Abstract

I shall start by describing the Black-Scholes model for stock price process to introduce volatility. I shall then outline the use of volatility in three practical applications: option pricing, portfolio selection and risk management. After describing some methods like GARCH, SV, implied vol of estimating volatility in various contexts (depending on the availability of data and application), I shall introduce the realized variance estimator in the context of high frequency data. However in the presence of microstructure noise, realized variance diverges to infinity. I shall describe some methods to handle this problem including an FDA approach. I shall then introduce the concept of jumps in asset prices and show some real data example on how the FDA approach can be used to detect days on which the asset price has jumps.