



Portfolio Modeling Series

Tuesday, 12th June and Wednesday, 13th June 2007

Attilio Meucci on

Quantitative Risk & Portfolio Management

LEHMAN BROTHERS

Course Overview

The course, which is taught in full-semester format at the Master's in Financial Mathematics - Courant Institute of New York University and in the Master's in Financial Engineering at Columbia University, covers all aspects of quantitative portfolio management and risk management from the foundations to the state-of-the-art in the industry. It is based on Attilio Meucci's bestseller Risk and Asset Allocation - Springer (more details on the last page). All delegates will be given a complimentary copy of the book.

- ◆ **Multivariate estimation techniques:** non-parametric, maximum-likelihood under thick tails, shrinkage, robust, Bayesian
- ◆ **Market modeling:** copulas, market location-dispersion ellipsoid, factor models, principal component analysis, FFT projection of market to the horizon, delta-gamma and full Monte Carlo pricing
- ◆ **Portfolio evaluation:** stochastic dominance, utility, value at risk, expected shortfall, coherent measures
- ◆ **Allocation techniques:** trading/prospect theory, total return management, benchmark allocation
- ◆ **Portfolio optimization under estimation risk:** Black-Litterman, Bayesian, cone programming and robust optimization

Audience

The course is designed for portfolio managers, risk managers, financial engineers, financial analysts, quantitative analysts, traders, and researchers.

The required level of mathematical background is kept to a minimum: the most advanced statistical and optimization techniques are introduced and thoroughly discussed by means of live MATLAB® simulations, intuitive geometrical representations, figures and plenty of examples.

More about the Instructor



Attilio Meucci is a Senior Researcher in the POINT Modeling group of Lehman Brothers. He designs portfolio solutions that are subsequently implemented in Lehman's portfolio management system, POINT. Attilio holds a BA summa cum laude in Physics and a PhD in Mathematics from the University of Milan, an MA in Economics from Bocconi University in Milan, and is CFA charterholder. Before joining Lehman, he was a trader at Relative Value International, a hedge fund in Greenwich, CT. Previously, he was at Bain & Co., where he designed solutions for risk management, portfolio insurance, tactical and strategic asset allocation.

Attilio Meucci is the author of several publications and has taught graduate courses on quantitative portfolio management and risk management in top schools worldwide.

Day 1 - Tuesday 12th June 2007

- 07:30 - 08:00 Registration, Breakfast and Welcome
Dev Joneja, Head of Fixed Income Research Europe
Stephen Vandermark, Head of Equity Quantitative Analytics Europe
- 08:00 – 12:00 Quantitative Risk and Portfolio Management - Part I
Multivariate Statistics (details below)
Attilio Meucci
- 12:00 – 13:00 Lunch
- 13:00 – 13:45 Portfolio Modeling at Lehman Brothers
Anthony Lazanas, Global Head of POINT Modeling
Hon Wai Lai, Equity Quantitative Analytics
- 13:45 – 18:30 Quantitative Risk and Portfolio Management - Part II
Estimation Techniques (details below)
Attilio Meucci
- 18:00 – 19:30 Cocktail and canapé networking reception

Day 2 - Wednesday 13th June 2007

- 07:30 – 08:00 Breakfast
- 08:00 – 12:00 Quantitative Risk and Portfolio Management - Part III
Modeling and Evaluation (details below)
Attilio Meucci
- 12:00 – 13:00 Lunch
- 13:00 – 14:00 Portfolio Solutions at Lehman Brothers
Albert Desclee, Head of Quantitative Portfolio Strategy Europe
Lee Phillips, Head of European Indices and POINT Marketing
Alan Hofmeyr, Head of Quantitative Portfolio Advisory, Equities
- 14:00 – 18:00 Quantitative Risk and Portfolio Management - Part IV
Portfolio Optimization (details below)
Attilio Meucci

Part I: Multivariate Statistics

- ◆ Representations of distributions:
 - Analytical (pdf, cdf, quantile, cf)
 - Monte Carlo simulations
- ◆ Copula-marginal factorization
 - Marginals/grades
 - Pdf, cdf, simulations of copulas
 - Special copulas
- ◆ Dependence / concordance statistics
 - Schweizer-Wolff measure
 - Kendall tau
 - Spearman rho
- ◆ Summary statistics and location-dispersion ellipsoid
 - Principal component factorization
 - Statistical interpretation
- ◆ Correlation: theory, practice and pitfalls
- ◆ Multivariate distributions for the markets
 - Normal distribution
 - Student t distribution
 - Elliptical distributions
 - Log-distributions
 - Wishart distribution
 - Order statistics

Part III: Modeling and Evaluation

- ◆ The quest for invariance in the markets
 - Equities: log-returns
 - Fixed-income: changes in yield to maturity
 - Derivatives: changes in ATM implied volatility
- ◆ Projection of the market distribution at the investment horizon: the FFT technique
- ◆ Pricing: analytical, approximate (delta-gamma), full Monte Carlo
- ◆ Dimension reduction, theory
 - Principal component analysis (PCA)
 - Explicit risk factors
- ◆ Dimension reduction, notable examples
 - Capital Asset Pricing Model
 - Multi-factor models
 - PCA of swap market
- ◆ Investor's objectives
 - Total return
 - Benchmark allocation
 - Net profits
- ◆ Global portfolio evaluation: dominance
- ◆ Summary portfolio evaluation: satisfaction
 - Sharpe ratio and information ratio
 - Expected utility and certainty-equivalent
 - Quantiles and value at risk
 - Expected shortfall, conditional value at risk
 - Other coherent measures of performance

