因果推論 Causal Inference

一、課程宗旨

本課程從「反事實因果模型」（counterfactual model of causality）的角度剖析因果推論（causal inference）的特性及其分析方法。課程之設計，旨在協助修畢「社會科學統計方法」的同學進一步探討學理上有關「因果關係」的問題，並能針對其研究主題與數據資料，運用紮實的研究設計、選擇適當的統計模型與分析方法。本課程的重心，放在社會科學中較常見的觀察研究（observational study）。

二、必備課本


Software:

Required: StataCorp. 2009. Stata Release 11. College Station: StataCorp LP.

Optional for structural equation modeling (SEM): Amos, EQS, LISREL, Mplus, or R.

三、相關課本

(QASS#160)


余桂霖，2011，《結構方程式模型分析》，台北：五南。
*黃芳銘，2007，《結構方程模式：理論與應用》五版，台北：五南。
四、計分方式

- 作業、練習、小考  30%
- 期末報告  60%
- 出席、回答抽問  10%

五、課程內容及指定閱讀

This is a tentative schedule for the semester. Unless we fall behind or move through some sections more quickly than expected, your reading assignments will be as indicated here.

Week 1  Review of Basic Math and Probability Theory

Fox, John. 2009. *A Mathematical Primer for Social Scientists*.

**COUNTERFACTUAL (NEYMAN- RUBIN) MODEL OF CAUSALITY (CMC)**

Week 2.  The Potential Outcomes Framework and Various Types of Treatment Effects

黃紀，2008，〈因果關係與觀察研究：「反事實模型」之思考〉，《社會科學論叢》，2(1): 1-22。
黃紀，2010，〈因果推論與效應評估：區段識別法及其於「選制效應」之應用〉，《選舉研究》，17(2): 103-134。 (讀第壹、貳節)
Morgan & Winship, Chapters 1, 2.
Khandker, Koolwal, & Samad, Chapters 1, 2.

參考讀物：

Week 3  Nonparametric Approach: Manski’s Partial Identification Theory

黃紀，2010，〈因果推論與效應評估：區段識別法及其於「選制效應」之應用〉，《選舉研究》，17(2): 103-134。（讀第參至第伍節）

PURELY DESIGN- BASED CAUSAL ANALYSIS

Week 4  “Classic” Experimental & Quasi-Experimental Designs

Campbell & Stanley, pp. 5-64;
Khandker, Koolwal, & Samad, Chapters 3, 12.
参考讀物：
Shadish, Cook, and Campbell, 2002..

Week 5  Causal Graphs and Conditioning

Morgan & Winship, Chapter 3;
參考讀物：

Week 6  Selection on the Observables: Propensity Score Matching Methods

Morgan & Winship, Chapters 4, & 5;
Khandker, Koolwal, & Samad, Chapters 4, 13.
参考讀物：
Angrist & Pischke, Chapter 3.

**Selection on the Unobservables**

**Week 7  Assuming Time-Invariant Unobservables: Difference-in-Differences (DiD) Method**

Khandker, Koolwal, & Samad, Chapters 5, 14.
参考讀物：
Angrist & Pischke, Chapter 5.

**Week 8  Allowing for Time-Varying Unobservables: Instrumental Variable (IV) Method**

Morgan and Winship, 2007, Chapter 7;
Khandker, Koolwal, & Samad, Chapters 6, 15.
参考讀物：
Angrist & Pischke, Chapter 4.

**Week 9  Exploiting Exogenous Rules as IVs: Regression Discontinuity (RD) Methods**

Morgan and Winship, 2007, Section 9.2;
Khandker, Koolwal, & Samad, Chapters 7, 16.
参考讀物：
Angrist & Pischke, Chapter 6.

**Week 10  Midterm Paper Presentation**
Repeated Observations (with T>2) and Causal Inference

Week 11  Interrupted Time Series (ITS) and Panel Data

Morgan and Winship, 2007, Sections 9.1 and 9.3
參考讀物:
   Angrist & Pischke, Chapter 5.

MECHANISM-BASED CAUSAL ANALYSIS

Week 12  Building Causal Mechanism: An Intro. to Structural Equation Models (SEM)

黃芳銘，第一至三章；
Morgan and Winship, Chapter 8.
參考讀物:

Heckman’s Models

Week 13  Heckman’s Sample Selection (Correction) Model


Week 14  Extension to Treatment Effects Model

黃紀，2010，〈Heckman’s Treatment Effect Model 簡介〉，政大選舉研究中心「研究方法工作坊」。
Week 15  Switching Regressions


黃紀，2010，〈Heckman’s Treatment Effect Model 簡介〉，政大選舉研究中心「研究方法工作坊」。

參考讀物：


Week 16-17  “Causality” in the Studies of Electoral Systems and Voting


Week 18 Term Paper Oral Presentation

6/27 *Term Paper Due*