# Monte Carlo Simulations of the multivariate distributions with different marginals*

Mária Bohdalová
*Comenius University, Faculty of Management, Department of Information Systems*
*e-mail: maria.bohdalova@fm.uniba.sk*

Ľudomír Šlahor
*Comenius University, Faculty of Management, Department of Finance and Economics*
*e-mail: ludomir.slahor@fm.uniba.sk*

**Abstract**

In this paper, we will describe Monte Carlo simulations of the multivariate distributions with different marginals. This approach demands the joint distribution to be known (marginals models can be fitted using different distributional specifications, including nonnormal distributions) and it uses copula theory as a fundamental tool in modeling multivariate distribution. The copula theory allows the definition of the joint distribution through the marginal distributions and the dependence between the variables. It is obvious, that the accuracy of the forecasts of the behavior of the risk factors depends on the sources of error. Usually, the residuals follow normal distribution. However, it has been observed that the Gaussian models do not fit very well the real-life data, e. g. do not allow so called fat tails and asymmetry of observed log returns. Fat tail is a property of some probability distributions (alternatively referred to as heavy tail distributions) exhibiting extremely large kurtosis. In this paper, we propose a multivariate simulation using models that have different error distribution.

*This research was supported by Science and Technology Assistance Agency under contracts No. VEGA-1/3014/06, APVV-1/4024/07 and VEGA-0375-06