Multi-Stage Model for Correlated Defaults

Cheng-Der Fuh

Graduate Institute of Statistics, National Central University

Abstract

Correlated defaults for multiple firms are complicated phenomenon in finance, however existing models are either simplified that contain little information, or complex that lose mathematical tractability. In this paper, we propose a structural form default model for multiple firms that preserves the rich information in structural form model, remains mathematical tractability, and captures empirical observed phenomenon. The model is divided into stages that, when any firm defaults, the model evolves into the next stage, where the firms would encounter a new set of default thresholds. By such, we are able to capture 'contagion' and other correlated default effects. This stage setting also provides us the mathematical tractability in the sense that, with the help of renewal theorem, we can provide asymptotic approximation for the joint probability of default times, which is critical for risk management. The results could be further applied for n-th to default swap pricing. Numerical results are also given for illustration.

Joint work with Chu-Lan Michael Kao.