Faculty of Economic Sciences

Advanced Econometrics

(Fall term + Spring term)

Lectures: Dr.Sc. in Economics Elena Kotyrlo

Classes: Andrey Tkachenko, Anna Gladysheva

Class Times and Locations: TBA

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Office Hours: TBA

Section 1. General information about the course

The course "Advanced Econometrics" focuses on the estimation, inference and identification of regression models. Particular attention is paid to the econometric theory, to the application of econometrics to real-world problems, and to the interpretation of the estimation results. The first part of the course (Fall term) includes linear regressions and models with limited dependent data. Topics on Gauss-Markov theorem, endogeneity, instrumental variables, maximul likelihood estimation will be covered. The second part of the course (Spring term) is focuses on issues in system of equations; time series models; panel data models; nonparametric and semiparametric models; Bayesian estimation. The course will include the use of STATA, a standard software for econometric and statistical analysis.

Section 2. Course goals, learning objectives, expected learning outcomes

The course aims to provide students with:

- knowledge on the fundamentals of econometrics and its application
- knowledge and proficiency on the use of statistical package STATA for econometric analysis
- practice in conducting data analysis and application of econometric tools in research and analytics

Prerequisites

Course requires knowledge of linear algebra, calculus, probability theory and mathematical statistics.

Section 3. Course Outline

No	Topic/Focus/Activity	Number of the week (lecture)	Lectures (hours)	Classes (hours)	Self-study (hours)	Readings and assignments
Part I: Fall term						
1	Introduction	1	2		2	G, Ch. 1
2	Matrix algebra			2	6	V, Appendix A G, Appendix A
3	Theory of Probabilities and Statistics. Estimation and Inference.			2	8	V, Appendix B G, Appendices B,C
4	The linear regression model. Least squares. Goodness of fit and analysis of variance.	2	2	2	8	V, Ch.2, 2.1, 2.2, 2.4 G, Chs. 2-3
5	The Gauss-Markov theorem. Linear hypothesis testing.	3-4	4	4	16	V, Ch.2, 2.3, 2.5, 2.8 G, Chs. 4, 5
6	Interpreting and comparing regression models. Functional form and structural change. Multicollinearity	5-6	4	4	16	V, Ch.3 G, Chs. 4, 5, 6
7	Heteroscedasticity. Generalized least squares.	7-8	4	2	8	V, Ch.4 G, Ch.9
8	Autocorrelation	9	2	2	4	V, Ch.4, 4.6-4.11 G, Ch.20
9	Endogeneity, instrumental variables and GMM	10-12	6	4	14	G, Ch.13, C&T, Ch.6

No	Topic/Focus/Activity	Number of the week (lecture)	Lectures (hours)	Classes (hours)	Self-study (hours)	Readings and assignments
10	Maximum likelihood estimation and specification tests. Nonlinear least-square estimation	13	2	2	8	V, Ch.6 G, Ch.14
11	Panel data models. Introduction	14	2	2	8	B, Ch.2-3, G, Ch. 11, V, Ch. 10
12	Binary choice models. Multi-response models.	15	2	4	10	V, Ch.7, 7.1, 7.2, 7.4, 7.5, 7.6 G, Ch.17, 17.1-17.3
13	Models for count data. The Poisson and negative binomial models.	16	2	2	8	V, Ch.7, 7.3 G, Ch.18, 18.4
14	Models with Limited Dependent Variables. Sample selection model. Heckman and Tobit models.	17-19	6	2	12	V, Ch. 10.7 G., Ch. 17.4-17.5
Part II: Spring term						
15	Duration models	20	2	2	8	V, Ch.7, 7.8 G, Ch.19, 19.4
16	Estimating Treatment Effects	21	2	3	12	G. Ch. 6.2.5, G., Ch. 19.6, C-T, ch. 3.6.4
17	Univariate time series models	22-23	4	3	8	V, Ch.8 G, Ch.21, 21.1, 21.2
18	Multivariate time series models	24	2	2	8	V, Ch.9 G, Ch.21, 21.3
19	Panel data models	25	2	4	8	V, Ch.10, B, Ch. 5, C-T, Ch.8 G, Ch.11. B, Ch. 4, 9
20	Dynamic panel data	26-27	4	2	8	V, Ch. 10.4-10.6, 10.8. B, Ch. 8
21	Spatial econometrics	28	2	2	8	E
22	Systems of equations. Seemingly unrelated regression model. Simultaneous equations models. Bivariate and multivariate probit models.	29-30	4	4	16	G, Ch.10; Ch.17, 17.5 C&T, Ch.6, B, Ch. 6-7
23	Nonlinear Regression Models. Quantile	31	2	2	8	G, Ch.7, 7.3 Ko

