A Quantitative Metric to Validate Risk Models

William Rearden and Chih-Kai Chang

Presented at the:
2013 Enterprise Risk Management Symposium
April 22-24, 2013

Abstract

The paper applies a back-testing validation methodology of economic scenario generating models and introduces a new D-statistic to evaluate the robustness of the underlying model during a specified validation period. The statistic presented here can be used to identify the optimal model by repeating calibrations with changing initial parameters. It can compare between calibration methods, be used to rank between models, and provide a single concise reporting metric for on-going model monitoring. To illustrate this methodology and ranking between models, the closed form bond pricing solutions of the CIR 1- and 2-factor models are used. CIR model parameters were estimated using Matlab's built-in least squares minimization routine. At each observation date during the validation period, a time-weighted point estimate of the error between the model and actual market term structure is calculated. Finally, the maximum of these time-weighted points across the validation duration is introduced as the D-statistic. The robustness of the D-statistic is improved by implementing a first-order auto-regressive sampling bootstrapping algorithm, which generates an empirical distribution for calculating the standard error of the D-statistic.