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Examples for applying Lévy processes to financial problems

Abstract

We consider the application of Lévy processes to some real life problems. This includes some new ideas as well as applying existing ideas to certain financial problems. We first consider a problem from asset allocation. In particular, we want to optimize a basket of indices to which a CPPI algorithm is applied. Since we model the joint density as a generalized hyperbolic one - as historic returns suggest - we need methods to estimate the parameters from market data, as well as calculate risk measures and simulate from such distributions. As a special case we consider the NIG distribution. Then, we consider exotic options, such as cliquet options on a single index. We derive formulae allowing for calibrating to the forward smile and show how to compute hedge sensitivities for exotic options using Monte Carlo methods.