

# Causal Inference in Education Research<sup>1</sup>

EDUC 747-001 / PUBPOL 750-003

Professor Susan Dynarski

Winter 2009 Wednesday 9:00-12:00

## Course Overview

This course explores the use of experiments and quasi-experiments in education research. We will examine papers that use advanced research methods such as instrumental variables, regression discontinuity, propensity score matching, natural experiments, differences-in-differences, and randomized trials.

Students will produce a substantial, original piece of research. Research options include testing an original hypothesis using data; replicating and extending an existing empirical paper; critically reviewing the existing research on a topic; and formulating a detailed research design. This class is ideal for PhD students early in their dissertation phase, as well as for advanced master's students who plan to work with empirical research in a professional setting.

This syllabus will be updated as the course progresses. The version on CTools is authoritative.

## Prerequisite

An introductory course in multiple regression analysis (e.g., EDUC 795 or PUBPOL 569).

## Readings

You are expected to complete the assigned reading before class. These papers must be read closely in order to really understand what is going on. Read actively: circle what is unclear, highlight what you find most interesting, peruse the bibliography for useful sources, read the footnotes and tables especially closely. It is very useful to write a summary of the paper for your own files.

To guide this process of active and thoughtful reading, I will post questions about the articles. You can prepare your answers to these questions with a study group (I encourage this). You will *not* submit these answers. Rather, I will ask you these questions in class.

There is no course packet. Readings consist of:

- 1) Articles and working papers (all available online and I provide links, but if a link is broken please go hunting yourself)
- 2) *Mostly Harmless Econometrics* by Joshua Angrist and Jorn-Steffen Pischke (paperback version is available at online bookstores for \$25)
- 3) Draft manuscript of Richard Murnane and John Willett, *Method Matters: Improving Causal Inference in Educational Research* (provided on course website)

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<sup>1</sup> Richard Murnane and John Willett teach a wonderful course on causal inference at the Harvard Graduate School of Education. They have generously shared their course materials, which I have drawn on in designing this course.

## Course Requirements and Grading

### 1) Class Participation

25%

I will cold call from the lists of reading questions I distribute before class. Names will be chosen randomly. The quality of your answers to these questions will determine your participation grade, along with the quality and quantity of your voluntary contributions to the class discussion.

### 2) Class Presentation (20 minutes, with slides)

15%

In March or April, you will present your research-in-progress to the class. Your slides should be posted to the course website by the day before your scheduled presentation. Co-authors should split the presentation so each gets a chance to speak.

### 2) Final Paper

60%

Your paper (20-25 pp) will be a substantial, original piece of quantitative research in education. For doctoral students, the goal is a publishable article. I encourage you to co-author with another student in the class. Research options include testing an original hypothesis using data; replicating and extending an existing empirical paper; critically reviewing the existing research on a topic; and formulating a detailed research design. In each case, the paper should reflect a through grasp of the course's technical concepts.

**You must meet all of these deadlines to get full credit for the paper. You are graded on the quality of the research *at each step* of the process, including the final draft.**

January 16	Submit: One- page paper prospectus
January	Meet with Dynarski to discuss prospectus
January 31	Submit: Three-page expanded prospectus
February	Meet with Dynarski to set goals
February 15	Submit: Annotated bibliography
February 28	Submit: Detailed outline, including blank tables
March 15	Submit: First draft
March	Meet with Dynarski to get feedback on draft
March - April	Oral presentation of research to class
April 15	Submit: Second draft
April 26	Submit: Final draft

## **January 7, 2009: Introduction**

### *Required Readings to be Discussed in Class*

Traub, James (2002). "[Does It Work?](#)" *New York Times Education Life*, November 10.

Barrow, Lisa and Cecilia Rouse (2005). "[Causality, Causality, Causality: The View of Education Inputs and Outputs from Economics.](#)" Federal Reserve Bank of Chicago

Cook, Thomas (2001). "[Sciencephobia.](#)" *Education Next* (Fall).

*Lecture:* Introduction to methodological issues in classical experimental research design, in preparation for the discussion in the following class. Observational design vs. experimental design. Getting ready to read the class size papers.

## **January 14: Class Size: Randomized Trial and Observational Analyses**

### *Required Readings to be Discussed in Class*

Angrist & Pischke (2008). *Mostly Harmless Econometrics* Ch 1-2.

Krueger, Alan (1999). "[Experimental Estimates of Education Production Functions.](#)" *Quarterly Journal of Economics* 114(2): 497-532.

Hanushek, Eric (1997). "[Assessing the Effects of School Resources on Student Performance: An Update.](#)" *Educational Evaluation and Policy Analysis* 19(2): 141-164.

Krueger, Alan (2003). "[Economic Considerations and Class Size.](#)" *The Economic Journal*, 113 (February): 34-63.

*Lecture:* Issues in analysis and design of experiments: intention to treat vs. effect of treatment on the treated; attrition. Getting ready to read the voucher papers.

## **January 21: Issues in the Design and Analysis of Randomized Trials**

*Required Readings to be Discussed in Class*

Chapter 4 of Murnane and Willett draft manuscript (CTools under Resources)

Howell, W.G, Wolf, P. J., Campbell, D. E., & Peterson, P. E. (2002). [School Vouchers and Academic Performance: Results from Three Randomized Field Trials](#). *Journal of Policy Analysis and Management*, 21(2), 191-217.

