Calibration of the time-dependent mean reversion parameter in the Hull-White model using neural networks
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Abstract

Interest rate models are widely used for simulations of interest rate movements and pricing of interest rate derivatives. In order to calibrate their parameters, several strategies and methods have been proposed. We focus on the Hull-White model, for which we develop a technique for calibrating the speed of mean reversion. This parameter is treated by most existing methods as a constant. We examine the theoretical time-dependent version of mean reversion function and propose a neural network approach to perform the calibration based solely on historical interest rate data. Our results are compared with those obtained by the most widely used methods, linear regression and generic global optimizer. The experiments indicate the suitability of depth-wise convolution over long-short memory modules and prove the advantages of our approach over the existing procedures. We manage to use the knowledge acquired from one market to another, while studying the effects of different subsets of maturities. The proposed models produce mean reversion values that are comparable to rolling-window linear regression’s results, allowing for greater flexibility while being less sensitive to turbulent markets.