UNIVERSITY of WASHINGTON

Introduction to Computational Finance and Financial Econometrics

Learn mathematical and statistical tools and techniques used in quantitative and computational finance. Use the open source R statistical programming language to analyze financial data, estimate statistical models, and construct optimized portfolios. Analyze real world data and solve real world problems.

Watch Intro Video

About the Course

Learn mathematical, programming and statistical tools used in the real world analysis and modeling of financial data. Apply these tools to model asset returns, measure risk, and construct optimized portfolios using the open source R programming language and Microsoft Excel. Learn how to build probability models for asset returns, to apply statistical techniques to evaluate if asset returns are normally distributed, to use Monte Carlo simulation and bootstrapping techniques to evaluate statistical models, and to use optimization methods to construct efficient portfolios.

You'll do the R assignments for this course on DataCamp.com, an online interactive learning platform that offers free R tutorials through learning-by-doing. The platform provides you with hints and instant feedback on how to perform even better. Every week, new labs will be posted.

Course Syllabus

Topics covered include:

- Computing asset returns
- Univariate random variables and distributions
  - Characteristics of distributions, the normal distribution, linear function of random variables, quantiles of a distribution, Value-at-Risk
- Bivariate distributions
  - Covariance, correlation, autocorrelation, linear combinations of random variables
- Time Series concepts
  - Covariance stationarity, autocorrelations, MA(1) and AR(1) models
- Matrix algebra
- Descriptive statistics
  - histograms, sample means, variances, covariances and autocorrelations
- The constant expected return model
  - Monte Carlo simulation, standard errors of estimates, confidence intervals, bootstrapping standard errors and confidence intervals, hypothesis testing , Maximum likelihood estimation, review of unconstrained optimization methods
- Introduction to portfolio theory
- Portfolio theory with matrix algebra
  - Review of constrained optimization methods, Markowitz algorithm, Markowitz Algorithm using the solver and matrix algebra
- Statistical Analysis of Efficient Portfolios

Sessions

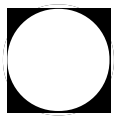
Aug 26th 2014 - Nov 4th 2014 ▾

View course record

Course at a Glance

- 10 weeks of study
- English
- English subtitles

Instructors



Eric Zivot
University of Washington

Categories

Economics & Finance

Share

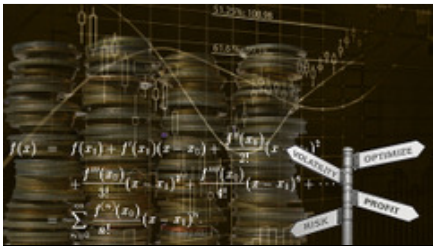
- Risk budgeting
  - Euler's theorem, asset contributions to volatility, beta as a measure of portfolio risk
- The Single Index Model
  - Estimation using simple linear regression

Suggested Readings

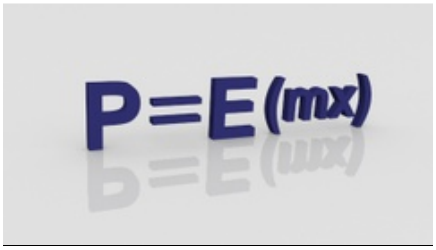
(The first 4 texts are highly recommended)
Introduction to Computational Finance and Financial Econometrics, Eric Zivot and R. Douglas Martin. Manuscript under preparation
Statistics and Data Analysis for Financial Engineering by David Ruppert, Springer-Verlag.
Beginner's Guide to R by Alain Zuur, Elena Ieno and Erik Meesters, Springer-Verlag.
R Cookbook by Paul Teetor, O'Reilly.
Other books for further reference:
Introductory Statistics with R, Second Edition (Statistics and Computing, Paperback), by Peter Dalgaard, Springer-Verlag, New York.
Modern Portfolio Theory and Investment Analysis, by E.J. Elton et al., Wiley, New York.
Financial Modeling, by Simon Benninga. MIT Press.
Statistical Analysis of Financial data in S-PLUS, by Rene Carmona, Springer-Verlag, 2004.
Interactive R tutorial (for beginners):
Introduction to R

Related Courses

Computational Investing, Part I



Mathematical Methods for Quantitative Finance



Asset Pricing, Part 1

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