Quanto Options and Mixture Exponential Jump-Diffusions [1]

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Abstract

A foreign equity option (or quanto option) is a derivatives security whose value depends on an exchange rate and a foreign equity. In this paper, valuation of quanto options are studied when the foreign equity prices and the exchange rates follow a double exponential jump diffusion (DEJD). In particular, the two underlying assets are allowed to have common jumps and dependent jump sizes, where the jump sizes are modelled via the multivariate copula of Marshall and Olkin (1967). Under such a dependence structure, analytical pricing formulas are obtained for various types of quanto options. When the exchange rate and foreign asset evovle as DEJD, it is shown that the domestic equivalent asset follows a mixture exponential jump diffusion (MEJD). Laplace transforms of various forms under MEJD are derived and the corresponding Laplace inversions are calculated. The proposed apporach is applied to options on multi-assets such as the quanto options and path-dependent options under MEJD. This paper demonstrates the usefulness of copula to pricing multi-assets exotic options, where estimating multivariate dependence is of crucial importance.

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