

---

# Meta-model for a large credit portofolio

Clément Rey<sup>\*1</sup>, Emmanuel Gobet , and Florian Bourgey

<sup>1</sup>Centre de Mathématiques Appliquées - Ecole Polytechnique – Ecole Polytechnique, Centre National de la Recherche Scientifique : UMR7641 – École Polytechnique Route de Saclay 91128 Palaiseau Cedex, France

## Abstract

We propose a meta-model for the loss distribution of a large credit portofolio in the Gaussian copula model. In the family of Gaussian copula models, we find two sources of randomness which are the systemic/common risk shared by every member of the portofolio and the idiosyncratic risk which is related to one member and is independent from all other sources of noise. The meta-model is built from a truncation of the Wiener chaos decomposition with respect to the systemic risk. It leads to a truncated Wiener chaos decomposition with random weights depending only on the idiosyncratic risk. Moreover, the portofolio being large, we derive a Central Limit theorem for those random weights. We thus propose an extension of our meta-model using Gaussian approximation instead of random weights. This method significantly reduce the computational time needed to simulate the credit Loss and then to estimate risk measures for instance.

**Keywords:** Metamodel, Chaos Decomposition, CLT

---

<sup>\*</sup>Speaker