Krueger, Alan and Pei Zhu (2004). "[Another Look at the New York City School Voucher Experiment](#)." *American Behavioral Scientist*. 47:5, pp. 658-98.

Myers, D. E. & Mayer, D. P. (2003). [Comments On: Another Look at the New York City School Voucher Experiment](#).

*Lecture:* Introduction to natural experiments. Getting ready to read the school lottery papers.

## **January 28: School Lotteries as Natural Experiments**

*Required Readings to be Discussed in Class*

Chapter 6 of Murnane and Willett draft manuscript (CTools under Resources)

Abdulkadiroglu, Atila, Josh Angrist, Sarah Cohodes, Susan Dynarski, Jon Fullerton, Thomas Kane, and Parag Pathak (2009). "[Informing the Debate: Comparing Boston's Charter, Pilot and Traditional Schools](#)." Boston Foundation Research Report.

Cullen, J.B., B.A. Jacob and S.E. Levitt (2006). "[The Effect of School Choice on Participants: Evidence from Randomized Lotteries](#)." *Econometrica*. 74:5, pp. 658-98.

## **February 4: Natural Experiments Using Differences-in-Differences & Fixed Effects**

*Required Readings to be Discussed in Class*

Dynarski, Susan (2003). "[Does Aid Matter? Measuring the Effect of Student Aid on College Attendance and Completion](#)." *American Economic Review* (March).

Dynarski, Susan (2008). "[Building the Stock of College-Educated Labor](#)." *Journal of Human Resources* (Summer).

Seftor, Neil and Turner, Sarah (2002). "[Back to School: Federal Student Aid Policy and Adult College Enrollment](#)." *Journal of Human Resources* 37:2, 336-352.

## February 11: Regression Discontinuity

*Required Readings to be Discussed in Class*

Angrist & Pischke (2008). *Mostly Harmless Econometrics* Ch 6.

Chapter 7 of Murnane and Willett

Angrist, Joshua and Victor Lavy (1999). "[Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement.](#)" *Quarterly Journal of Economics* 114:2 (May), 533-602.

## February 18: Regression Discontinuity & IV

*Required Readings to be Discussed in Class*

Angrist & Pischke (2008). *Mostly Harmless Econometrics* Ch 6.

Judy Scott-Clayton, On Money and Motivation: A Quasi-Experimental Analysis of Financial Incentives for College Achievement, October 2008.

Angrist, Joshua and Alan Krueger (1991). "Does Compulsory Schooling Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics* 106:4, pp. 979-1014.

## March 4 & 11: Fixed Effects & IV

*Required Readings to be Discussed in Class*

Angrist & Pischke (2008). *Mostly Harmless Econometrics* Ch 4  
-skip 4.2 & 4.3 & starred subsections & skim proofs

Currie, Janet and Enrico Moretti (2003). "[Mother's Education and the Intergenerational Transmission of Human Capital.](#)" *Quarterly Journal of Economics* 118:4.

Deming, David (forthcoming). "[Early Childhood Intervention and Life-Cycle Skill Development Evidence from Head Start.](#)" *American Economic Journal: Applied Economics*.

*Guest Speaker March 11:*

David Deming, Harvard University

*Two Student Presentations*

**March 18 & 25**  
**Assessing the Effectiveness of Teacher Certification:**  
**Randomized Trials and Observational Analysis**

*Required Readings to be Discussed in Class*

Boyd, Donald et al (2007). "[The Effect of Certification and Preparation on Teacher Quality](#)." *The Future of Children*. (non-technical, gives you policy context and overview of the literature)

Decker, Paul et al (2004). "[The Effects of Teach For America on Students: Findings from a National Evaluation](#)." *Mathematica Policy Research*

Darling-Hammond, Linda et al (2005). "[Does Teacher Preparation Matter? Evidence about Teacher Certification, Teach for America, and Teacher Effectiveness](#)." *Education Policy Analysis Archives*.

Kane, Thomas et al (2008). "[What Does Certification Tell Us about Teacher Effectiveness? Evidence from New York City](#)." *Economics of Education Review* 27, pp. 615–631."

*Two Student Presentations per Class*

**April 1: Evaluations in Developing Countries**

*Required Readings to be Discussed in Class*

Banerjee, Abhijit, Shawn Cole, Esther Duflo and Leigh Linden (2007). "[Remedying Education: Evidence from Two Randomized Experiments in India](#)." *Quarterly Journal of Economics*.

Banerjee, Abhijit and Esther Duflo (2008). "[The Experimental Approach to Development Economics](#)." NBER Working Paper No. 14467

*Two Student Presentations*

**April 8: Assessing Accountability Regimes using Cross- and Within-State Policy Variation**

*Required Readings to be Discussed in Class*

Dee, Thomas and Brian Jacob (2006). "[Do High School Exit Exams Influence Educational Attainment or Labor Market Performance?](#)" NBER working paper.

Goodman, Joshua (2008). "[The Labor of Division: Returns to Compulsory Math Coursework](#)" Economics Department, Columbia University.

*Two Student Presentations*

## **April 15: Financial Aid**

*Required Readings to be Discussed in Class*

Susan Dynarski, "[The New Merit Aid](#)," in Caroline Hoxby, ed., *College Choices: The Economics of Which College, When College, and How to Pay For It*. University of Chicago Press. 2004.

*Two Student Presentations*

**April 22: Student Presentations, Wrap-up & Lunch at Dominick's!**