

Advanced Risk and Portfolio Management

One Week, Heavily Quantitative, Omni-Comprehensive, Buy-Side Bootcamp

by **Attilio Meucci**

August 15-20, 2011

Baruch College, 55 Lexington Avenue, New York City

symmys.com

What you get

- ✓ **Knowledge:** in-depth understanding of buy-side modeling from the foundations to the most advanced statistical and optimization techniques, in six intensive days of theory and MATLAB live examples and exercises
 - **Market modeling:** random walk, ARMA, GARCH, Levy, long memory, stochastic volatility
 - **Multivariate statistics:** non-parametric, non-normal MLE, shrinkage, robust, Bayesian estimation; copula/marginal factorization; location-dispersion ellipsoid
 - **Factor modeling:** theory and pitfalls of time-series and cross-sectional factor models, CAPM, APT, principal components analysis, random matrix theory
 - **Pricing:** full evaluation, Greeks, stress-matrix interpolation; analytical, Monte Carlo, historical
 - **Risk analysis:** diversification, stochastic dominance, expected utility, Sharpe ratio, Omega, Kappa, Sortino, value at risk, expected shortfall, coherent and spectral measures
 - **Portfolio construction:** robust/SOCP optimization, shrinkage/Bayesian allocations, Black-Litterman and beyond; transaction costs, liquidity, market impact; statistical arbitrage; convex/concave dynamic strategies, CPPI, delta-replication
- ✓ **Textbook:** *Risk and Asset Allocation* - Springer by Attilio Meucci
- ✓ **Code:** full set of case studies; temporary MATLAB license
- ✓ **Certification:** All attendees will be awarded
 - 40 credits - CFA Institute Continuing Education Program
 - 40 credits - GARP Continuing Professional Educational Program
 - 3 academic credits - Baruch College, Master's in Financial Engineering Program
 - Certificate in Advanced Risk and Portfolio Management (optional)
- ✓ **Meet the stars:** Litterman, Derman, Carr, Almgren, Dupire, Mercurio, more...

What you pay

\$850 (Academic/Student); **\$1,200** (Partner); **\$1,550** (Professional); **group rates** (contact us). After regular expenses and rent for the venue, profits will be donated to charities.

Audience

- ✓ Finance professionals with quantitative background
 - Portfolio managers/risk managers on the buy-side will learn the latest developments in the field and deepen their knowledge of mainstream approaches
 - Sell-side professionals will bridge the gap to quantitative buy-side finance
- ✓ Academics and students

Instructor

Attilio Meucci, PhD, CFA.

Chief risk officer, Kepos Capital LP. Adjunct professor, Baruch College. Author, *Risk and Asset Allocation* - Springer. Regular contributor to *Risk Magazine*, *GARP Risk Professional Magazine*

Registration / information

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Day 1 – Monday, 15 August 2011, Auditorium (4-150)

Morning Session	Afternoon Session
Introduction/Quest for Invariance (8:30-12:30)	Quest for Invariance/Projection/Pricing (13:30-16:00)
<ul style="list-style-type: none"> ▪ P vs Q: the worlds of quantitative finance ▪ The “Prayer”: modular steps of ARPM <ul style="list-style-type: none"> - P1: Quest for Invariance - P2: Estimation - P3: Projection - P4: Pricing - P5: Aggregation - P6: Attribution - P7: Evaluation - P8: Optimization - P9: Execution - P10: Ex-Post Analysis ▪ Invariance and the random walk <ul style="list-style-type: none"> - Equities: log-returns - Fixed-income: changes in yield to maturity - Derivatives: (log) changes in vol. surface ▪ Advanced dynamics in discrete time <ul style="list-style-type: none"> - Autocorrelation and AR(1) processes - ARMA processes and Wold's theorem - Long memory: fractional integration - Volatility clustering: GARCH 	<ul style="list-style-type: none"> ▪ Advanced dynamics in continuous time <ul style="list-style-type: none"> - Random walk: Levy processes - Autocorrelation: Ornstein-Uhlenbeck - Long memory: fractional Brownian motion - Volatility clustering: stochastic volatility - Volatility clustering: subordination ▪ Projection to investment horizon <ul style="list-style-type: none"> - Analytical projection - Numerical projection: Fast Fourier Transform; simulations - Annualization of skewness, kurtosis, etc. - Square-root/linear risk ellipsoid propagation ▪ Pricing at investment horizon <ul style="list-style-type: none"> - Full analytical: log-distributions - Full numerical: scenario pricing (Monte Carlo/historical) - Taylor approximation: theta-delta/vega- gamma; carry-duration-convexity - Stress-matrix approximation
	Review & Exercises (16:00-18:30)
	Guest Lecture by Mark Carhart (18:30-19:15)

