PAM 4100 Syllabus
Causal Reasoning and Policy Evaluation
Department of Policy Analysis and Management
Cornell University
Spring 2016

Professor: Jordan Matsudaira
Office: 133 MVR Hall
Email: jdm296 at cornell dot edu
Office Hours: TBA
Course Meeting Times: TR 11:40 - 12:55pm
Location: MVR 151

Course Description

This is an advanced workshop course in applied quantitative methodology, focused on understanding how econometric evidence is used to justify causal claims about public policies and programs. This topic has special salience in the field of program evaluation, but is more widely relevant for thinking through the merits of public policies. Does the minimum wage cause employment losses? Does banning bilingual education raise achievement for Spanish speaking students? Do tougher penalties deter crime? For each of these important policy questions, there are many studies answering “yes” and many others answering “no”. In this class we will study the uses and abuses of the statistical tools and research designs that are employed to generate such findings. While no studies are perfect, some are better than others, and it’s important for decision makers to be able to separate the wheat from the chaff in making informed choices.

In this course we will study the most commonly used research designs used to assess the effectiveness of policies, treatments, laws, business strategies, etc. Each design relies on different sets of assumptions to justify the causal claims it produces. We will learn to evaluate when these assumptions are likely to be violated, and how such violations lead to misleading conclusions.

Learning Objectives

The goals of this course are to give students a chance to develop their ability to apply econometric techniques and reasoning to analyze real-world policy problems, along with their capacity to communicate the results of their analyses. More specifically, students who successfully complete the course will be expected to:

- Be familiar with causal reasoning, and how to evaluate whether common research designs support causal conclusions.
- Be proficient at using statistical analysis software to create evidence to investigate causal claims.
- Gain experience working on analysis and presentation projects as a team, and learn to effectively communicate the results of quantitative analyses.

Prerequisites

The prerequisite for this course is PAM 3100 (Multiple Regression Analysis) or a similar course. When in doubt, please see me. We will briefly review both some relevant econometrics and how to use the Stata statistical analysis software, but the goal of the course is to learn to apply tools that have already been studied.
ASSIGNMENTS AND GRADING

The aim of this course is to make you a sophisticated consumer and producer of quantitative analyses. Aside from attending lectures and participation, there will be three types of assignments over the semester.

- **Problem Sets** In the beginning of the course we will briskly review material from your econometrics courses with a focus on how various techniques are used in the context of research designs to evaluate the effect of some policy or program. I will give about 4-5 problem sets guiding you through replications of published studies of various policy issues. The problem sets will help you to learn to use the Stata statistics software program to analyze data and think critically about the utility of different research methods. Together, these problem sets will account for 20 percent of your grade.

- **Problem Analysis Exercise (PAE).** For many people, doing econometrics is the best way to learn. Accordingly I will assign a series of ‘policy analysis exercises’ that require you to analyze ‘real’ data to answer important policy questions, in a setting constructed to mirror ‘real-world’ tasks you might face employed as an analyst. You will work on the PAEs in groups that I assign, and you will present the results from your analyses in group presentations in class. This phase of the class will entirely abandon the lecture format–after introducing a PAE we will set aside two class periods for you to work with your group and meet with me in small groups to discuss your progress; have a day of in-class presentations; and a day to discuss the lessons of each exercise. Group work and participation by everyone will be important for making this succeed. Your average scores across about 4 PAEs along with your participation in our discussions will determine 50 percent of your grade.

- **Final Policy Project** Finally, there will be a 72-hour take-home final project that you will complete between the last day of class and the last day of the final exam period (you may choose any time window that works well for you). This final project will resemble the PAEs, but you will work on it independently and report your results in a brief memo with supporting tables and figures. The goal is to ensure that each of you has gained proficiency with the tool kit we build over the semester. This assignment will comprise approximately 30 percent of your grade.

