

QUANTITATIVE ANALYSIS OF CREDIT RISK

TOPICS OF THE COURSE:

- CREDIT RATINGS, CREDIT EVENTS, CREDIT SPREADS, EXPECTED LOSS AND LOSS GIVEN DEFAULT
- STRUCTURAL MODELS:
 - a) MERTON'S MODEL:
 - DEFAULT TIME
 - PAYOFFS AT MATURITY
 - EQUITY AS A CALL OPTION
 - VALUING THE BONDS
 - DEFAULT PROBABILITY
 - CREDIT SPREAD
 - EXAMPLE (Properties and calibration)
 - PROS AND CONS
 - JOINT DEFAULT PROBABILITIES
 - b) THRESHOLD MODELS
 - b1) EXTENSIONS OF MERTON'S (Black and Cox)
 - b2) STOCHASTIC BARRIER (Hull and White)
 - EXAMPLE (Properties and calibration)
- INTENSITY BASED MODELS
 - a) (homogeneous) POISSON PROCESS
 - POISSON DEFAULT ARRIVAL
 - BOND PRICING
 - RECOVERY CONVENTIONS
 - RECOVERY OF FACE VALUE
 - EQUIVALENT RECOVERY
 - FRACTIONAL RECOVERY
 - CREDIT SPREADS
 - b) TIME-VARYING INTENSITY
 - CALIBRATION
 - EXAMPLE (Properties and calibration)
- JOINT DEFAULT PROBABILITIES:
 - INDEPENDENT SHOCKS
 - COPULA FUNCTIONS
 - EXAMPLE (Properties and calibration)
 - PROS AND CONS
- c) COX PROCESS (Duffie and Singleton '97, '99)
 - INTENSITY MODELS AND AFFINE PROCESSES
 - COPULAS AND JOINT DEFAULT PROBABILITIES
 - PORTFOLIO LOSS AND VAR
 - CREDIT DERIVATIVES: BASICS
 - a) Single-name instruments:
 - Default put option
 - Default swap
 - b) Multi-name instruments:
 - first-to-default

READING LIST:

- Cherubini, U., Luciano, E., Vecchiato, W., Copulas methods in Finance, J. Wiley, 2004
- Duffie D. and Singleton, K., 1997, "An Econometric Model of the Term Structure of Interest Rate Swap Yields, The Journal of Finance, 52, 1287-321
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- Giesecke, K., 2002, Credit risk modeling and valuation: an introduction, Humboldt-Universität zu Berlin, Working Paper.
- Jouanin J-F, Riboulet G., Roncalli T., Beyond conditionally independent defaults, Groupe de Recherche Opérationnelle, Crédit Lyonnais, France, Working Paper.
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- Black, F., Cox, J., 1976, "Valuing Corporate Securities: Some effects of bond indenture provisions", The Journal of Finance, 31, 351-67
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- J. and Huang M., 2002, "How much of the Corporate-Treasury yield spread is due to Credit Risk?: A new calibration approach", Stanford University, Working Paper
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- Luciano E., Copula-based default dependence modelling and invariance: where do we stand? In "Credit Risk: Models, Derivatives, and Management – Empirical Studies and Analysis", ed. by N. Wagner, Chapman & Hall, Financial Mathematics Series, 2008