

## Analysis of Financial Time Series by Using Ornstein-Uhlenbeck Type Models

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**Abstract :** In the present work, we develop a technique for estimating the volatility of financial time series by using stochastic differential equation. Taking the daily closing prices from developed and emergent stock markets as the basis, we argue that the incorporation of stochastic volatility into the time-varying parameter estimation significantly improves the forecasting performance via Maximum Likelihood Estimation. While using the technique, we see the long-memory behavior of data sets and one-step-ahead-predicted log-volatility with  $\pm 2$  standard errors despite the variation of the observed noise from a Normal mixture distribution, because the financial data studied is not fully Gaussian. Also, the Ornstein-Uhlenbeck process followed in this work simulates well the financial time series, which aligns our estimation algorithm with large data sets due to the fact that this algorithm has good convergence properties.

**Keywords :** financial time series, maximum likelihood estimation, Ornstein-Uhlenbeck type models, stochastic volatility model

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