

# RISK AND PORTFOLIO MANAGEMENT: Syllabus, Part 1

Jan 27: What is financial risk and why is it important to manage it? History of financial crisis and what we learnt from them. Basel I, II and III, Regulation, Dodd-Frank, Volker.

Feb 3: Extreme-value theory and coherent risk measures. Basic probability distributions of EVT. Tail risk. Introduction to liquidity & concentration risk.

Feb 10: Equity portfolios: single-stock fat tail distributions, Hill's estimators. Correlations and copulas. VaR and Expected shortfall.

Feb 17: Risk management of interest-rate securities: the Treasury market. building forward rate curves, volatility of rates PCA of rate curves. Application to risk management of cleared repos/reverse repos.

Feb 24: Risk-management of treasury bond portfolios. Liquidity considerations: on-the-run vs off-the-run bonds; liquidity multipliers.

March 2: Interest-rate derivatives: the LIBOR swap curve. What instruments are used? Interest-rate volatilities and correlations. Historical vs. synthetic, vs. hybrid models for measuring the risk of swap/futures portfolios.

March 9: Central Clearing of OTC derivatives. CCPs: main players and their differences. Modeling CCP risk. Systemic risk. Guarantee fund sizing. The business of systemic risk management.

March 16: SPRING BREAK

## RISK AND PORTFOLIO MANAGEMENT: Syllabus, Part 2

March 23: Introduction to risk-management of options portfolios. Standard methodologies and their shortcomings: SPAN & TIMS.

March 30: Implied volatilities as risk factors. Arbitrage-free volatility surfaces. Simulating the joint probability of returns of stocks and implied volatilities. Risk measures for options: ES vs. VaR. Liquidity risk.

April 6: Credit default swaps: basic pricing formulas. Cleared CDS: variation margin, initial margin, guarantee fund sizing. Single-name and index CDS. Building swap curves and exploring their statistics.

April 13: Residential Mortgage-backed securities (RMBS): FNMA, FHMC, GNMA pass-through securities. Repurchase agreements for Agency RMBS. Pricing models and prepayment risk. Factor risk for repo market financing.

April 20: Risk-management of portfolios of RMBS: prepayment risk, factor risk modeling. Portfolio and diversification effects.

April 27: Mathematical theory of liquidity risk. Almgren-Chriss. CORE, Garleanu-Pedersen. Towards a theory of liquidity.

May 4: Course conclusion and final lecture.

May 11: LAST ASSIGNMENT DUE