

# MEASURING AND OPTIMIZING PORTFOLIO CREDIT RISK: A COPULA-BASED APPROACH

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## Abstract

The aim of this paper is to present a methodology in order to measure and optimize portfolio credit risk. A Monte Carlo simulation is used to build the portfolio loss distribution. The times until default of the obligors in the portfolio are simulated following a copula approach. We assume that the default dependence structure is driven by a Student's t-copula. Different portfolio risk measures are been estimated. Moreover, the portfolio risk profile has been optimized. When we are dealing with credit risk, the portfolio asset returns are far from be normally distributed. In this context, the traditional mean-variance approach can lead to inaccurate results. Therefore, portfolio risk is optimized by minimizing a new risk measure, the Conditional VaR by a linear programming technique. In this work we apply the copula approach to measure credit risk of a portfolio of ten different obligors. We also see how the portfolio risk can be substantially reduced maintaining the same expected return, by modifying the portfolio structure using credit default swaps.

**Keywords:** Conditional Value-at-Risk, Copula functions, Credit Default Swap, Hazard Rate, Monte Carlo Simulation, Student's t-copula, Time until default.

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