The Valuation of Catastrophe Equity Puts in Jump Risks

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Most prior studies assume that the loss claim arrival process follows Poisson process when pricing the catastrophe insurance products. However, for catastrophic events, the assumption that resulting claims occur in terms of the Poisson process is inadequate as it has constant intensity. To overcome this shortcoming, alternative models are proposed to address the stochastic intensity of catastrophic events. In this paper, we propose Marked Point process, Markov modulated Poisson process, and doubly stochastic Poisson process to model the arrival process for catastrophic events. Next, we propose a generalization of Radon-Nikodym processes that a changing measure corresponds to a change of drift for the underlying Brownian motion and a change of the stochastic intensity for the jump risk component. To evaluate the price of catastrophe equity put options, we use the Merton measure to derive pricing formulae and dynamic hedging for Catastrophe equity put options.

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