Syllabus

Data Analysis 2: Finding Patterns with Regression

(MS Finance track)

- **Instructor:** Tibor Voros (vorost@ceu.edu)
- **Credits:** 2 cr
- **Term:** Fall 2018-2019
- **Course level:** Master of Science
- **Prerequisites:** Data Analysis 1 required
- **Course drop:** As described by the Regulations of the MS in Finance program, please check here

Course description

This is a continuation of the Data Analysis 1: Exploration (MS Finance track) course. The course expands on data manipulation and visualization topics, incorporating inferential statistics (with a particular focus on regression) and programming tools. The course will expand on technical requirements, mathematical foundations and key techniques to be effective in data analysis. As such, the course will cover a wide range of topics, with particular emphasis on using the R programming language and software environment for evaluating relationships and analyzing data using linear regressions. Please note that the course continues into Data Analysis 3 course. This course is based on the Data Analysis (Business Analytics) course and thus uses material (with permission) from the Data Analysis course (authors: G. Békés, G. Daróczi, G. Kézdi).

Learning outcomes

INTENDED LEARNING OUTCOMES	ASSESSMENT
Knowledge and Understanding 1. Describe the problem solving process and the role of quantitative analysis 2. Recall and explain important guidelines for designing, building, and testing programs 3. Describe tools and techniques for regression, their underlying concepts, assumptions, capabilities and limitations 4. Discuss possibilities of articulating these tools and techniques in integrated approaches to problem solving	Final exam, Assignments
Intellectual Skills 1. Recognize critical factors in a problem 2. Develop a structure for analyzing problems 3. Carry out a cogent quantitative analysis at inferential statistics level & develop and test hypothesis related to regressions 4. Present the analysis and insights on a problem to interested parties in a convincing, non-technical manner	Minute papers, Final exam, Assignments
Practical Skills 1. Design, build, test and use meaningful spreadsheet, VBA and R approaches to present and solve quantitative business problems 2. Carry out data analysis and regression	Final exam, Assignments

3. Understand basic programming approaches and develop adequate programmings skills	
Transferable Skills 1. Translate descriptions of business / financial situations into formal models, and investigate those models in an organized fashion 2. Extract insights from data, and use those insights to communicate, persuade and motivate change 3. Interact with members in a group to produce analysis for external parties with time constraints	Assignments (team), Final exam

Reading list

Core readings

- G Békés & G Kézdi: Data Analysis for Business, Economics and Policy: Patterns, Prediction and Causality (in manuscript format)
- Wayne L. Winston: Data Analysis and Business Modeling (MS Excel 2003 & any of the more recent editions are fine) – a free downloadable e-book will be provided exclusively for the course.

Recommended readings

- R Schumacker, S Tomek: Understanding Statistics Using R (CEU Library, downloadable)
- A Ohri: R for Business Analytics (CEU Library, downloadable)
- A R Anderson, D J Sweeney, T A Williams: Statistics for Business and Economics (CEU library)
- P Newbold, W Carlson, B Thorne: Statistics for Business and Economics (CEU library)

Prerequisites

Participants should complete Data Analysis 1 before this course. If DA1 has not been completed, prospective participants should contact the course leader prior to applying for the course.

Assessment

Element	Contribution to grade (100 total)
Data Analysis 2– 2cr	**100.00**
Exam	40.00
Minute papers & tests, quizzes	10.00
Assignments	50.00

Minute papers & tests, quizzes

Minute papers / tests / etc. are short written exercises, given at the beginning, during, or towards the end of a class. Their purpose is one or more of the following: (1) to check preparation on the assignment's key points; (2) to stimulate critical thinking and sound reasoning; and (3) to obtain feedback about topics discussed in previous class sessions. Usually minute papers are marked 0-3 points (max. 5).

Assignments

Exercises and other relevant assignments may be assigned for the purposes of practice, some of which will be collected for review. Most exercises are individual or small team (max. 2-3 participants) based. Examples of exercises: case studies, data analysis, multiple choice tests.

Exam

Individual exam (may be held in the computer lab): multiple choice and complex data exercises. Closed book, one A4-page can be used. Usually approx. 90-120 minutes. Please note: due to the number of participants & technical requirements, the exam may have different formats.

Grading Policy

- Students may not miss more than 2 lectures. Failing to do so will yield an administrative fail grade. In case of known absence, please contact the instructor in advance (if possible). Additional tasks / exercises / tests may be assigned.
- To pass, students will need to get at least 50% of the overall grade
- Deadlines are strict: usually home assignments are given at least with 3-5 days deadline. Every missed day decreases the grade by 25%. Submission time is checked in Moodle.

Technical/laptop requirement

Please bring a notebook to the classes.

Course schedule and materials for each session

Please see CEU Department of Economics calendar for class timing. Further details and material will be available on Moodle.

	Activity
1	**Regression Analysis.** Examples, basics. Problems & issues in regression.
2	**Different Types of Regressions. Multiple Linear Regression I.** Logarithms, other nonlinear transformations. Spline & polynomials.
3	**Multiple Linear Regression II. Time Series.** Interaction, causal analysis etc
4	**Practice – Examples & Case Studies.** Sales predictions & cashflow model building. Optimization.
5	**Probabilistic Approach: Decision Trees and Value of Information.**
6	**Exam**

Brief Bio

Tibor Vörös has over 20 years experience in both academic and corporate environments. He is an enthusiastic and curious individual, who has explored areas ranging from medical approaches and robotics to corporate financial processes. Tibor's work is mostly related to information systems (e.g. knowledge management, decision making, business intelligence, business analytics) and quantitative areas. He also researched these topics and evaluated corresponding frameworks from the theoretical point of view. Tibor Vörös holds an MSc in Maths, Physics and Information Technology and he is a Harvard Executive Education graduate. He worked at the Central European University Business School as Senior Lecturer for several years: he also undertook the role of MBA Director among other administrative duties. Tibor has spent considerable time on complex finance-driven business simulations and created unique storyboards to help participants experience real life problems in classroom situations. CEEMAN has selected Mr Vörös as the winner of the Innovation in Course Design category for the CEEMAN Champions' Award 2010. Current research work concentrates on the relationship of organizational culture and information technology. Tibor also took part in various industry campaigns, including the Microsoft Business Productivity Infrastructure Optimization campaign or the Cloud Business Transformation approach.