No	Topic/Focus/Activity	Number of the week (lecture)	Lectures (hours)	Classes (hours)	Self-study (hours)	Readings and assignments
	regression					
24	Kernel methods of estimation	32	2	2	8	G, Ch.12, 12.4 Ke
25	Semiparametric estimation. The stochastic frontier model	33	2	4	8	G, Ch.12, 12.3 C&T, Ch.9
26	Bootstrap Methods	34	2	2	6	G, Ch.15, 15.4 C&T, Ch.11
27	Bayesian estimation and inference	35	2	4	6	G, Ch.16 C&T, Ch.13
28	Shrinkage Methods. Ridge, Lasso, Elastic Lasso.	36	2	2	8	H&T, Ch. 3

Description of course methodology and forms of assessment to be used:

classes will meet twice per week, for a 2-hour lecture and a 2- hour tutorial. Students are expected to be present for all lectures and actively participate in all tutorial activities. The lecturer will hold office hours, except for breaks and holidays, with additional hours held by the tutor.

Section 4. Texts, readings and other informational resources

Required readings:

Greene W. H. Econometric analysis. 7 th. ed, Prentice Hall, NY, 2012 [G]
Verbeek M. A guide to modern econometrics. – John Wiley & Sons, 2004. [V]

Additional readings:

Baltagi B.H., Econometric Analysis of Panel Data. John Wiley&Sons, Ltd. 2005 [B]
Cameron A. C., Trivedi P. K. Microeconometrics: methods and applications. Cambridge university press, 2005. [C&T]

Elhorst J. P., Spatial econometrics: from cross-sectional data to spatial panels. Heidelberg, New York, Dordrecht, London : springer, 2014. [E]

Hardle W., Muller M., Sperlich S., Werwatz A., Nonparametric and Semiparametric Models, Springer, 2004. [H]

Hastie T., Tibshirani R., Friedman J. The Elements of Statistical Learning: Data Mining, Inference, and Prediction. Springer, 2008. [H&T]

Keele L., Semiparametric Regression for the Social Sciences, John Wiley&Sons, Ltd., 2008. [Ke]

Koenker R., “Quantile regression”, Cambridge University Press, 2005. [Ko]

Section 5. Examination/Evaluation

Assessment and grade determination for the Fall term:

- The first control work includes test and problems on the topics 1-5.
- The first homework: the course participants collect their own cross sectional data and the statistical package STATA for data analysis (and econometric techniques on the topics 1-9).
- Midterm exam includes test and problems on the topics 1-9.
- The cumulative score for the Fall term = 0.5 first control work + 0.5 first homework
- The final grade for the Fall term = 0.6 cumulative score for the Fall term + 0.4 midterm exam

Assessment and grade determination for the Spring term:

- The second control work includes test and problems on the topics 10-16.
- The second homework: the course participants collect their own time series and panel data and use the statistical package STATA for data analysis (and econometric techniques on the topics 13-16).
- Final exam includes test and problems on the topics 10-25.
- The cumulative score for the Spring term = min(0.3 Fall term + 0.35 second control work + 0.35 second homework + 0.03 activity score; 10)
- The final grade for the Spring term = 0.6 cumulative score for the Spring term + 0.4 final exam

Activity on classes calculates as follows:

Maximum of activity score is 10 that requires to be active on 20 or more classes. If student is active less than 20 classes the activity score calculate proportionally to 20.
Student is marked to be active on a class if he\she solves some problem at the blackboard or replies 3 or more lecturer's question from the seat.

Section 6. Academic Integrity

The Higher School of Economics strictly adheres to the principle of academic integrity and honesty. Accordingly, in this course there will be a zero-tolerance policy toward academic dishonesty. This includes, but is not limited to, cheating, plagiarism (including failure to properly cite sources), fabricating citations or information, tampering with other students' work, and presenting a part of or the entirety of another person's work as your own. HSE uses an automated plagiarism-detection system to ensure the originality of students' work. Students who violate university rules on academic honesty will face disciplinary consequences, which, depending on the severity of the offense, may include having points deducted on a specific assignment, receiving a failing grade for the course, being expelled from the university, or other measures specified in HSE's Internal Regulations.