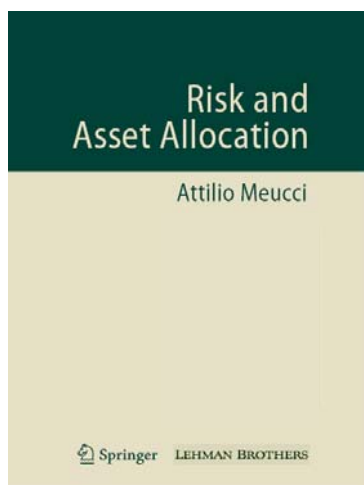
Part II: Estimation Techniques

- ◆ Estimators: definitions and practical evaluation
- ◆ Non-parametric estimators
 - Order statistics and VaR estimator
 - Sample mean/covariance: best-fitting ellipsoid
 - Sample factor loadings: ordinary least squares
- ◆ Maximum-likelihood estimators: assumptions on the market distribution
 - Normal hypothesis: sample estimators
 - Non-normal hypothesis: outlier rejection
- ◆ Shrinkage estimators: efficiency versus bias
 - Stein mean
 - Ledoit-Wolf covariance
- ◆ Robust estimators: what if the assumptions on the market distribution are wrong?
 - Assessing robustness: influence function
 - High-breakdown estimators
- ◆ Bayesian estimators: including the practitioner's experience
 - Analytically tractable examples
 - Numerical techniques
- ◆ Missing observations: estimation from unbalanced panels
 - E-M algorithm
 - ML marginalization

Part IV: Portfolio Optimization

- ◆ Constrained optimization: computationally tractable problems
 - Linear and quadratic programming
 - Second order and semi-definite cone programming
- ◆ Mean-variance optimization
 - Numerical solutions
 - Pitfalls of the mean-variance approach
 - Mean-variance as sub-optimal two-step approach
- ◆ Market asymmetries and the Mean-CVaR approach
- ◆ Total return vs. benchmark allocation
- ◆ Simple allocation techniques
 - General equilibrium / benchmark-implied allocations
 - Sample-based allocation: leverage of estimation risk
- ◆ Advanced allocation techniques
 - Bayesian allocation
 - Black-Litterman allocation
 - Copula-opinion pooling allocation
 - Resampled allocation
 - Robust allocation
 - Robust Bayesian allocation

About “Risk and Asset Allocation”



This encyclopedic book contains a detailed exposition spanning all the steps of one-period allocation from the foundations to the most advanced developments.

Multivariate estimation methods are analyzed in depth, including non-parametric, maximum-likelihood under non-normal hypotheses, shrinkage, robust, and very general Bayesian techniques. Evaluation methods such as stochastic dominance, expected utility, value at risk and coherent measures are thoroughly discussed in a unified setting and applied in a variety of contexts, including prospect theory, total return and benchmark allocation. Portfolio optimization is presented with emphasis on estimation risk, which is tackled by means of Bayesian, resampling and robust optimization techniques.

All the statistical and mathematical tools, such as copulas, location-dispersion ellipsoids, matrix-variate distributions, cone programming, are introduced from the basics. Comprehension is supported by a large number of figures and examples, as well as real trading and asset management case studies.

“This exciting new book takes a fresh look at asset allocation and offers up a masterly account of this important subject. The quantitative emphasis and included MATLAB software make it a must-read for the mathematically oriented investment professional”

Peter Carr, Head of Quantitative Research, Bloomberg LP, Director of MMF, NYU

“Meucci’s Risk and Asset Allocation is one of those rare books that take a completely fresh look at a well-studied problem, optimal financial portfolio allocation based on statistically estimated models of risk and expected return. Designed for graduate students or quantitatively oriented asset managers, Meucci provides a sophisticated and integrated treatment, (...) This is rigorous and relevant!”

Darrell Duffie, Professor of Finance, Graduate Business School, Stanford University

“A wonderful book! Mathematically rigorous and yet practical, heavily illustrated with graphs and worked examples, Attilio Meucci has written a comprehensive treatment of asset allocation starting from statistical concepts, covering investment primitives, and leading to portfolio optimization in a Bayesian context with parameter uncertainty.”

Bob Litterman, Head of Quantitative Resources, Goldman Sachs Asset Management

“This book takes the reader on a journey through portfolio management starting with the basics and reaching some fascinating terrain. Attilio Meucci shows a real talent for explaining the most difficult of subjects in a very clear manner.”

Paul Wilmott, wilmott.com

“This book fills a gap (...) It brings together in a logical sequence a vast swathe of work by statisticians and economists on optimal allocation among risky assets (...) Meucci’s book is comprehensive and rigorous, from presenting basic statistical tools to framing the optimization problem and solving it.”

Risk Magazine review by Jacques Pezier, ICMA Centre, University of Reading

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