EC9A3: Advanced Econometric Theory

University of Warwick, Department of Economics
Fall 2024

Module Description

The EC9A3 module is the first-year graduate sequence in econometrics. This module introduces the students to tools widely used in the econometric analysis of economic data. Term 1 of EC9A3 will focus on identification and estimation theory.

Contact Information

Lecturer:	Luis E. Candelaria.
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Office Hours:	EC9A3, Mon 4-6pm.

Class Information

Lectures:	Tue 11am-1pm and Wed 3pm-5pm. First Class: Tue, Oct 3rd. Last Class: Wed, Dec 6th.
Seminars:	Tue 2pm - 4pm.
TA:	Adam Di Lizia, `Adam.Di-Lizia@warwick.ac.uk`

Grading Policy

There will be (approx) 4 biweekly homework assignments, 1 presentation, and 1 final exam.

Assignments:	You may work in teams of up to 4 members. Assignments do not count for the final mark, but you are highly encouraged to hand in your solutions. Feedback will be provided on the solutions submitted. The solutions will be discussed jointly during the seminar session.
Presentation:	Presentation will be in groups of up to 4 members. The presentation will take place in week 9. The list of papers will be circulated in week 2 of the term.
Final Exam:	The exam will be in person. The exam date is unchangeable unless previous approval from the PG office is obtained. Different arrangements require approval from the PG Office.
Grade Structure:	Term 1 accounts for 50% of the final EC9A3 mark. 10% of the final mark is assigned to the presentation. 40% of the final mark is assigned to the exam.

References

You are responsible for the assigned textbook readings, the lecture notes, and what is discussed in the lecture. The main textbooks will be

(W) Wooldridge (2010), *Econometric Analysis of Cross-Section and Panel Data.*

(H) Hansen (2022), *Econometrics.*

Other good general references are

- Statistics and Probability Theory
  - (S1) Hansen (2022), *Probability and Statistics for Economist.*
  - (S2) Casella and Berger (2008), *Statistical Inference.*
  - (S3) Resnick (1999), *A Probability Path.*
  - (S4) Dudley (2002), *Real Analysis and Probability.*
  - (S5) A.W. van der Vaart (1998), *Asymptotic Statistics.*
  - (S6) Billingsley (1995) *Probability and Measure.*
- Econometrics
  - (E1) Angrist and Pischke (2008), *Mostly Harmless Econometrics.*
  - (E2) Angrist and Pischke (2014), *Mastering 'Metrics: The Path from Cause to Effect.*
  - (E3) Cunningham (2021), *Causal Inference: The Mixtape.*
  - (E4) Cameron and Trivedi (2005), *Microeconometrics: Methods and Applications.*
  - (E5) Hayashi (2000), *Econometrics.*
  - (E6) Imbens and Rubin (2015), *Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction.*
  - (E7) Amemiya (1985), *Advanced Econometrics.*
  - (E8) Newey and McFadden,(1994). "Large sample estimation and hypothesis testing", *Handbook of Econometrics.*
  - (E9) Lewbel (2019), "The identification zoo: Meanings of identification in econometrics", *Journal of Economic Literature.*

Preliminary Outline

1. Preliminaries
   (a) Review of Probability theory.
   [S1] Chapters 1-5, [S2]: Chapters 1-2, [S4] Chapter 1, [S5] Chapters 1-2.
   (b) Causality.
   [E1]: Chapter 1-2. [W]: Chapter 1.
2. Identification
   (a) Point Identification of the Classical Linear Regression Model.
   [E9]
3. Treatment Effects
   [E1]: Chapter 3, [W]: Chapter 18.
4. Estimation Theory
   (a) Asymptotic Theory: Convergence of random variables, LLN, CLT, and Delta method.
   [S1] Chapter 6-9, [S5] Chapters 2. [E6] Chapter 2., [W] Chapter 3.
   (b) Extremum Estimators: Consistency, Asymptotic distribution.
   [E6] Chapter 7, [W] Chapter 12, [E9] Chapters 1-4.
   (c) Hypothesis testing: Power, Size control, Confidence regions, Z-statistic, Wald statistic.
   [S1] Chapter 13-14, [S2] Chapter 8, [E6] Chapter 2, [W]: Chapter 12.
5. Linear Regression Model:
   [E6] Chapter 2, [W] Chapter 4.
6. Maximum Likelihood
   [S5] Chapters 5, [W] Chapter 13.
7. Instrumental Variables, LATE, and GMM.
   [E6] Chapter 3, [W] Chapter 5.
8. Nonlinear Models
   [W] Chapter 15.
9. Advanced Topics
   (a) Clustered Standard Errors.
   (b) Regularization and high-dimensional methods.
   (c) The Bootstrap