Course Outline

Course Code	: BSE4713
Course Title	: Causal Econometrics for Business
Semester	: Semester 2, Academic Year 2023/2024
Faculty	: Pinchuan Ong
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Overview

This econometrics course provides students with tools needed to understand cause-and-effect relationships in the data. Businesses make a lot of investment decisions based on data, but poor understanding of causality can lead to mistaken inference, sometimes disastrously. In this course, you will learn the basic tools that are used to obtain causal relationships.

Throughout the course, we will cover major econometric tools, starting with the ones used to identify causal relationships. All tools have strengths and weaknesses, but some have more weaknesses than others. You will learn when to use these methods, their limits, and the difficulties faced when using actual data.

A large component of the grade is related to the group project that students will work on. The lectures deliberately front-load the main causal identification econometric tools that are potentially useful for the project, viz. difference-in-differences, instrumental variables, and regression discontinuity design. The project topic is open-ended, but students are expected to apply one of these three methods in the project. Students will be guided on the project throughout the course (see contact sessions in schedule).

The assigned textbook provides a good overview of the three methods to be used in the project. The textbook goes in-depth into the math of the methods in some parts; you are expected to become familiar with the math insofar as it is required to implement the methods (e.g. the regression specification). That said, the math is not the focus of this course, and we will focus more on the application aspects of the methods. At the end of the course, you are expected to become familiar with data work that involve the methods. Just as important, you will learn how to critically assess the work when someone presents you with an argument based on data.

This course requires knowledge from an introductory econometrics course, for example BSE3703 Econometrics for Business I. Basic knowledge about regressions is required. Previous courses may have covered some elements of causal identification (usually near the end of the course); that is fine, as long as the student does take a previous project or assignment that uses those methods and use it wholesale as the project in this course. Basic knowledge about estimating regressions using data analysis software is helpful but not required.

Course Objectives

- Learn basic tools to identify causal relationships from the data
- Understand the strengths and limitations of different methods
- Be able to critically assess whether an evaluation based on data is high or low quality
- Be able to apply the above to research reports, reports from consultants, and popular media articles

General Guide & Reading

1. Lecture slides prepared by the instructor

Lecture slides will be posted on Canvas before each class meeting. Students are expected to visit the site regularly, and download and review the materials before they come to the classes.

2. Textbook

Angrist, J. D., & Pischke, J. S. (2015). *Mastering 'Metrics: The Path from Cause to Effect*. Princeton University Press.
Cunningham, S. (2021). *Causal inference: The mixtape*. Yale university press.

3. Group project

The topic of the group project is open-ended. Each group will produce a project that utilizes a method from weeks 1 to 4 to analyze an issue of its choosing. The group will submit a project proposal in recess week, and present on the findings in week 11/12. There will be two dedicated group-specific meetings during lecture hours for the project (weeks 5 and 8) for the group to consult on project-related issues.

4. Discussant assignment

Students will be assigned as discussant for another group's project. Imagine you are an organization that engaged the group to investigate the issue, and they are now presenting their results. What questions should you be asking at the presentation? How should you evaluate the results? Each student is to submit a discussant report on the presentation they are assigned.

Assessment

Assessment Components	Weightage
Class participation	10%
Group project proposal	10%
Group project final presentation	30%
Individual assignment	20%
Discussant assignment	30%

Academic Honesty & Plagiarism

Academic integrity and honesty is essential for the pursuit and acquisition of knowledge. The University and School expect every student to uphold academic integrity & honesty at all times. Academic dishonesty is any misrepresentation with the intent to deceive, or failure to acknowledge the source, or falsification of information, or inaccuracy of statements, or cheating at examinations/tests, or inappropriate use of resources.

Plagiarism is "the practice of taking someone else's work or ideas and passing them off as one' own" (The New Oxford Dictionary of English). The University and School will not condone plagiarism. Students should adopt this rule - You have the obligation to make clear to the assessor which is your own work, and which is the work of others. Otherwise, your assessor is entitled to assume that everything being presented for assessment is

being presented as entirely your own work. This is a minimum standard. In case of any doubt, you should consult your instructor.

Additional guidance is available at:
- http://www.nus.edu.sg/registrar/administrative-policies-procedures/acceptance-record#NUSCodeofStudentConduct
- http://nus.edu.sg/osa/resources/code-of-student-conduct

Schedule and Outline

Week	Topic	Activities
1	Review of OLS, experimental design	
2	Difference-in-differences	
3	Instrumental variables	Groups to be formed
4	Regression discontinuity design	
5	Project consultation with individual groups—first feedback on project idea	
6	Standard errors matters (bootstrap, clustering)	
Recess		Group project proposal due
7	Nonparametric regressions	
8	Project consultation with individual groups—Check in on preliminary slides	
9	Missing data	
10	No class (Good Friday)	Individual assignment due
11	Project Presentation	
12	Project Presentation	
13	(Time permitting) Nonlinear issues	Discussant assignment due