A VALUATION OF QUANTO CONSTANT MATURITY SWAP PRODUCTS UNDER THE THREE-FACTOR BGM MODEL

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ABSTRACT
Quanto constant maturity swaps (Quanto CMS) products can be used to manage the spread risk of foreign interest rate swap. Monte Carlo simulation is usually used to evaluate Quanto CMS products, but it’s often time consuming to use Monte Carlo simulation method. In this paper we derive an approximated dynamic process of the foreign forward swap rate under the three-factor BGM model with the characteristic which the foreign forward swap rate is approximated to the linear combination of the foreign forward LIBOR rate. We use no-arbitrage analytical formula to evaluate Quanto CMS products under the three-factor BGM model. Then we apply this approximated formula to evaluate Quanto CMS Spread option and Quanto CMS Ratchet option. The numerical analysis shows that the relative errors between the Monte Carlo simulations and the approximated analytic formulas are very small for the both examined option products. Moreover, the calculation time of the analytic formulas method is much smaller than the Monte Carlo simulation method for both products.

Key words and phrases: Quanto CMS, Quanto CMS Spread option, Quanto CMS ratchet option, three-factor BGM model, Monte Carlo simulation.
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