THE UNIVERSITY OF WATERLOO

Department of Economics

ECONOMICS 673

RANDOMIZED CONTROL TRIALS AND POLICY EVALUATION IN ECONOMICS

Chris Riddell

WINTER 2020

HH 104
E-mail: c2riddell@uwaterloo.ca

Course objectives:

This course provides an in-depth 'treatment' of the use of randomized control trials 'RCT' (i.e., experiments) in economics. The focus is on policy-relevant research questions, and in particular Canadian policy research questions. Thus, the course also spends a good deal of time on the policy issue including the relevant institutions and policy context/background. Because of the close connection in labour market institutions and policy changes, along with the pattern of completed major social experiments over time, we also cover some US evidence and institutions. Note, given the simplicity of the econometrics for experimental evaluation combined with the policy orientation of this course, there is very little algebra and a substantial language-based component.

The course also examines other econometric approaches that have become useful (necessary perhaps) in the analysis of RCTs including instrumental variables 'IV' and difference-in-differences. Some knowledge of both of these estimators is assumed for this course, and thus if you do not have that knowledge (and are not taking Economics 622 concurrently) you would need to get up to speed early in the course (or take other appropriate action). In particular, we cover the Local Average Treatment Effect and the use of IV for analysis of experiments with non-compliance. Second, we will use the difference-in-differences estimator to try and recover the treatment effect of a 'contaminated' experiment.

The specific topics on research design/econometrics to be covered include the following:

1. Causal inference and the evaluation problem (Rubin Causal Model)
2. RCTs: Advantages and Disadvantages
    a. Random assignment solves selection bias
    b. Treatment Effects: ATT and ITT and Non-compliance
    c. Disadvantages: Substitution bias, Hawthorne Effects, John Henry Effects, Attrition Bias, Post-randomization Events
3. The Local Average Treatment Effect
4. Instrumental Variables analysis of experiments with non-compliance
5. Difference-and-Differences and post-randomization events

The policy issues/debates and major RCTs that we focus on include the following:

1. Class size and Project STAR (we use this data: Assignment #1)
2. Welfare reform and the Self-Sufficiency Project 'SSP'
3. Guaranteed income (i.e., basic income/negative income tax) and SIME-DIME + MINCOME (we use this data: Assignment #2)

Assessment strategies:

Final grades are based on two substantial assignments (10% *each*), analysis of potential pitfalls of past or ongoing RCT of your choice including presentation #1 (10%), a replication project of past RCT of your choice including presentation #2 (30%), and a final exam (40%). Note that the assignments, data, all documentation you will need (codebooks, questionnaires if relevant, etc.), info you need for presentations and the project are at LEARN. You will need to be enrolled at LEARN for this course.

Class participation is encouraged, and will be rewarded in a qualitative manner in the final grade; i.e., useful participation can increase your grade at the end of the year.

The final examination is used to assess the student's understanding of the material covered in the lectures and assigned readings. All questions on the final exam relate to the course objectives noted above, however, note that you will need to apply that knowledge of the course to scenarios you have not seen before. Also note that the final exam does not include any questions on the student presentations or specific topics chosen by students.

The assignments allow students to apply the research methods covered in the lectures and assigned readings to several real-world situations and to obtain experience with empirical analysis using appropriate data. The assignments also give you the tools you need to do the project. PLEASE NOTE THAT THE ASSIGNMENTS AND PROJECT MUST BE SUBMITTED BY HARD-COPY ONLY. ALWAYS INCLUDE YOUR DOFILE.

<u>Texts and reference materials:</u>

Required readings are available at LEARN.

There is no textbook exactly suitable for this material. I recommend *Mostly Harmless Econometrics* by Josh Angrist and Steffen Pischke. There are short sections of this that I provide at LEARN (subject to copyright laws), *but you should buy this book if you don't already have it*.

Some of the econometric theory needed for the course is covered in Greene, *Econometric Analysis*, 5th edition, chapters 13, 14, 15, and 22 and in Wooldridge, *Introductory Econometrics: A Modern Approach*, 3rd edition, 2006, chapters 13, 14, 15, 16 and 17.

