

The Valuation and Risk Measure of CDO-Squared under Conditional Independence

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Abstract

In this paper we address the pricing issues of CDO of CDOs. Underlying the conditional independence assumption we use the factor copula approach to characterize the correlation of defaults events. We provide an efficient recursive algorithm that constructs the loss distribution. Our algorithm accounts for the number of defaults, the location of defaults among inner CDOs, and in addition the degree of overlapping between inner CDOs. Our algorithm is a natural extension of the probability bucketing method of Hull and White (2004). We analyze the sensitivity of different parameters on the tranche spreads of a CDO-squared, and in order to characterize the risk-reward profiles of CDO-squared tranches, we introduce appropriate risk measures that quantify the degree of overlapping among the inner CDOs.

Hull and White (2004) presents a recursive scheme known as probability bucketing approach to construct conditional loss distribution of CDO. However, this approach is insufficient to capture the complexities of CDO².

In the case of the modeling of CDO, we are concerned for the probabilities of different number of defaults upon a time horizon t , e.g., the probabilities of 3 defaults happened within a year. With the mentioned probabilities, we can then calculate the expected loss within the time horizon, which enables us to figure out the spreads of CDO.

However, in the modeling of CDO², an appropriate valuation should be able to overcome two more difficulties: (1) the overlapping structure of the underlying CDOs, and (2) the location where defaults happened, in order to get the fair spreads of CDO².