

Kolmogorov-Smirnov type Tests for Local Gaussianity in High-Frequency Data

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Abstract

We derive a nonparametric test for the class of Itô semimartingales with non-vanishing diffusion component using high-frequency record of the process on an interval with fixed span. The test is based on the fact that the leading component of the high-frequency increments of Itô semimartingales with non-vanishing diffusion component is a normally distributed random variable with unknown stochastic variance that is proportional to the length of the high-frequency interval. We form a nonparametric estimate of the local variance and scale the high-frequency increments by it. To remove the effect of “big” jumps, we further discard the high-frequency increments exceeding a time-varying threshold determined by our estimate of the local variance. Our test is then based on comparing the distance between the empirical cdf of the rescaled high-frequency increments not exceeding the threshold and the cdf of a standard normal random variable. We show that the test has a good power against Itô semimartingales with no diffusion component as well as Itô semimartingales contaminated with noise.

Keywords: High-frequency data, Itô semimartingale, jumps, Kolmogorov-Smirnov test, stable process, stochastic volatility