Fast Simulations in Credit Risk

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Abstract
We consider the problem of simulating tail loss probabilities and conditional expectations (the portfolio loss distribution) for credit portfolios under the normal copula framework. We face this problem when quantifying standard risk measures, Value-at-Risk (VaR) and expected shortfall (ES). We use Importance Sampling (IS) and inner replications using geometric shortcut as the variance reduction techniques. Previous studies in the normal copula setting use both outer IS on common factors affecting all the obligors and inner IS on the resultant conditional default probabilities. This paper replaces inner IS with inner replications realized by a geometric shortcut and combines it with outer IS. Numerical results show that our method is extremely efficient in accessing tail loss probabilities and conditional expectations at multiple points in a single simulation run.

Key words: Monte Carlo simulation; credit risk; geometric shortcut; VaR; expected shortfall; variance reduction