Non Linear Valuation accounting for Initial and Variation Margins (IniVarMargin)

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The paradigm of linear risk-neutral pricing rules of financial contracts has changed in the last years, influenced by the regulators, and nowadays banks and financial institutions have to cope with posting collateral to a clearing house in order to secure their positions.

Everyday, the clearing house requires that each member posts a certain capital, reflecting the exposure of their OTC contracts. The *initial margin* and *variation margins* correspond to posting a collateral in order to, respectively, cover a new trade, or cover the daily change in market value of the contract. Under some simplifying modeling assumptions, the problem boils down, as a first approximation, to a linear pricing equation depending on the interest rate proposed by the clearing house.

In this project, we aim at accounting for two non-linear phenomena that occur in practice. First, the variation margins are submitted to thresholds, in the sense that these margins are not required when daily adjustments are too small: this leads to a non-linear pricing equation taking the form of a Backward Stochastic Differential Equation with a small non-linear term. Second, the deposit can depend also on the VaR of the portfolio projected over 10 days, giving rise to an equation including a McKean-type term (a term that depends on the law of the solution). The aim of this project is to develop and test advanced computational methods (perturbation methods, regression Monte-Carlo, interacting particle systems, branching processes) to tackle these two issues.

References

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