EAD 936
Econometric Analysis for Education Policy
Fall 2016

Professor Scott Imberman
25E Marshall-Adams Hall
Mailbox in 110 Marshall-Adams Hall.
517-355-4667
imberman@msu.edu

Prof. Joshua Cowen
201B Erickson Hall
517-355-2215
jcowen@msu.edu

Synopsis: The goal of this course is to provide students who plan to conduct research in education policy with practical understanding of econometric techniques often used in this research and the methodologies' relationship with causal inference. Through lectures, problem solving, and readings of seminal papers that utilize the techniques, by the end of the course students will understand when each strategy is appropriate, the benefits and drawbacks of each strategy, and the theoretical underpinnings behind each methodology. Thus upon completion students should be capable of thoroughly reading and criticizing research papers using econometric techniques in applications and to know when it is appropriate to apply such techniques to their own research.

Meetings: This course will be held Mondays and Wednesdays from 12:40PM to 2:00PM. In Bessey 222.

Office Hours: Imberman: Mondays 10:00am – 11:30am or by appointment in 25E MAH.
Cowen: By appointment.

Requirements:

(1) Exams: There will be two take-home exams in this class. The first will be due October 26th course and the second will be due on the day of the scheduled final exam time, December 15th. Students should expect to spend approximately 10 hours on each exam and will have two week to complete it. Each exam will be worth 30% of your grade.

(2) Paper Reports: Periodically throughout the course students will complete a roughly one page guided report discussing a paper read for class. This will be worth 15% of your grade.

(3) Referee Report: Students will complete a report on a work in progress paper presented at a recent education policy conference. Students are to treat the paper as a

submission to a journal and write a referee report that focuses on issues in the econometric strategies used in the paper. This report will be worth 25% of your grade and will be due during the last class.

Readings:

Required: There are three primary required textbooks for this course. The first is Mostly Harmless Econometrics" by Joshua Angrist and Joris Pishke (ISBN 978-0691120355). The second required text is "Methods Matter" by Richard Murnane and John Willett (ISBN 978-0199753864). The third is "Introductory Econometrics: A Modern Approach" (ISBN 978-1111531041) by Jeffrey Wooldridge. You may use an earlier version but note that chapter numbers provided below are from the 6th edition. All three books are placed on reserve in the main MSU library if you do not wish to buy them, though we recommend purchasing at Angrist and Pishke (which is relatively inexpensive) and Wooldridge (not so inexpensive) if you plan to continue work in quantitative education policy.

Other Useful Resources: Advanced students may want to consider acquiring "Econometric Analysis of Cross Section and Panel Data" by Jeffrey Wooldridge (ISBN 978-0262232586) which covers many of the topics we will discuss in class in more detail. A useful resource for basic statistical techniques is "Statistical Methods for the Social Sciences" by Alan Agresti and Barbara Finlay (ISBN 978-0130272959). Finally, remarkably, Wikipedia is often a useful resource for statistics so if you are not clear on something that would be a good first place to look for additional help, but be aware that since it is not formally edited there may be errors.

Papers: Finally, we will assign a series of papers in education policy and economics of education that utilize the various techniques we will cover in class. We will discuss these papers in class and critically assess their findings, the appropriateness of their econometric techniques, and the implications of these studies for policy. All papers will be provided on D2L.

Course Outline: This outline is preliminary and subject to change. Note that the Angrist & Krueger and Wooldridge readings can be quite technical with a lot more in there than you need for this course. Thus, it's recommended that you read those assignments *after* the relevant lecture and essentially use these texts as a secondary reference to the lectures. All papers and Murnane & Willett readings should be done before the class where the material will be covered.

NOTE THAT THE SYLLABUS IS PRELIMINARY AND READINGS AND TOPICS COVERED MAY CHANGE

1. Introduction

Why is it important to use econometrics in education policy?
What is causal inference?

Readings: Murnane & Willett, Chapters 1 – 3
Angrist & Pishske, Chapters 1
Wooldridge, Chapter 1

2. Mathematics and Statistics Background/Review

Basic linear algebra.
Calculus: derivatives.
Probability.
Commonly used probability distributions.
Conditional expectations.
Z and *t* statistics.

3. Ordinary Least Squares Regression

What is linear regression?
Intuition behind minimizing the sum of squared residuals.
Concepts of consistency, bias and efficiency.
When is OLS causal?
Homoskedasticity and heteroskedasticity.
Using proxy variables as a method of causal inference.

