Properties of Stationary Solutions of the SDE \(dV_t = V_t - dU_t + dL_t\)

Tuesday, October 5, 2010
A405 Wells Hall
10:20 a.m. - 11:10 a.m.
Refreshments: 10:00 a.m.

Abstract

The generalized Ornstein-Uhlenbeck process driven by a bivariate Lévy process \((\xi_t, \eta_t)_{t \geq 0}\) with starting random variable \(V_0\) (usually assumed independent of \((\xi_t, \eta_t)_{t \geq 0}\)) is defined as
\[V_t = e^{-\xi_t} \left( V_0 + \int_0^t e^{\xi_s - d\eta_s} \right), \quad t \geq 0.\] It is the unique solution of the stochastic differential equation
\[dV_t = V_t - dU_t + dL_t, \quad t \geq 0\]
where \((U_t, L_t)_{t \geq 0}\) is again a bivariate Lévy process, completely determined by \((\xi_t, \eta_t)_{t \geq 0}\). In particular it holds \(\xi_t = -\log(\mathcal{E}(U)_\square), \quad \square \geq t\), with \(\mathcal{E}(U)\) denoting the Doléans-Dade Exponential of \(U\), which forces the process \(U\) to have no jumps which are smaller or equal to \(-1\).

In this talk the solution of the given SDE for a general bivariate Lévy process \((U_t, L_t)_{t \geq 0}\) is treated. Hereby we also allow dependance of the starting random variable on \((U_t, L_t)_{t \geq 0}\). We determine necessary and sufficient conditions for the existence of strictly stationary solutions and develop some of their distributional properties like expectation, autocorrelation and tail behaviour.

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