Scholes option price model Brownian motion and the underlying Normal distribution play a fundamental role. Empirical evidence however shows that the normal distribution is a very poor model to fit real-life data. In order to achieve a better fit we replace the Brownian motion by a special Lévy process: the Meixner process. We show that the underlying Meixner distribution allows an almost perfect fit to the data by performing a number of statistical tests. We discuss properties of the driving Meixner process. Next, we give a valuation formula for derivative securities, state the analogue of the Black-Scholes differential equation, and compare the obtained prices with the classical Black-Scholes prices. Throughout the text the method is illustrated by the modeling of the Nikkei-225 Index. Similar analysis for other indices are given in the appendix.

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