ECON 771
Advanced Econometrics
SPRING 2024

Instructor: Andrii Babii

Time and Location: T and Th, 11:00 – 12:15 PM, Gardner 211

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Prerequisites

Econ 770 is required. Some knowledge of probability theory, statistics, and linear algebra is mandatory.

Course description

This course is a continuation of Econ 770 with emphasis on theoretical foundations and practical applications of basic econometric tools. Topics include least squares, asymptotic theory, QMLE, discrete choice models, endogeneity, instrumental variables, GMM, time series analysis, and panel data. Problem sets will require solving theoretical exercises and empirical work.

Problem Sets

There will be weekly problem sets. You can use Matlab, R, Python, or Julia. The TA support will be provided in Matlab though. Pre-canned routines and packages are not allowed. Your lowest grade problem set will not count towards the final grade, but you should submit all problem sets. You can discuss problem sets in groups, however, everyone should handle in her/his own solution. Please list names of all people whom you discussed solutions with. The due time is before the beginning of the class.

Grading

Your final grade will be based on:

- 20% problem sets (12 best)
- 30% midterm, 2/20 (in class)
- 50% final, 5/02 (3 hours)

Tentative schedule

#	Date	Topics	Problem Sets Posted	Due
1	1/11	Economic data and econometric models		
2	1/16	OLS: algebra	PS 1	
3	1/18	OLS: geometry		
4	1/23	OLS: finite-sample properties	PS 2	PS 1
5	1/25	Inference: testing and confidence sets		
6	1/30	OLS: finite-sample inference	PS 3	PS 2
7	2/1	Large sample theory I		
8	2/6	Large sample theory II	PS 4	PS 3
9	2/8	Linear regression: asymptotic properties		
10	2/15	Linear regression: standard errors	PS 5	PS 4
11	2/20	Linear regression: asymptotic inference		
12	2/22	Linear regression: bootstrap	PS 6	PS 5
13	2/27	**Midterm exam**		
14	2/29	Maximum Likelihood Estimation I	PS 7	PS 6
15	3/5	Maximum Likelihood Estimation II		
16	3/7	IV: endogeneity	PS 8	PS 7
		Spring Break		
17	3/19	IV: estimation and asymptotic properties		
18	3/21	IV: hypothesis testing	PS 9	PS 8
19	3/26	GMM: moment restrictions		
20	4/2	GMM: asymptotic properties	PS 10	PS 9
21	4/4	GMM: hypothesis testing		
22	4/9	GMM: weak identification and optimal instruments	PS 11	PS 10
23	4/11	Time series: weak stationarity and Wold's decomposition		
24	4/16	Time series: stationarity and estimation of ARMA	PS 12	PS 11
25	4/18	Time series: forecasting		
26	4/23	Panel Data: fixed effects I	PS 13	PS 12
27	4/25	Panel Data: fixed effects II		
28	4/30	Panel Data: random effects		PS 13

References

1. My lecture notes.

2. Recommended textbooks:

    (a) Hayashi, *Econometrics*, Princeton University Press, 2000.

    (b) Hansen, *Econometrics*, Princeton University Press, 2022.

3. Optional reading:

    - Florens, Marimoutou, Anne Peguin-Feissolle, *Econometric Modeling and Inference*, Cambridge University Press, 2007.
    - Wooldridge, *Econometric Analysis of Cross-section and Panel data*, MIT Press, 2000.
    - Davidson and MacKinnon *"Econometric Theory and Methods"*, Oxford University Press, 2003.
    - Manuel Arellano *Panel Data Econometrics*, Oxford University Press, 2003.
    - Frölich and Sperlich *Impact Evaluation: Treatment Effects and Causal Analysis*, Cambridge University Press, 2019.
    - Angrist and Pischke *Mostly Harmless Econometrics*, Princeton University Press, 2009.
    - *Handbook of Econometrics*, vol. 1-7A, North Holland, 1983-2020.
    - Abadir and Magnus *Matrix algebra*, Cambridge University Press, 2005.

4. If this is your first econometrics course for more intuition you refer to

    - *Introduction to Econometrics* by Stock and Watson, Pearson Series in Economics.
    - *Introductory Econometrics: A Modern Approach* by Wooldridge, Cengage.