

Merton's Option Pricing Model and Credit Risk Portfolio Analysis: Monte Carlo Simulation

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The estimation of risk of large portfolios of credit risky securities is the problem that can be studied using Monte Carlo methods. The main difficulties such as interest rates and FX rates are include the large number of risk factors with statistical dependencies between probabilities of default. There are several variance reduction techniques (importance sampling, stratifies sampling) that are applicable to many practical problems in finance, in particular, in pricing of sophisticated securities. One critical difficulty in implementing Merton's (1974) credit risk model is that the underlying asset value cannot be directly observed. The model requires the unobserved asset value and the unknown volatility parameter as inputs. The maximum likelihood estimator for the mean and volatility parameters, asset value, credit spread and default probability are derived for Merton's model. A Monte Carlo study-2 (*first version was presented in Karlsruhe TH-June 2005*) is conducted to examine the performance of this maximum likelihood method. An application to real data is also presented. The quality of the approximations is inspected by comparing them with barrier prices obtained by solving the corresponding pricing that conclude quality of approximations supports of main claim.

Keywords: Credit risk, Credit Derivative, option pricing, Merton's, Monte Carlo simulation-2.

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