Readings Angrist & Pishke, Chapters 3.1.3 – 3.2.3

Fryer, Roland G., and Steven D. Levitt. "Understanding the black-white test score gap in the first two years of school." *Review of Economics and Statistics* 86.2 (2004): 447-464.

4. Randomized Controlled Trials (Experiments)

Why conduct experiments?
The Rubin causal model.
Treatment effects.
Problems with experiments.
Attrition.

Readings: Murnane and Willett, Chapters 4 – 6

Angrist & Pishke, Chapters 2.2 – 2.3

Figlio, David, Mark Rush and Yi Lin. “Is It Live or Is It Internet? Experimental Estimates of the Effects of Online Instruction on Student Learning” *Journal of Labor Economics* 31 (2013): 763 – 784.

Muralidharan, Karthik, and Venkatesh Sundararaman. "Teacher Performance Pay: Experimental Evidence from India." *The Journal of Political Economy* 119.1 (2011): 39-77.

5. Panel Data Methods

Cross-section, longitudinal and panel data.
Unobserved random-effects.
Unobserved fixed-effects.
Strict exogeneity assumption.
Use of school and student fixed-effects.
Whether to use fixed effects or lagged achievement to account for student factors.

Readings: Angrist & Pishke, Chapters 5.1, 5.3 – 5.4

Wooldridge, Chapter 14

Burke, Mary A., and Tim R. Sass. "Classroom peer effects and student achievement." *Journal of Labor Economics* 31.1 (2013): 51-82.

Bifulco, Robert, and Helen F. Ladd. "The impacts of charter schools on student achievement: Evidence from North Carolina." *Education Finance and Policy* 1.1 (2006): 50-90.

6. Natural Experiments, Difference-in-Differences and Triple Differences Techniques

What are “natural experiments?”
Non-parametric difference-in-differences.
Regression techniques for difference-in-differences and triple differences.
Benefits of identifying off of trends.
Comparative Interrupted Time Series
Cluster-robust standard errors.
Parallel trends assumption.
Assumption of no concurrent changes in unobservables.
Policy endogeneity.

Readings: Murnane and Willett, Chapter 8

Angrist & Pishke, Chapter 5.2

Andrews, Rodney J., Scott A. Imberman, and Michael F. Lovenheim. "Recruiting and Supporting Low-Income, High Achieving Students at Flagship Universities." NBER Working Paper No. 22260 (2016).

Dee, Thomas and Brian Jacob. "The Impact of No Child Left Behind on Student Achievement." *Journal of Policy Analysis and Management* 30 (2011): 418-446.

Strunk, Katherine, et al. "The Impact of Turnaround Reform on Student Outcomes: Evidence and Insights from Los Angeles Unified School District." *Education Finance and Policy* 11 (2016): 251-282.

7. Regression Discontinuity

RD as a localized experiment.
Local average treatment effect from RD.
Parametric and non-parametric methods.
Strict and fuzzy RD.
Bandwidth choice.
Tests for manipulation.

Readings: Murnane & Willett, Chapter 9

Angrist & Pishke, Chapter 6

Robinson-Cimpian, Joseph P. and Karen D. Thompson. "The Effects of Changing Test-Based Policies for Reclassifying English Learners." *Journal of Policy Analysis and Management* 35 (2016): 279-305.

Winters, Marcus A. and Joshua Cowen. "Grading New York: Accountability and Student Proficiency in America's Largest School District." *Educational Evaluation and Policy Analysis* 34 (2012): 313-327.

8. Instrumental Variables

What is an "instrument?"
When to use instrumental variables.
Instrument power and validity.

Making the argument for validity.
Two-stage least squares.
Direct tests for power and the pitfalls of weak instruments.
Indirect tests for validity.
Average treatment effects vs. local average treatment effects.
Lotteries as instruments.

Readings: Angrist & Pishke, Chapters 4.1, 4.4 – 4.5

Wooldridge, Chapter 15

Abdulkadiroğlu, Atila, et al. "Accountability and flexibility in public schools: Evidence from Boston's charters and pilots." *The Quarterly Journal of Economics* 126.2 (2011): 699-748.

Imberman, Scott A.. "The Effect of Charter Schools on Achievement and Behavior of Public School Students." *Journal of Public Economics*, 95 (2011): 850-863.

Other topics if time allows:

Propensity Score Matching
Bootstrap Standard Errors
Synthetic Controls