

Syllabus: AEB 6933

Advanced Econometrics

Fall 2018

Travis McArthur

Class schedule:	Monday	11:45am – 12:35pm
	Wednesday	11:45am – 1:40pm
Location:	205 Rolfs Hall	
Contact Email:	tmcarthur@ufl.edu	
Phone number:	352-294-7696	
Office Hours	Monday 4:00 – 6:00pm, Thursday 3:00 – 4:00pm, & by appointment	
Office Location	1123 McCarty B	

Course Description

This course covers econometric techniques beyond linear regression and maximum likelihood techniques. These techniques include nonparametric statistics, quantile regression, spatial econometrics, shrinkage estimators, estimation of structural models, and machine learning. The methods will be taught within the context of theoretical models that give these techniques economic content. The applications of the techniques will draw largely from the development economics literature.

Learning Objectives

Upon completion of this course, you will have:

- Learned the relative weaknesses and strengths of various econometric techniques
- Become familiar with how econometric techniques are applied in development economics and other fields of economics
- Explored the debates in the discipline about the interface of economic theory and empirical work
- Practiced how to write a referee report
- Strengthen good coding practices, including learning to use a version control system

Course Prerequisites

Knowledge of graduate microeconomics theory I (i.e. ECO 7115) and Ph.D.-level econometrics is required. Basic knowledge of a statistical package or language is expected.

Grading

Assessment in the course is determined by:

- 4 problem sets, worth 60% of the total grade (15% each)
- 4 research ideas, worth 20% (5% each)
- Referee report and presentation of a job market paper, worth 20%

Problem sets

There will be four problem sets to do throughout the semester. The problem sets will require programming in statistical analysis software and some application of econometric theory. Although I will accept assignments written in any language, I will only offer assistance on programming questions in R. Furthermore, I can only guarantee that the exercises can be completed with R. (Since most statistical software is Turing complete, with enough effort it should be possible to use other languages for any problem.)

To complete the programming parts of the assignments, you will use the GitHub version control system and give me read access to the relevant repository. Up to three students can commit to the same repository, and each student must commit at least some code to the repository to receive credit for the problem set. You do not have to stay in the same group for the whole semester.

Research ideas

You will write 1-2 page (maximum) summary of a research question of your choice. The purpose is to get the creative juices flowing for research. It should include the following pieces: What is your specific question? What does theory say the answer should be? What data would you need to answer the question? What estimating equation would you use and what coefficients would you expect? What identification issues will you face and how would you deal with them?

Do not cite previous literature. This assignment requires no literature review or searching on the internet. If you would like to pursue it as a project, you can always check afterward if the literature has already addressed the question. Do not spend time giving the background of the situation either. Focus on developing your research question. Also, you don't need to choose your question based on data that already exists. You can write about what you would do if you had the ideal feasible data set, but you must write about a data set that would be possible to collect with time and money.

Toward the end of the semester we will have in-class discussions about the research ideas. Each student will choose his or her favorite research idea to discuss.

Referee Report and Presentation

Each of you will have to write a 3-5 page referee report and give a 30 minute presentation on a different paper. Please e-mail me your first, second, and third choice papers and presentation dates by Sunday, September 2. They are all job market papers of students on the job market last year.

A referee report should include approximately one or two paragraphs of summary and then longer sections on larger concerns and more minor concerns. Make sure to have approximately two to four pages of detailed critiques. You should number your critiques. I will share two documents that explain how one should write a referee report (one is thanks to Alain de Janvry and Elisabeth Sadoulet and the other is thanks to William Thomson).

The presentations should be approximately thirty minutes long. Around twenty minutes of the presentation should be spent explaining what the paper does. Five minutes should be spent discussing the main contributions and the main shortcomings of the paper. The last five minutes should be spent discussing questions which are left open for future researchers on related topics. While these numbers are approximate,

you must make sure to cover these last two points. After your presentation there will be another five minutes for discussion with everyone.

All students in the course are expected to read the introduction of the job market paper before class the day it is presented. The presenter should hand in his or her referee report on the same day as the presentation is scheduled. A tentative list of papers from which you can choose are listed below. You can choose other job market papers from the 2017-18 job cycle or 2018-19 cycle particularly if your research interest is outside of development economics, but you must have me approve it so that it is up to quality standards.

