

Using Matlab in applied Finance – 24 hours

Course objectives:

Related to the “Econometrics of Financial Markets” courses, the aim of this class is to provide sufficient bases in Matlab-programming to be able to deal with concrete financial applications from data acquisition (from various data sources) to publishing the results.

Course outline:

1. Introduction to Matlab (2x3h)
 - 1.1. Language and environment
 - 1.2. Data acquisition
2. The first step in financial data analysis (3h)
 - Dealing with missing, incomplete or corrupted data
 - Constructing time series, displaying financial data
 - Basic statistics, Parameter estimation, Robust estimation
3. Traditional Econometric methods implementation (3x3h)
 - 3.1. Markowitz efficient frontier
 - 3.2. Statistic tests in the CAPM framework
 - 3.3. Factor Selection in a multi-factor framework
4. Pricing models and inverse methods (3h)
 - Black & Scholes model
 - Implied Volatility
5. Dealing with intraday transaction data (3h)

Assessment: practical (3h)

References:

- Matlab Getting started guide: http://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf
- John C. Hull, *Options, Futures, and Other Derivatives*, Prentice Hall
- Little, Roderick J. A and Donald B. Rubin. *Statistical Analysis with Missing Data*, 2nd ed., John Wiley & Sons, Inc., 2002.
- E. F. Fama and K. R. French, *Common risk factors in the returns on stocks and bonds*, Journal of Financial Economics, vol. 33, pp. 3–56, 1993.
- R. A. Maronna, *Robust M-estimators of multivariate location and scatter*, Annals of Statistics, vol. 4, no. 1, pp. 51–67, 1976.
- M. Markov, V. Mottl, and I. Muchnik, *Principles of nonstationary regression estimation: A new approach to dynamic multi-factor models in finance*, Technical Report 2004-47, DIMACS, October 2004.
- J. D. Hamilton, *Time Series Analysis*, Princeton University Press, 1994.
- H. L. Van Trees, *Optimum Array Processing, Part IV of Detection, Estimation and Modulation Theory*, John Wiley & Sons, 2002.
- J. Rissanen, *Modeling by shortest data description*, Automatica, vol. 14, pp. 465–471, 1978.