The mini course taught by Imbens and Wooldridge *What's New in Econometrics* covers many of the methods studied in this course. These lectures are available at http://www.nber.org/WNE. The lectures on experiments, instrumental variables, instrumental variable analysis of experiments, and difference-in-differences are all highly useful and relevant to the course.

For the relevant background in labour economics, students should read the relevant chapters in Benjamin, Gunderson, Lemieux and Riddell, *Labour Market Economics: Theory, Evidence and Policy in Canada*, 6th edition, 2007, and in particular the sections on negative income taxes.

<u>Statistical software:</u>

Stata is to be used for all empirical assignments. You cannot use R. I include a brief crash-course at the beginning of term that also serves a pedagogical role for illustrating selection bias, but students should not view that as adequate for completing the assignments without substantial extra work.

<u>Key Dates:</u>

Class changes: Class on <u>March 6th</u> will be moved to the following week as I'm at a conference. Also, class on <u>March 27th</u> will be moved to earlier in the week as I'm at a conference.

Final: In class, 3 hours, April 3rd

Assignment 1: Due Monday January 27th by 5pm to Assignment Box
Assignment 2: Due Monday February 10th by 5pm to Assignment Box

Presentation dates are sign-up based. Please note, that the various presentations will be spread out through the term (especially for Presentation #1), and therefore if you want a specific date I suggest you sign up early. This will also depend on the final class size.

Presentation #1 – Selection of SRDC RCTs to choose from

For further details and other options, see: http://www.srdc.org/our-capabilities/experimentation.aspx. If there is a different RCT you want to choose and you aren't sure if sufficient documentation is available check with me.

UPSKILL: A large-scale demonstration project to measure the impacts of literacy and essential skills (LES) training in the workplace. The project uses a random assignment design to provide the most reliable measures of the impacts of LES training on workers skills, their job performance, and other outcomes relevant to workers and firm-level objectives. Approximately 80-100 firms and 1,200 workers participated, half of whom received training; the other half served as a control group in the study.

Motivational Interviewing Pilot Project: The evaluation of an intervention — called Motivational Interviewing (MI) — intended to help British Columbia social assistance recipients overcome any ambivalence that may be keeping them from making desired changes in their lives. The hypothesis under test is that MI will act as a catalyst for change moving from unemployment to employment. Outcomes for income assistance recipients streamed to receive MI are compared to outcomes from a randomly-assigned control group streamed not to receive MI.

British Columbia Advancement via individual determination (AVID): The evaluation of a demonstration project, using a random assignment design with more than 1,300 high-school students in British Columbia, of an academic preparation model for under-achieving students who are unlikely to go on to post-secondary education without some supportive intervention.

Future to Discover: The evaluation of a demonstration project involving 5,400 high-school students in New Brunswick and Manitoba that is testing, through a randomized trial, an alternative form of financial support and enhanced career education as ways to increase youth participation in post-secondary education, especially youth from low-income families.

Learn$ave: A demonstration project to evaluate, using random assignment, individual development accounts (matched saving accounts and financial literacy training) offered to low-income families to encourage adult learning activities and small business start-up; the project involved a total of some 5,000 low-income families in 10 communities, as well as non-profit organizations to coordinate and carry out service delivery and financial institutions to maintain the accounts.

Project and Presentation #2 – RCTs to choose from:

https://dataverse.harvard.edu/dataverse/jpal?q=&types=dataverses%3Adatasets&sort=dateSort&order=desc&page=2

This link is the J-PAL (Abdul Latif Jameel Poverty Action Lab) datavserse hosted at Harvard. Every RCT here has the data and original code used by the authors in their published paper. Note: there are a few projects here that are not RCTs so don't choose one of those. As you can see from the link there are 105 total entries so lots of choice. I would suggest picking a RCT on a topic you're interested in early in the course and reading the paper associate with that RCT. Then, as you progress through Assignments 1 and 2, start to play with the data.