**Computer work**

I recommend that students use Stata for the problem sets I will assign and the final project because it is becoming the ‘industry standard’ in places you may seek employment (though SAS is still popular) and it is the only package for which I will provide support. You are free, however, to use any program you wish. I will conduct a Stata review or orientation as needed. Stata can be accessed in most computer labs and libraries on campus, or you can use Stata on-line if you set up an account with CISER. If you wish, you may also elect to purchase a copy of the Stata program for your own computer. You can order a copy of Stata for yourself at a mild discount by taking advantage of Cornell’s campus-wide grad-plan by accessing the site below. I recommend purchasing ‘Intercooled Stata (Stata/IC)’ for the purposes of this class ($125 for a one-year license, or $75 for a 6 month license), but those who anticipate using the program for serious data work in the future may wish to purchase Stata-SE, which has the capacity to work with much larger datasets. Note that ‘Small Stata’ is not adequately powerful for the work in this class. See [http://www.stata.com/products/whichstata.html](http://www.stata.com/products/whichstata.html) for information about different versions of Stata, and see [http://www.stata.com/order/new/edu/gradplans/gp-campus.html](http://www.stata.com/order/new/edu/gradplans/gp-campus.html) to order the program online.

Some decent resources for learning Stata programming on your own can be found on-line at: [http://www.stata.com/links/resources1.html](http://www.stata.com/links/resources1.html)

**Academic Integrity**
The University Faculty Senate has developed a Code of Academic Integrity that governs all student academic undertakings. Absolute integrity is expected of every Cornell student. A Cornell student’s submission of work for academic credit indicates that the work is the student’s own. Any and all outside assistance must be acknowledged. For the specifics of this code of conduct, see http://cuinfo.cornell.edu/Academic/AIC.html

A clarification regarding homework: you may discuss homework with others, but may not copy homework or allow others to copy from you. (Equivalently, you may not tell others any answers or receive answers from others.) Similarly, I view any use of class materials from previous versions of this class as a violation of the Code. Your first assignment in this course is to read the entire Cornell Code of Academic Integrity (follow the link above). Ignorance of its contents will not be an acceptable excuse for any infractions.

**Students with Disabilities**

Students with documented physical or learning disabilities in need of accommodation should notify me at the beginning of the semester.

**Textbooks and Other References**

There are no required books or course-packs for this class. Most of the required reading for this class will consist of articles and reports available through the University’s networked resources. Links to most readings are embedded in the course outline and reading list for you to download and print as you see fit.

**Course Outline and Readings (Approximate)**

Note that I will modify the schedule and the set of readings along the way as dictated by necessity. The following is meant to be a rough guide only.

**I. Introduction and Overview**

In the first few sessions we will discuss the goals of the course, and review the syllabus. The story of Hormone Replacement Therapy motivates the goals and importance of what will occupy us for the semester. We’ll also schedule a review session on programming in Stata’s statistical analysis software package.


**II. An Overview of the Logic of Causal Inference**

Understanding the nature of causal arguments in the social sciences is an important lie

A. Correlation is not causation ... but what is? The Fundamental Problem of Causal Inference. Solutions to the FPCI.


**III. Randomized Controlled Experiments and Causal Inference**

As we shall see, randomized controlled trials are known as the gold standard for research on the causal effects of public policies. Even so, they are not without their limitations. We will learn the theory behind why this simple research design is often the most credible, and read several examples of the RCT in action, and also talk about some shortcomings of this design. The lessons we learn here will help us to evaluate many more types of research strategies by identifying how they differ from an RCT.

IV. Non-experimental methods: Statistical Control (Regression Analysis)

For a variety of reasons, true experiments are rare in policy research. As a result, researchers are left to try to gain knowledge about the effects of different programs relying only on observational—e.g., gained through a survey—data. This type of study poses many more problems to causal inference because of the differences among people exposed to different treatments. These differences often lead to ‘bias’ in the estimation of causal effects. Regression analysis is the most common research tool that researchers use to attempt to statistically ‘control’ for these differences. We will discuss the theory behind the method and review some studies where the credibility of the design is more and less credible.


