Sensitivity Calculations for STCDOs under the Student t Model with Random Recovery

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A synthetic collateralized debt obligation, or synthetic CDO, is a transaction that transfers the credit risk on a reference portfolio of assets. The reference portfolio in a synthetic CDO is made up of credit default swaps. Much of the risk transfer that occurs in the credit derivatives market is in the form of synthetic CDOs. The calculation of loss distributions of the portfolio of reference instruments over different time horizons is the central problem of pricing synthetic CDOs.

While the Gaussian copula model, introduced to the credit field by Li (2000) has become an industry standard, its theoretical foundations, such as credit spread dynamics may be questioned. Various authors have also considered tail dependence amongst default times or default events. This would lead to fat tails in the credit loss distributions.

In this paper dependence between default times is modeled through Student $t$ copulas. We use a factor approach leading to semi-analytic pricing expressions that ease model risk assessment. It is assumed that defaults of different titles in the credit portfolio are independent conditional on a common market factor. We present an extension to the student $t$ factor model in which the loss amounts—or equivalently, the recovery rates—associated with defaults are random. We detail the model properties and compare the semi-analytic pricing approach with large portfolio approximation techniques.

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