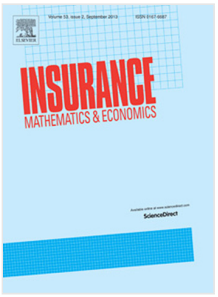

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A Factor Model for Joint Default Probabilities. Pricing of CDS, Index Swaps and Index Tranches

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Abstract

A factor model is proposed for the valuation of credit default swaps, credit indices and CDO contracts. The model of default is based on the first-passage distribution of a Brownian motion time modified by a continuous time-change. Various model specifications fall under this general approach based on defining the credit-quality process as an innovative time-change of a standard Brownian motion where the volatility process is mean reverting Lévy driven OU type process. Our models are bottom-up and can account for sudden moves in the level of CDS spreads representing the so-called credit gap risk. We develop FFT computational tools for calculating the distribution of losses and we show how to apply them to several specifications of the time-changed Brownian motion. Our line of modelling is flexible enough to facilitate the derivation of analytical formulae for conditional probabilities of default and prices of credit derivatives.

Keywords: time-change, mean-reverting process with jumps, CDS pricing, credit index pricing, tranche pricing

JEL: G12, C51, C63

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