

Joint HSE-NES BAE program

Fall 2016

Econometrics

Tentative course syllabus

15 June 2015

Course instructor

Konstantin Styrin

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Office hours: by appointment.

TA

TBA

Email: TBA

Office hours: TBA

Schedule of classes

Meeting times: TBA

Location: TBA.

Textbooks

[W] Wooldrige J.M., *Introductory Econometrics: A Modern Approach*, South-Western College Publishing, 2000.

[AP] Angrist, J. and Pischke, J., *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2009.

Course description

Econometrics is an introductory course for the joint NES-HSE bachelor's program. The main objectives of the course are to introduce students to basic econometrics techniques and to prepare them to do their own applied work. Students are encouraged to think of the course as a preparation toward their thesis research project. The prerequisites of the course are Calculus and Statistics at an intermediate level. The knowledge of some computer-programming is welcome. The course is taught in Russian.

Grading

1. There will be two midterm tests and the final test for the course. The first midterm test will be on TBA and the second midterm test on TBA. Both midterm tests will be taken during the class period. In addition, students will be responsible for solving ten problem sets as homework assignments.

2. The main form of evaluation is the final test at the end of the semester. Passing the final test is necessary in order to get a passing mark for the course. A passing grade is obtained by correctly solving 40% of the final test. The final test date, time, and location TBA.
3. Conditional on passing the final test, the grade for the course is calculated as follows. The score for each of the midterm tests will contribute to the final grade with the total weight of 20%. The contribution of homework will be 25%. The final test will contribute the remaining 35%.
4. Students who fail the final test or whose final grade average is below a passing grade have the opportunity to take a makeup test. Students who pass the makeup test get the minimum passing grade for the course. There are no further makeup opportunities.
5. Students who miss a midterm test due to illness and present necessary medical documentation will be given the opportunity to make up for the missed credit by solving extra problems during the final test. No other makeup opportunities for a missed midterm test will be offered.
6. Homework assignments will be graded by a teaching assistant. The grade given by the assistant is final and cannot be appealed. No late homework will be accepted.

Tentative course outline and readings

1. **Introduction to econometrics.** “The dismal science”: Why do we need econometrics? Causal relationships vs. correlations. Experiments and quasi-experiments. Identification and statistical inference. Internal and external validity. The selection problem. Cross-section and longitudinal data.
AP, Chapters 1-2; W, Chapter 1.
2. **The simple/univariate regression model** Derivation of the OLS estimator. Mechanics and properties. Units of measurement and functional form. Unbiasedness and efficiency.
W, Chapter 2.
3. **Multi-variate regression analysis** Motivation: multiple sources of variation. Mechanics and interpretation of OLS. The “partialling out” interpretation and linear projections. Unbiasedness and efficiency: the Gauss-Markov Theorem.
AP, Chapter 3; W, Chapter 3.
4. **Inference in the multi-variate regression model** Sampling distributions of the OLS estimators. Testing hypothesis. Confidence intervals.
W, Chapter 4.
5. **Asymptotic properties of OLS** Consistency, asymptotic normality, and asymptotic efficiency. The LM test. Potential sources of endogeneity: omitted variables, measurement error, simultaneity.
W, Chapter 5.
6. **Further issues in OLS estimation** Data scaling and beta scores. Quadratic and interaction terms. Prediction. Dummy variables. Proxy variables. Missing data and outliers.
W, Chapters 6, 7 and 9.

7. **Heteroscedasticity** Consequences for OLS. Heteroscedasticity-robust inference. Breusch-Pagan and White tests (optional; if time permits). WLS and FGLS.

W, Chapter 8.

8. **Instrumental variables and 2SLS** Instruments as a solution to endogeneity. Reduced-form equations. Exclusion restrictions. Rank condition. Two-stage least squares and GMM. Consistency and other asymptotic properties. Potential pitfalls. Local average treatment effects.

AP, Chapter 4; W, Chapter 15.

Angrist, J. and V. Lavy (1999), "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement," *The Quarterly Journal of Economics* 114, 533-575.

Levitt, S.D. (1996), "The Effect of Prison Population Size on Crime Rates: Evidence from Prison Overcrowding Litigation," *The Quarterly Journal of Economics* 111(2), 319-351.

9. **Simultaneous equations models** Endogeneity bias in OLS. Exclusion restrictions and instruments. Reduced form vs. structural form coefficients.

W, Chapter 16.

10. **Introduction to panel data methods** Why panel data is necessary. Problems with panel data: attrition. Pooled OLS, random effects and fixed effects estimators.

W, Chapters 13-14.

11. **Maximum likelihood** (optional; if time permits) ML estimators. Likelihood ratio, Wald and LM tests. GLS and 2SLS as ML estimators.

TBA

12. **Limited dependent variable models** Probit, logit, tobit, and heckit.

W, Chapter 17.

13. **Regression analysis with time series data** Stationary time series. Trend and seasonality. Finite distributed-lag models. Autocorrelation. Asymptotic properties of OLS. Heteroscedasticity-and-autocorrelation-consistent standard errors. Tests for unit roots. Spurious regression and co-integration. Forecasting. Vector autoregressions (VARs): reduced-form vs. structural. Identification of structural macro shocks in VARs.

W, Chapters 10-12, 18.