Day 2 – Tuesday, 16 August 2011, Auditorium (4-150)

Morning session	Afternoon session
Quest for Invariance II (8:30-12:30)	Linear Factor Models (13:30-16:00)
<ul style="list-style-type: none"> ▪ Multivariate statistics <ul style="list-style-type: none"> - Distribution taxonomy - Representations: pdf, cdf, cf, quantiles, scenario/probabilities - Spectral theorem / covariance visualization ▪ Copulas <ul style="list-style-type: none"> - Copulas in theory - Copulas in practice: Copula-Marginal Algorithm - Panic copulas with Fully Flexible Probabilities ▪ Multivariate dynamics <ul style="list-style-type: none"> - Multivariate Ornstein-Uhlenbeck process - Cointegration - Statistical arbitrage ▪ Linear factor models <ul style="list-style-type: none"> - Systematic-idiosyncratic vs dominant-residual LFM's - Distributional r-square - Time-series, cross-sectional, statistical/PCA LFM's - Factor analysis 	<ul style="list-style-type: none"> ▪ The five applications of LFM's <ul style="list-style-type: none"> - Multivariate estimation - Asset pricing theory - Search for alpha - Portfolio optimization - Risk attribution/hedging ▪ LFM's case studies <ul style="list-style-type: none"> - Swap market: PCA and Fourier basis - Stock market: fundamental, macro, random matrix theory ▪ Factor modeling pitfalls <ul style="list-style-type: none"> - Returns vs. invariants vs. P&L - The idiosyncratic myth - CAPM vs. APT vs. LFM's - Time-horizon beta
	Review & Exercises (16:00-18:30)
	Guest Lecture by Fabio Mercurio (18:30-19:15)

Day 3 – Wednesday, 17 August 2011, Auditorium (4-150)

Morning session Estimation I (8:30-12:30)	Afternoon session Estimation II (13:30-16:00)
<ul style="list-style-type: none"> ▪ Estimators <ul style="list-style-type: none"> - General definitions - Evaluation: bias, inefficiency, error - Stress-testing - Generalized p-values, generalized t-statistics ▪ Multivariate non-parametric estimators <ul style="list-style-type: none"> - Sample quantile and order statistics. - Sample mean/covariance and best-fitting ellipsoid - Sample factor loadings, betas, and OLS ▪ Multivariate maximum-likelihood estimators <ul style="list-style-type: none"> - Normal hypothesis: sample estimators - Non-normal hypothesis: fat tails and outlier rejection ▪ Shrinkage estimators <ul style="list-style-type: none"> - Stein mean - Ledoit-Wolf covariance 	<ul style="list-style-type: none"> ▪ Robust estimators <ul style="list-style-type: none"> - Assessing robustness: the influence function - Huber's "M" robust estimators: location, scatter and betas - Outlier detection and high-breakdown estimators - Minimum-volume ellipsoid and minimum-covariance determinant ▪ Missing data <ul style="list-style-type: none"> - EM algorithm - ML marginalization
	Review & Exercises (16:00-18:30)
	Cocktail party (18:30-21:00) See last page

Day 4 – Thursday, 18 August 2011, Auditorium (4-150)

Morning session Risk Management I (8:30-12:30)	Afternoon session Risk Management II (13:30-16:00)
<ul style="list-style-type: none"> ▪ Portfolio aggregation <ul style="list-style-type: none"> - P&L vs. returns - Holdings vs. weights ▪ Investor's objectives <ul style="list-style-type: none"> - Total return - Benchmark allocation - Net profits ▪ Portfolio attribution <ul style="list-style-type: none"> - Bottom-up approach - Factors on Demand - Portfolio-specific factor models - Non-Greek few-out-of-many hedging ▪ Portfolio evaluation <ul style="list-style-type: none"> - Stochastic dominance - Satisfaction indices ▪ Non-dimensional indices <ul style="list-style-type: none"> - Sharpe ratio, Omega, Sortino ratio, Kappa ▪ Diversification <ul style="list-style-type: none"> - Review of common definitions - Conditional principal portfolios - Effective number of bets 	<ul style="list-style-type: none"> ▪ Expected utility and certainty-equivalent <ul style="list-style-type: none"> - Analytical solutions: mean-variance as satisfaction - Numerical solutions ▪ Quantiles and value at risk (VaR) <ul style="list-style-type: none"> - Semi-analytical solutions in elliptical markets - Cornish-Fisher approximation - Extreme value theory (EVT) - Numerical solutions - Contribution to VaR from securities/factors ▪ Coherent measures of performance <ul style="list-style-type: none"> - Expected shortfall (ES) and conditional value at risk (CVaR) - Contribution to ES from securities/factors - Spectral measures of performance ▪ Stress Testing for estimation risk <ul style="list-style-type: none"> - Basic stress testing - Panic copulas with Copula-Marginal Algorithm - Fully Flexible Probabilities (time/state/entropy pooling conditioning) - Fully Flexible Bayesian networks
	Review & Exercises (16:00-18:30)

