

A non-parametric calibration of the HJM geometry: an application of Itô calculus to financial statistics

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Abstract. We show that the geometry of the Heath–Jarrow–Morton interest rates market dynamics can be non-parametrically calibrated by the observation of a single trajectory of the market evolution. Then the hypoellipticity of the infinitesimal generator can be exactly measured. On a data set of actual interest rates we show the prevalence of the hypoelliptic effect together with a sharp change of regime. Volatilities are computed by applying the Fourier cross-volatility estimation methodology.

Keywords and phrases: non-parametric estimation, stochastic volatility, Fourier analysis, high frequency data, HJM equation, hypoellipticity, Lie brackets, finite dimensional realizations

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