Logarithmic Derivatives of Densities for Jump Processes
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Logarithmic derivatives of density functions are equivalent to the Greeks computations for asset price dynamics models in mathematical finance. The Malliavin calculus is a powerful tool in the sensitivity analysis, and the obtained formulae are effective in the Monte Carlo simulations.

In this talk, we consider a jump process determined by a stochastic differential equation including the drift, the diffusion, and the jump terms. It is well known that there exists a smooth density for the process with respect to the Lebesgue measure under the Hormander type condition on the coefficients, via the Malliavin calculus. The main goal is to derive the explicit representations of the logarithmic derivatives of the density with respect to the initial point, and some other parameters governing the equation. The obtained formulae reflect the effects, not only from the diffusion terms, but also from the jump terms. Our approach is based upon the martingale method via the Clark-Ocone type formula.

References