- Carlson, S. (2017), “Dynamic Incentives in Credit Markets: An Exploration of Repayment Decisions on Digital Credit in Africa.”
- Colonnelli, E. & M. Prem (2017), “Corruption and Firms: Evidence from Randomized Audits in Brazil.”
- de Rochambeau, G. (2017), “Monitoring and Intrinsic Motivation: Evidence form Liberia’s Trucking Firms.”
- Kreindler, G. (2017), “The Welfare Effect of Road Congestion Pricing: Experimental Evidence and Equilibrium Implications.”
- Montero, E. (2017), “Cooperative Property Rights and Agricultural Development: Evidence from Land Reform in El Salvador.”
- Neggers, Y. (2017), “Enfranchising Your Own? Experimental Evidence on Bureaucrat Diversity and Election Bias in India.”
- Rigol, N., R. Hussam, & B. Roth (2017), “Targeting High Ability Entrepreneurs Using Community Information: Mechanism Design in The Field.”
- Vera-Cossio, D.A. (2017), “Targeting Credit Through Community Members.”
- Walker, M. (2017), “Informal Taxation and Cash Transfers: Experimental Evidence from Kenya.”

Course Plan

- Week 1:** Introduction; Properties of estimators through simulation
- Week 2:** Coding practices; Statistical power; Model selection
- Week 3:** Quantile regression
- Week 4:** Nonparametrics: Kernel estimation and its properties
- Week 5:** Nonparametrics: Nonparametric regression
- Week 6:** Parametric and nonparametric identification; Structural and reduced-form approaches
- Week 7:** Heckman selection model and the Generalized Roy model
- Week 8:** Spatial econometrics: Measures of spatial autocorrelation
- Week 9:** Spatial econometrics: Regression
- Week 10:** Shrinkage estimators: James–Stein, Ridge regression
- Week 11:** Shrinkage estimators: Lasso and Maximum Entropy
- Week 12:** Machine learning: Introduction
- Week 13:** Machine learning: Neural nets and random forests
- Week 14:** Discussion of research ideas

Tentative reference and reading list

1: Introduction; Properties of estimators through simulation

- Wooldridge, Jeffrey. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: MIT Press, 2002. Ch. 3 - 4.

2: Coding practices; Statistical power; Model selection

- Gentzkow, Matthew and Jesse M. Shapiro. 2014. *Code and Data for the Social Sciences: A Practitioner's Guide*. University of Chicago mimeo, <https://web.stanford.edu/~gentzkow/research/CodeAndData.pdf>, last updated January 2014.
- Nicholas Eubank. (2016) "Embrace Your Fallibility: Thoughts on Code Integrity." <https://thepoliticalmethodologist.com/your-fallibility-thoughts-on-code-integrity/> . June 6, 2016
- Greene, William H. (2012). *Econometric Analysis*. 7th edition. p. 148-152 and 178-181

3: Quantile regression

- Angrist, J. D., & Pischke, J.-S. (2009). *Mostly harmless econometrics*. Chapter 7: Quantile Regression, pages 269 - 291.
- Gamper-Rabindran, Shanti, Shakeeb Khan, and Christopher Timmins (2010). The impact of piped water provision on infant mortality in Brazil: A quantile panel data approach. *Journal of Development Economics*, Volume 92, Issue 2. Pages 188-200

4: Nonparametrics: Kernel estimation and its properties

- Hardle, Muller, Sperlich and Werwatz (2004) *Nonparametric and Semiparametric Models*. Ch. 3.

5: Nonparametrics: Nonparametric regression

- Hardle, Muller, Sperlich and Werwatz (2004) *Nonparametric and Semiparametric Models*. Ch. 4
- Behrman, Jere R., Yingmei Cheng , and Petra E. Todd (2004). Evaluating Preschool Programs When Length of Exposure to the Program Varies: A Nonparametric Approach. *The Review of Economics and Statistics* 86:1, 108-132.

6: Parametric and nonparametric identification; Structural and reduced-form approaches

- Rosa L. Matzkin. *Handbook of Econometrics Volume 6, Part B*, 2007, Pages 5307-5368. Chapter 73 Nonparametric identification
- Keane (2010) Structural vs Atheoretic approaches to econometrics. *Journal of Econometrics*.

