

## Economics 412: Empirical Microeconomics

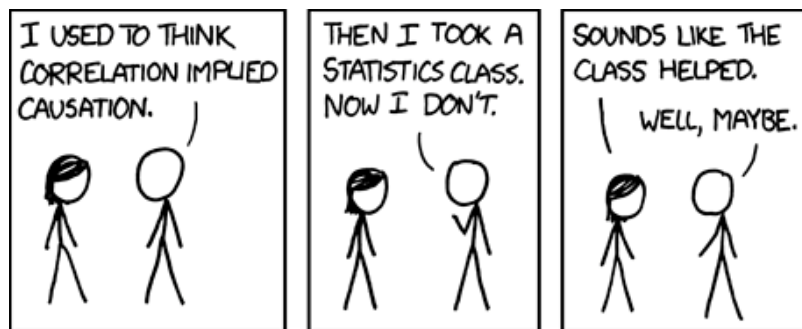
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Class meetings: T, TH 3:30 – 4:50

Office hours: T, TH 2-3 and by appointment



Source: <http://xkcd.com> (hat tip Chris Blattman & Michael Clemens)

### Course Objectives

The aim of this course is to empower students with a set of conceptual and econometric skills to estimate the causal impact of one factor on some outcome of interest. Examples explore the causal effect of policies, laws, programs and “natural experiments.” We will go beyond estimating causal effects to analyze the channels through which the causal impact was likely achieved, using microeconomic understanding of incentives and institutions.

The course will introduce students to a variety of econometric techniques in impact evaluation and a set of reasoning skills intended to help them become both a consumer and producer of applied empirical research. Students will learn to critically analyze evaluation research and to gauge how convincing the research is in identifying a causal impact.

At the end of the course the student will be able to:

- Understand and apply a variety of quantitative methods for estimating impact, including randomized controlled trials and quasi-experimental designs, such as “natural experiments,” propensity score matching, difference-in-differences and synthetic control designs.
- Critically analyze impact evaluation research in the social sciences and gauge the validity of causal estimates
- Understand evaluation design, including methods for designing randomized-controlled field trials
- Learn how to develop meaningful hypotheses that are amenable to evaluation and test them using econometric techniques

## Texts and Reading Materials

The texts for the class comprise two books and a variety of journal articles and papers.

The **required** textbooks for the class are:

Gerber, Alan S., and Donald P. Green. 2012. *Field Experiments: Design, Analysis, and Interpretation*. New York: W.W. Norton. (FEDAI in the reading list below)

Angrist, Joshua D., and Stephen Pischke. 2009. *Mostly Harmless Econometrics: An Empiricists' Companion*. Princeton, NJ: Princeton University Press. (MHE in reading list below)

Journal articles are listed below under each calendar date.

## Topics

### **I. Overview of Causal Inference**

FEDAI, Chapter 1

MHE, Chapters 1 & 2 (pp. 3 – 24)

Gertler, Paul J., Patrick Premand, Sebastian Martinez, Christel M. J. Vermeersch, and Laura B. Rawlings. 2010. *Impact Evaluation in Practice*. Chapter 3

### **II. Randomized Trials: Basic Mechanics**

FEDAI Chapter 2

Gertler, Paul J., Patrick Premand, Sebastian Martinez, Christel M. J. Vermeersch, and Laura B. Rawlings. 2010. *Impact Evaluation in Practice*. Chapter 4

*Optional:*

Bruhn, Miriam, and David McKenzie. 2009. "In Pursuit of Balance: Randomization in Practice in Development Field Experiments." *American Economic Journal: Applied Economics* 1(4):200-232.

### **III. Randomized Trials: Inference**

FEDAI Chapter 3

### **IV. Randomized Trials: Using covariates**

FEDAI Chapter 4

## **V. Randomized Trials: Non-compliance**

FEDAI, Chapters 5-6

Gertler, Paul J., Patrick Premand, Sebastian Martinez, Christel M. J. Vermeersch, and Laura B. Rawlings. 2010. *Impact Evaluation in Practice*. Chapter 4.

## **VI. Randomized Trials: Power**

FEDAI, Appendix 3.1

Gertler, Paul J., Patrick Premand, Sebastian Martinez, Christel M. J. Vermeersch, and Laura B. Rawlings. 2010. *Impact Evaluation in Practice*. Chapter 11

*Optional:*

<https://chrisblattman.com/2015/12/07/if-you-run-field-experiments-this-might-be-paper-that-will-make-it-harder-to-publish-your-work-in-a-few-years/>

## **VII. Instrumental Variables**

MHE, Sections 4.1, 4.4.1-4.4.2

Angrist, Joshua D., and Alan B. Krueger. 1991. “Does Compulsory School Attendance Affect Schooling and Earnings?”. *The Quarterly Journal of Economics* 106 (4). Oxford University Press: 979–1014.  
<http://www.jstor.org/stable/2937954>.

## **VIII. Panel Methods**

MHE Sections 5.1-5.3 (inclusive)

Gertler, Paul J., Patrick Premand, Sebastian Martinez, Christel M. J. Vermeersch, and Laura B. Rawlings. 2010. *Impact Evaluation in Practice*. Chapter 6

*Optional:*

Bleakley, H. 2010. “Malaria eradication in the Americas: A retrospective analysis of childhood exposure.” *American Economic Journal: Applied Economics* 2, no. 2: 1–45.

