Syllabus

Portfolio Choice and Asset Pricing—MAFIRM Collegio Carlo Alberto

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Setup

- Teaching style: Introduction of new theory is alternated with in-class exercises to facilitate immediate understanding of the concept.
- Students should bring a laptop with Excel, Python, Matlab or comparable software.

Grading

- Homework set: 8 points
  - To be submitted in groups of 2-3 students
- Final Exam: 25 points
  - Individual, closed book
  - One A4 handwritten "cheat sheet" allowed
  - Duration: 2 hours

Prerequisite Knowledge and Skills

- Basic Linear Algebra and Calculus
  - Elementary matrix and vector operations
  - Constrainted optimization (Lagrangian)
  - Solving system of equations
- Statistics and Probability
  - Expected value, Variance and Covariance
  - Multivariate Gaussian Distribution
- Basic knowledge of Excel, Python, Matlab, or other related program

Content

- **Chapter 1**: Arbitrage-free markets and pricing by replication
  - Basic model of financial markets
  - Futures and options
  - Complete and incomplete markets
  - Law of one price and pricing by replication
  - Exploiting arbitrage opportunities
  - First fundamental theorem of asset pricing
  - Second fundamental theorem of asset pricing
  - Pricing kernel and risk-neutral pricing
  - Pricing on a binomial tree
  - Examples: pricing American options and convertible bonds
  - Case study 1: valuation of an executive stock options package
- **Chapter 2**: Modern portfolio theory
  - Lotteries and risk-aversion
  - Mean-variance preferences
  - Mean-variance portfolio optimization with a single and multiple risky assets
  - Mean-variance portfolio optimization without riskless asset
  - Minimum variance portfolio, capital allocation line, efficient frontier
  - CAPM (derivation and interpretation)
  - Empirical test of CAPM
  - Case study 2: CAPM and the cost of capital
  - Pricing kernel consistent with mean-variance optimization
  - Roll's Critique
- **Chapter 3**: Consumption-based Asset Pricing
  - Utility theory and (Arrow-Pratt) risk aversion
  - Static portfolio optimization in complete and incomplete markets
  - Dynamic portfolio optimization in complete and incomplete markets
  - Dynamic Asset Pricing in complete and incomplete markets
  - Consumption CAPM
  - Equity Premium Puzzle

- **Chapter 4**: Multi-Factor Models
  - Parameters to estimate a factor models
  - Macro, fundamental and statistical factors
  - Fama-French 3-Factor model
  - Interpretation of factor models
  - Smart beta
  - Event Studies
  - 1-Factor CAPM data mining exercise

Related Textbooks

- Cochrane (2010): "Asset Pricing". ISBN: 978-8122431247
- Ang (2014): "Asset Management". ISBN: 978-0199959327
- Pedersen (2015): "Efficiently Inefficient". ISBN: 978-0691166193