

Parameter Estimation and Bias Correction for Diffusion Processes

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ABSTRACT

This paper considers parameter estimation for continuous-time diffusion processes which are commonly used to model dynamics of financial securities including interest rates. To understand why the drift parameters are more difficult to estimate than the diffusion parameter as observed in many empirical studies, we develop expansions for the bias and variance of parameter estimators for two mostly employed interest rate processes. A parametric bootstrap procedure is proposed to correct bias in parameter estimation of general diffusion processes. Simulation studies confirm the theoretical findings and show that the bootstrap proposal can effectively reduce both the bias and the mean square error of parameter estimates for both univariate and multivariate processes. The advantages of using more accurate parameter estimators when calculating various option prices in finance are demonstrated by an empirical study on a Fed fund rate data.

Key Words: Bias correction, Bootstrap, Continuous-time models, Diffusion Processes, Jackknife, Parameter estimation.