## **IX. Synthetic Control**

Abadie, Alberto; Diamond, Alexis; Hainmueller, Jens, "Synthetic Control Methods for Comparative Case Studies: Estimating the Effect of California's Tobacco Control Program" *Journal of the American Statistical Association*, vol. 105, no. 490, June 2010, pp. 493-505.

Abadie, Alberto and Javier Gardeazabal, "The Economic Costs of Conflict: A Case Study of the Basque Country," *American Economic Review*, March 2003, pp. 113-132.

## Assignments

### Homework Assignments

There will be 3 homework assignments in the first half of the course that will provide you with an opportunity to learn about and implement experimental designs. Please submit these assignments via Blackboard.

### Project Assignment

You will complete this assignment individually. The tasks will largely be completed over the second half of the semester. You will have the opportunity to choose your own research question and to design a study that answers this question.

The assignment has several phases:

1. **Research Question:** Develop a research question
  - a. Discuss why this is (a) interesting and (b) important
  - b. Provide a hypothetical answer to your question
  - c. Explain why observational studies answering your question may be biased
2. **Experimental Design:** Design an experiment to answer the question
  - a. Randomization strategy
    - i. Unit(s) of assignment, blocking
    - ii. Why does this assignment mechanism provide an unbiased answer to your question
    - iii. Randomize assignment
      1. If blocking on covariates or baseline variables, see below under Data
  - b. Data
    - i. Unit(s) of observation
    - ii. In a spreadsheet (.xls or .csv) or Stata (.dta) file, name each variable you will use in your analysis
      1. Observations should be blank...
      2. ...unless blocking randomization on covariates or baseline values, which should be filled in (randomly generated)
    - iii. Sample size by treatment group
  - c. Estimation plan
    - i. Provide the mathematical notation for your main estimation equation
    - ii. How will you account for non-compliance
  - d. Submission should include:
    - i. Text description of (a) and (b)
    - ii. Accompanying description for randomization
    - iii. Data file with variable names, empty observations
3. **Experimental Analysis:** Analyze the data I provide to answer your question experimentally
  - a. Summary statistics on the data: N, average, min, max, SD

- b. Differences-in-means (or differences) to generate ITTy, ITTd, and CACE
  - c. Discussion of the presence and effects of non-compliance in your experiment
  - d. What conclusions do you draw from this? How does this address your initial hypothesis?
  - e. Submission should include:
    - i. Text description (Word, PDF, or LaTeX format)
    - ii. Results tables (can be in text document or as standalone in Excel, PDF, etc)
4. **Quasi-experimental Design:** Design a quasi-experiment to answer the question
- a. Causal identification
    - i. How will your strategy establish causality?
    - ii. How will your strategy test your specific hypothetical answer (and not an alternative mechanism)?
    - iii. What assumptions does this strategy require? Are they likely to hold in this case?
    - iv. Provide the mathematical notation for your main estimation equation
    - v. How does the design compare to your experimental analysis?
  - b. Data
    - i. Unit(s) of observation
    - ii. In a spreadsheet (.xls or .csv) or Stata (.dta) file, name each variable you will use in your analysis
      - 1. Observations should be blank
    - iii. Sample size by treatment group
  - c. Submission should include:
    - i. Text description of (a) and (b)
    - ii. Data file with variable names, empty

## Grades

Assignment 1	5%
Assignment 2	5%
Assignment 3	5%
Experimental design presentation	15%
Experimental design paper	15%
Experimental analysis paper	20%
Quasi-experimental presentation	15%
Quasi-experimental design paper	20%

## Schedule

Date	In-class topic	Assignment
Jan 28	Overview of causal inference	
Feb 2	Overview of causal inference	
Feb 4	Randomized trials: Basics	
Feb 9	Randomized trials: Basics	
Feb 13	Randomized trials: Inference	Assignment 1 due
Feb 16	Randomized trials: Inference	
Feb 18	Randomized trials: Covariates	Research question due
Feb 23	Randomized trials: Covariates	Assignment 2 due
Feb 25	Randomized trials: Non-compliance	
Mar 2	Randomized trials: Non-compliance	
Mar 4	BREAK	Assignment 3 due
Mar 9	Randomized trials: Power	
Mar 11	Presentations of experimental designs	Presentation
Mar 16	Presentations of experimental designs	“
Mar 18	Presentations of experimental designs	“
Mar 23	Presentations of experimental designs	“
Mar 25	Instrumental variables	
Mar 30	Instrumental variables	Experimental Design due
Apr 1	Instrumental variables	
Apr 6	BREAK	
Apr 8	Panel methods	Experimental Data provided
Apr 13	Panel methods	
Apr 15	Panel methods	Experimental Analysis due
Apr 20	Synthetic control	
Apr 22	Synthetic control	
Apr 27	Presentations of quasi-experimental designs	
Apr 29	Presentations of quasi-experimental designs	
May 4	Presentations of quasi-experimental designs	
May 6	Presentations of quasi-experimental designs	