7: Heckman selection model and the Generalized Roy model

- Heckman, J. J., & Honoré, B. E. (1990). The Empirical Content of the Roy Model. *Econometrica*, 58(5), 1121-1149.
- Brücker, H., & Trübswetter, P. (2007). Do the best go west? An analysis of the self-selection of employed East-West migrants in Germany. *Empirica*, 34(4), 371-395.

8: Spatial econometrics: Measures of spatial autocorrelation

- LeSage, James and R. Kelly Pace. (2009) *Introduction to Spatial Econometrics*. Ch 1-2 p. 1 - 42

9: Spatial econometrics: Regression

- Arbia, Giuseppe. (2014). *A Primer for Spatial Econometrics*. ch 2 -3. p. 26 - 97

- Staal, S.J, I Baltenweck, M.M Waithaka, T deWolff, and L Njoroge, (2002). Location and uptake: integrated household and GIS analysis of technology adoption and land use, with application to smallholder dairy farms in Kenya, *Agricultural Economics*, Volume 27, Issue 3, Pages 295-315

10: Shrinkage estimators: James–Stein, Ridge regression

- Efron, Bradley and Trevor Hastie, 2016, *Computer Age Statistical Inference*, Ch 7 “James–Stein Estimation and Ridge Regression,” p. 91 - 107

11: Shrinkage estimators: Lasso and Maximum Entropy

- Kallestrup-Lamb, Malene, Anders Bredahl Kock & Johannes Tang Kristensen (2016) Lassoing the Determinants of Retirement, *Econometric Reviews*, 35:8-10, 1522-1561.
- Golan, A., Perloff, J. M., & Shen, E. Z. (2001). Estimating a Demand System with Nonnegativity Constraints: Mexican Meat Demand. *Review of Economics and Statistics*, 83(August), 541–550.

12: Machine learning: Introduction

- Mullainathan, Sendhil, and Jann Spiess. 2017. "Machine Learning: An Applied Econometric Approach." *Journal of Economic Perspectives*, 31 (2): 87-106.
- Hastie, Trevor, Robert Tibshirani, and Jerome Friedman (2016). *The Elements of Statistical Learning: Data Mining, Inference, and Prediction*. Second Edition. Ch. 11 - 12.
- Jean, Neal, Marshall Burke, Michael Xie, W. Matthew Davis, David B. Lobell, and Stefano Ermon (2016). Combining satellite imagery and machine learning to predict poverty. *Science*.

13: Machine learning: Neural nets and random forests

- Hastie, Trevor, Robert Tibshirani, and Jerome Friedman (2016). *The Elements of Statistical Learning: Data Mining, Inference, and Prediction*. Second Edition. Ch. 15
- Chernozhukov, Victor, Mert Demirer, Esther Duflo, and Iván Fernández-Val. (2018). *Generic Machine Learning Inference on Heterogenous Treatment Effects in Randomized Experiments*. NBER Working Paper No. 24678

University Policies

Academic Honesty

The University of Florida requires all members of its community to be honest in all their endeavors. Students are required to commit themselves to academic honesty by signing a prescribed basic statement, including the Student Honor Code, as part of the registration process. A fundamental principle is that the whole process of learning and pursuit of knowledge are diminished by cheating, plagiarism, and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the University will take severe action against dishonest students. Similarly, measures will be taken against faculty, staff, and administration members who practice dishonest or demeaning behavior.

UF Services

Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Resources are available on-campus for students having personal problems or lacking clear career and academic goals that interfere with their academic performance. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling;
2. Student Mental Health, Student Health Care Center, 392-1171, personal counseling;
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual counseling;
4. Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Accommodations for Students with Disabilities

Students with disabilities, who need reasonable modifications to complete assignments successfully and otherwise satisfy course criteria, are encouraged to meet with the instructor as early in the course as possible to identify and plan specific accommodations. Students will be asked to supply a letter from the Office for Students with Disabilities to assist in planning accommodations. Please see instructor outside of class time to discuss any accommodations you might need.

Instructor evaluations

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at: <https://evaluations.ufl.edu> Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at: <https://evaluations.ufl.edu/results>