

Counterparty Credit Risk and Interest Rate Derivatives Pricing

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Abstract:

This thesis deals with the pricing of OTC financial derivatives including the counterparty credit risk (CCR). It focuses on the interest rate derivatives for which the interest rate must be modeled as random. This is where they differ from the pricing of other derivatives. The credit valuation adjustment (CVA) concept is used to calculate CCR which is in line with current banking regulation Basel III. When we assume the independence of the underlying asset and the credit quality of the counterparty, we obtain an analytical expression of CVA. However, if the independence is violated, the CVA calculation becomes quite complicated. Specifically, the CVA of the interest rate swap (IRS) is calculated mainly using the simulation approach which is time and computationally consuming. Therefore, we bring two new methods for IRS CVA calculation where the CVA is expressed in a semi-analytical form. These methods use copula functions, particularly the Gaussian copula and the upper Fréchet bound, and we compare them numerically with a complex simulation study. Furthermore, we propose a method of calibration of the correlation coefficient and we determine the impact of changes in the intensity of default on the final CVA with four different parametric models for the Gaussian copula approach.

Keywords:

Interest Rate Derivatives, Counterparty Credit Risk, Credit Valuation Adjustment, Wrong-Way Risk