Mathematical Models in Econometrics KMA/MME-A

range 2 + 1, exam

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Module outline

1st Topic: Classical Linear Regression Model.

(1) Regression function. Simple linear (line) regression. Properties of regression line (and switched regression line). The ordinary least squares estimation of regression parameters.

(2) Statistical properties of the ordinary least square estimators.

(3) Regression model in matrix form.

(4) Evaluation of the regression model. Testing statistical significance of the regression model and testing statistical significance of individual parameters.

2nd Topic: Classical Linear Regression Model.

(5) Regression diagnostics, different types of residuals and their properties, identification of outliers.

(6) Problems connected with violating of linear regression assumptions (i.e. heteroscedasticity, autocorrelation) and multicollinearity)

(7) Problem of multicollinearity and choice of appropriate model.

3rd Topic: Generalised Linear Regression Models.

(8) Discrete and restricted explanatory variable. Probit and logit regression and its usage. Censored explanatory variable.

(9) Generalised linear (GLM) models.

4th Topic: Nonlinear Regression Models in Econometrics.

(10) Particular problems of nonlinear models. Linear transformation of models and linearization. Numerical methods for parameters estimation in nonlinear models.

5th Topic: Nonparametric robust methods in econometrics.

(11) Orthogonal regression models. LAD regression models.

(12) Nonparametric estimation of regression curves.

6th Topic: Econometrical Equations Systems.

(13) Panel data. Simultaneous equations systems.

Literature ...

(1) Wooldridge, J.M.: Introductory Econometrics: A Modern Approach. Cengage Learning; 5 edition, 2012.

(2) Verbeek, M.: A Guide to Modern Econometrics. Chichester, England: John Wiley and Sons, 2008.

(3) Maddala, G.S.: Introduction to Econometrics. Macmillan Publishing Company New York. 1988.

(4) Greene, W.H.: Econometric Analysis. Pearson Education, Inc. 2003.

(5) Huynh, H.T., Lai, V.S., Soumaré, I.: Stochastic simulation and applications in finance with MATLAB programs. Hoboken, NJ: John Wiley,2008.

Software

Important feature of this course is learning how to use mathematical software capable of econometrical modelling. Note that MATLAB shall be used for practical purposes within lectures throughout the semester. However, students should feel free to use any eligible mathematical software they prefer (e.g. Mathematica, R, Maple, etc.).

Elements of Assessment and Exam Requirements

During the semester students will be assigned tasks and by completing them, they could be awarded at most **5 points**. Acquired points will be accounted for the final exam assessment.
The exam itself consists of theoretical and practical part. The theoretical part of the exam is written and is mainly focused on knowledge of the fundamental concepts and methods of econometrical modelling. Succeeding in the theoretical part is the necessary condition to entry the practical part of the exam. In the practical part students shall demonstrate usage of mathematical software of their choice within the given task. The crucial element is to be able to correctly interpret acquired results and to show overall understanding of the discussed topic.

Exam Assessment

(1) Points acquired during the semester – the maximum is **5 points**; the necessary minimum is **3 points**.

(2) The theoretical part (written test) – the maximum is **10 points**; the necessary minimum is **6 points**.

Hand written notes in range of A5 page could be used during the test.

(3) The practical part – the maximum is **10 points**; the necessary minimum is **6 points**.

Within the practical part of the exam students are entitled to use their own notes and other materials.

Assessment of the practical part also includes the oral examination during which students are supposed to demonstrate understanding of the topic and to interpret the acquired results.

Points	Assesment
25 - 22	A
19 - 21	B
16 - 18	C
15 or less	Fail

Blanka Šedivá, 26. září 2017.