Course description
"Financial Econometrics"
BA in Economics: 2 ECTS, 46 contact hours, 2 module 2017/2018
Master of Sciences in Finance/ in Economics: 3 ECTS, 40 contact hours, 2 module 2016/2017
Master of Sciences in Applied Economics: 4 ECTS, 40 contact hours, 2 module 2017/2018

Instructor

Sergey Onenko, PhD student, lecturer, Department of Economics

Outline

The course will focus on the basic approaches of the statistical analysis of financial data, that is primarily (but not exclusive) of the time series nature. We will cover descriptive analysis of univariate data, linear time series decomposition and modeling all its components as well as conditional volatility models. In the later parts of the course, multivariate modeling as well as Value-at-Risk applications and portfolio theory will be discussed. A considerable effort will be put on demonstrating the practical implementation of all the concepts and techniques in the R statistical package.

After mastering this course, the students will be able to learn how to statistically describe and analyze financial data, know how to model returns of assets and different approaches one can take, determine the presence of deterministic or stochastic trend and seasonality in the data and adjust the data for these components, identify, estimate and diagnose the cyclical component of the time series data, produce forecasts of time series data and evaluate the accuracy of these forecasts, model bivariate time series data using Vector Autoregressions, apply and evaluate the Value-at-Risk metrics, and estimate the efficient frontier of a portfolio and interpret CAPM. All of the above skills will be practically implemented by programming in R.

Structure and content BA in Economics:

Topics	Totally	Face-to-face meetings		Home work
		Lectures	Tutorials	
1. Review of statistics and descriptive analysis of financial data, return calculations	28	4	4	20
2. Univariate time series analysis – decomposition, trend, seasonality, cyclicality, unit root, forecasting	31	4	7	20
3. Modeling volatility	22	2	4	16
4. Value-at-Risk (VaR)	20	2	2	16
5. Vector Autoregressions	20	2	2	16
6. Introduction to portfolio theory, CAPM, portfolio VaR	15	2	3	10

7. Regularization: ridge regression and the lasso	14	4	4	6
Total volume of hours	150	20	26	104

Master of Sciences in Finance/ in Economics:

Topics	Totally	Face-to-face meetings		Home work
		Lectures	Tutorials	
1. Review of statistics and descriptive analysis of financial data, return calculations	20	4	4	10
2. Univariate time series analysis – decomposition, trend, seasonality, cyclicality, unit root, forecasting	19	4	5	10
3. Modeling volatility	20	2	2	16
4. Value-at-Risk (VaR)	20	2	2	16
5. Vector Autoregressions	20	2	2	16
6. Introduction to portfolio theory, CAPM, portfolio VaR	15	2	3	10
7. Regularization: ridge regression and the lasso	12	4	2	6
Total volume of hours	126	20	20	84

Prerequisites

The course will use concepts in probability and statistics in a significant manner. A review of all the important concepts will be provided during the course. Also, prior knowledge of R (or any other statistical programming language) is a plus, although not a necessity.

Indicative Assessment Methods and Strategy

There will be one final exam, focused both on theory as well as practice, worth 60 % of the grade. Another 40 % will be devoted to the group project, in which students in couples will carry out an analysis of the data of their choice and provide a professional output of this analysis.

Teaching and Learning Methods

The course consists of lectures (20 academic hours = 10 80-minute long lectures) and of seminars (26 academic hours for bachelors students and 20 for master students). The seminars will be primarily (though not exclusively) focused on demonstrating and practicing the use of all the concepts in R. Therefore, a useful by-product of the course will be an enhancement of the knowledge of R.

Indicative Self-Study Strategies	Type	+/–	Hours
	Reading (lecture materials, mandatory and optional resources)	+	30
	Study for seminars / tutorials	+	30
	Assignments for practicals / labs	-	0
	E-learning / distance learning (LMS)	-	0

	Fieldwork	-	0
	Project work	+	15
	Other (please specify)	-	0
	Preparation for the credit test / exam	+	20

Main reading list

- Brooks, C. (2014). *Introductory econometrics for finance*. Cambridge university press.
- Tsay, R. S. (2005). *Analysis of financial time series* (Vol. 543). John Wiley & Sons.
- Campbell, J. Y., Lo, A. W. C., & MacKinlay, A. C. (1997). *The econometrics of financial markets* **2nd ed. Edition (Vol. 2, pp. 149-180).** Princeton**, NJ: Princeton University Press. Winner of the 2014 Eugene Fama Prize for Outstanding Contributions to Doctoral Education, University of Chicago Booth School of Business.**

Optional Reading

- R. Hyndman , G. Athanasopoulos, Forecasting: principles and practice, OTexts: Melbourne, Australia, 2014 (free online textbook https://www.otexts.org/fpp)
- Cryer J. D., Time Series Analysis: With Applications in R, Springer Texts in Statistics, 2009.
- Timmerman A., Elliott G., Handbook of Economic Forecasting SET 2A-2B, Volume 2A & 2B, North Holland, 2013
- Richard J.D. Harris, Faith Yilmaz: Momentum Trading Strategy Based on the Low Frequency Component of the Exchange Rate, 2008