V. Non-experimental methods: More Statistical Control (Matching Methods)

Regression methods are often criticized for being too ‘parametric’. In some cases, matching methods may provide a more flexible and thus effective way for controlling for observable differences across treatment and control groups. We will study a popular type of the many available matching estimators: propensity score matching.


VI. Reflection: Does statistical control work?


VII. Difference in differences


VIII. IV methods


IX. Regression discontinuity research designs


Rough Course Outline

I. Part 1: econometrics and research designs
The class will start with a classic lecture-problem set format. We will review many popular estimators and work through problem sets to discover their strengths and weaknesses in various contexts.

II. Part 2: PAEs
In this part of the class, we abandon the lecture format and you will be put in groups to analyze real policy issues and present your findings. Each PAE will unfold over 2 weeks (4 class periods), with the first meeting dedicated to introducing the problem and planning your analysis with your group, then one class set aside for meeting with me in your groups, a class worth of presentations, and then a class for discussing/reflecting on the assignment. An example of a PAE assignment is given on the next page.
Example Policy Analysis Exercise

In recent years, concern has grown that the quality of health care in American hospitals and nursing homes may be inadequate. In a report of the Institute of Medicine of the National Academy of Sciences, the IOM estimated that as many as 98,000 Americans die every year due to medical errors. That report suggested that inadequate nurse staffing levels were a key reason behind this low level of care. Over the past decade and a half, many states reacted to this study by enacting regulations that require a minimum number of nurses per patient to be on duty each day, or, similarly, a minimum number of nurse hours per patient per day. This problem has been particularly acute in nursing homes, where egregious maltreatment, neglect, and substandard care of residents continues to be documented despite frequent government inspections and many regulations aimed at ensuring quality care.

Suppose you are the chief policy advisor for a legislator who wants to decide whether to vote for a bill that would establish a minimum nurse staffing ratio for all nursing homes that receive Medicaid payments (i.e., nearly all of the homes in the U.S.). Others will advise him on politics; he has asked you to advise him about the potential benefits and/or drawbacks of such a policy based purely on the likely effects that such a law might have. To gain insight about the causal effects of such a law, he asks you to analyze the causal effect of a state staffing law for California nursing homes using a data set he obtained from the California Office of Statewide Health Planning and Development (CAOSHPD) (available on Blackboard: ca_minstaff.dta).

The data contain information on utilization (occupancy and the number of patient days), staffing levels, and quality of care outcomes for 913 nursing homes in California from 1996 through 2004. This is a panel data set with one observation for each facility-year combination for 8,217 total observations (913 homes times 9 years).

[...background details]

Your legislator asks you to focus your memo on two main themes. First, given the low level of resources available for enforcement of such a law, she/he is skeptical that the law would actually cause nursing homes to hire more nurses. Rather, firms might ignore, or at least delay complying with, the law. Second, she/he believes that the literature on the benefits of nurse staffing may be overstated so is skeptical about whether the law would have an impact on the quality of care in nursing homes even if the law is successful in raising staffing levels. Your legislator gives you the following instructions in preparing your memo.

1. Spend no more than 1-2 (short) paragraphs providing some basic background facts about what happened to a) nurse staffing levels per resident day; b) the fraction of firms in compliance with the 3.2 HPRD standard; and c) measures of quality of care, before and after implementation of the staffing law in CA. The two quality of care measures available in the data are 1) total deficiency citations (citations for a broad range of substandard care given during state health inspections—more citations is reflective of poorer care); and 2) the fraction of residents with pressure sores (a deterioration of skin integrity that is caused by lying in place for too long. Pressure sores are thought to be preventable with sufficient assistance in moving about). Be careful to note whether any changes you describe are statistically significant.

2. Staff at CAOSHPD have provided several variables to help you identify which firms might have been affected by the staffing law—your legislator strongly suggests you use (some of) these in your analysis. (More details)

Here are some hints for your data analysis (SNIP).
References


