Credit correlations and CVA

Présentation :

The importance of credit derivatives markets have been considerably decreased since the last financial crisis. Still, they the modeling of credit instruments remains crucial by its presence throughout the economic and financial chain.

This training presents an overview of credit models. Starting from structural models of default, we gradually move to the models used in practice for credit derivatives such as CDS, CDS Swaptions, and CVA calculation for vanilla products. We next focus on the problem of CDO valuation, which requires appropriate modeling of the correlation between defaults of different names within given pool of credits. Of course, beyond its good representation of the phenomenon under consideration, the permanent concern of a model is its calibration and computation in real time. These points will be discussed in detail.

Our pedagogical approach insists on understanding the technical issues, without going into the purely mathematical details. Similarly, numerical algorithms will be justified in detail without concern for the theoretical justification of the convergence.

The morning will be devoted to a quick review of structural models, then the introduction of credit market modeling tools. The afternoon will be devoted to the models for calculating the credit adjustment value, as well as the numerical calculation and calibration aspects of all the models encountered.

Key elements for the training session

Duration: 1 day
Language : English or French
Location: Ecole Polytechnique Executive Education, Palaiseau

Pre requisite
- Basic notions in probabilities.
- Basic knowledge of stochastic calculus (the essential tools will be reviewed).
- Basic notions in optimization.

Objectives

- Present the classic models of the credit markets:
  - Value of a company subject credit risk
  - Credit correlation products,
  - Credit Adjustment Value (CVA)
- Learn the basics of methods often used in black box.
- Illustrate the implementation of these approaches (calibration and numerical implementation).

Competences acquired at the end of the training

- Knowledge of credit derivative models.
- Practical use of these models

Pedagogical approach

Conceptual and methodological topics illustrated by examples
Program contents

MORNING / 9 – 12:30 am  
Nizar TOUZI

General Introduction  
Round table presentation and objectives reviews

Structural models  
Merton model  
Black & Cox model  
Leland & Toft model

Intensity models and credit derivatives  
Reminders: exponential law, Poisson process, intensity, time dependent intensity, Cox process  
Credit spread and CDS market  
Derivatives with underlying subject to default, CVA

AFTERNOON / 2 – 5:30 pm  
Caroline HILLAIRET

Contribution of evolutionary algorithms  
Credit correlation models  
Copula  
CDO evaluation with Gaussian copula

Biologically inspired optimization algorithms  
Calibration  
Digital implementation: nested Monte Carlo, Branching Monte Carlo.

Academic director for this training

Nizar Touzi - Professor at École polytechnique

Trainers

Nizar Touzi - Professor at École polytechnique  
Caroline Hillairet – Lecturer at École polytechnique