Day 5 - Friday, 19 August 2011, Auditorium (4-150)

Morning session Portfolio Management I (8:30-12:30)	Afternoon session Portfolio Management II (13:30-16:00)
<ul style="list-style-type: none"> ▪ Constrained optimization: computationally tractable problems <ul style="list-style-type: none"> - Linear and quadratic programming - Second order and semi-definite cone programming ▪ Two-step heuristics <ul style="list-style-type: none"> - Analytical mean-variance: two-fund theorem - Numerical mean-variance: quadratic programming - Mean-CVaR and alternative trade-offs ▪ Benchmark vs. total-return portfolio management <ul style="list-style-type: none"> - Expected outperformance, tracking error, info ratio - Frontier in total-return coordinates - Frontier in relative-return coordinates ▪ Pitfalls of mean-variance ▪ Estimation risk <ul style="list-style-type: none"> - Allocation as a decision - Opportunity cost as loss of an estimator ▪ Simple allocation techniques <ul style="list-style-type: none"> - Prior allocation: efficiency - Sample-based allocation: unbiasedness 	<ul style="list-style-type: none"> ▪ Robust allocation <ul style="list-style-type: none"> - Box uncertainty sets - Elliptical uncertainty sets (second-order cone programming) ▪ Re-sampled allocation ▪ Multivariate Bayesian estimation <ul style="list-style-type: none"> - Theoretical background - Analytical solutions: Normal-Inverse Wishart model - Numerical solutions: Monte Carlo Markov Chains ▪ Bayesian allocation <ul style="list-style-type: none"> - Predictive return allocation - Classical-equivalent allocation
	Review & Exercises (16:00-18:30)
	Guest lecture by Rob Almgren (18:30-19:15)

Day 6 - Saturday, 20 August 2011, Auditorium (4-150)

Morning session (8:30-12:30) Portfolio Management III	Afternoon session(13:30-16:00) Portfolio Management IV
<ul style="list-style-type: none"> ▪ Tactical portfolio construction <ul style="list-style-type: none"> - Rosenberg-Grinold - Black-Litterman - Black-Litterman for derivatives ▪ Beyond Black-Litterman <ul style="list-style-type: none"> - Entropy Pooling and Fully Flexible Views - Non-normal markets - Non-linear views - Generalized stress-testing - Ranking allocation 	<ul style="list-style-type: none"> ▪ Dynamic allocation strategies <ul style="list-style-type: none"> - Convex/concave strategies - CPPI - Delta-replication - Drawdown control ▪ Liquidity <ul style="list-style-type: none"> - Transaction costs - Market impact - Best execution
	Guest lecture by Peter Carr (16:00-16:45)
	Review & Exercises (16:45-18:30)

Cocktail Party - Wednesday, 17 August 2011, Reception Room (14-220)

18: 30 – 19:00: Buffet and refreshments

19:00 – 20:00: Guests

19:00-19:10: Peter Carr - “Math by the Numbers”

19:10-19:30: Emanuel Derman - “Models.Behaving.Badly”

19:30-19:50: Bob Litterman - “Experiences of a P-Quant”

19:50-20:00: Bruno Dupire - “Experiences of a Q-Quant”

20: 00 – 20:15: Buffet and refreshments

20: 15 – 20:35: Corporate Partners

20:15-20:20: Chris Donohue, Director of Research and Educational Programs - GARP

20:20-20:25: Sebastian Ceria, Founder and Chief Executive Officer - Axioma

20:25-20:30: Andy Sparks – Head of Product Management - MSCI

20:30-20:35: Dan diBartolomeo – President and Founder - Northfield Information Services, Inc.

20: 35 – 21:00: Buffet and refreshments

Corporate Partners of ARPM Bootcamp 2011

Affiliation with our partners grants a \$350 discount in tuition

