A Pricing Framework for Valuation Adjustments

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Course Description

The financial crisis started in 2007 has shown that any pricing framework must include from the very beginning the possibility of default of any market player. As a consequence derivative valuation and risk analysis have moved from exotic derivatives managed on simple single-asset classes to simple derivatives embedding credit risk and new, or previously neglected, types of complex and interconnected non-linear effects.

The detailed analysis of how a trade is really implemented between two counterparties in the market is a requirement to track all the possible costs and risks. Derivative valuation is adjusted to include counterparty credit risk and contagion effects along with funding costs due to collateral posting, treasury policies, and capital constraints. A second level of complexity is produced by moving from a single trade to the whole bank portfolio. Aggregation-dependent valuation processes, and theirs operational challenges, arising from non-linearities are discussed both from a mathematical and practical point of view.

By following the developments of recent literature, an arbitrage-free valuation framework is developed for bilateral counterparty risk adjustments, inclusive of wrong-way and contagion risks, collateralization and funding costs. The resulting valuation equations take the form of semi-linear PDEs, or backward SDEs, depending only on real market rates and processes. Collateralization is described starting from the day-by-day operations followed by the counterparties to implement the credit support annex. Segregation and re-hypothecation policies are discussed both for bilateral-traded and centrally-cleared deals along with funding implications. Margining and funding costs are included into the derivation of pricing formulae, along with their relationship with hedging strategies and liquidity policies. Fund transfer pricing procedures driving the business strategies of the bank are presented and their impact on funding costs is described.

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Course Program

- An overview of valuation adjustments
  - Counterparty credit risk
  - Funding costs and accounting policies
  - Capital charges and regulatory impacts
- Counterparty credit risk and collateralization
  - Securities, derivatives and trading strategies
  - Perfect collateralization approximation
  - Wrong-way risk and gap risk
- Funding costs and treasury policies
  - A detailed cash-flow analysis of trading activities
  - Borrowing and lending operations
  - Pricing at the netting-set level
- Accounting policies for the trading book
  - Fund transfer pricing
  - Linear and large-pool approximations
  - Examples with interest-rate and equity products

References

[1] D. Brigo, M. Morini, and A. Pallavicini. *Counterparty Credit Risk, Collateral and Funding with pricing cases for all asset classes.* Wiley, Chichester, 2013.