

ECO 2401 (Second Half)
ECONOMETRICS II

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1. Key Course Information

Course website: Quercus (<https://q.utoronto.ca>)

Lectures: Tuesday and Thursday 9:00 – 11:00 am ET (online synchronous, Zoom)

Office hours: By appointment on Zoom

TA: Joon Cho (joonhwan.cho@mail.utoronto.ca)

Course Delivery Method:

Lectures are delivered remotely. They are live-streamed, not necessarily recorded. To complete this online course, you must have access to a computer or a tablet with a working microphone and webcam, all webcams must be on.

Prerequisites: ECO2400H or ECO2408H

Evaluation:

35% Midterm (first half with Professor Adonis Yatchew)

35% Referee reports and problem sets (this second half)

30% Term paper

In this section, you will be asked to write three referee reports and answer questions related to the papers that you will be asked to referee. More detailed will be discussed in class.

2. Course Description

In this course, we will visit some recent advances in micro-econometrics. A significant amount of time will be devoted to the question of identification and causality (see more details below). This year we will visit three topics and have guest lectures on some useful econometric methods for applied researchers.

Topic 1: Identification

In this first topic, we will focus on the concept of identification which gained much wider attention in recent decades than in the past. We will discuss how data (what we observe) and model assumptions (what we assume beyond what is observed) jointly deliver answers to empirically relevant questions,

highlighting both the limit/content of the data and the tradeoff between credibility of inference and strength of model assumptions. To do so, we will begin by introducing some preliminary concepts:

1. Model structures, model completeness, model coherency.
“...all models are wrong, but some are useful.” – George Box.
“Art is not truth. Art is a lie that makes us realize truth...” – Pablo Picasso.
2. Point/partial identification, identified set, sharp bounds.
3. Falsifiability.
“The criterion of the scientific status of a theory is its falsifiability, or refutability, or testability.” – Karl Popper.

The leading papers we will use for this topic are:

- Chesher and Rosen (2017): “Generalized Instrumental Variable Models.” *Econometrica* 85(3), 959–989.
- Galichon and Henry: (2011): “Set Identification in Models with Multiple Equilibria.” *The Review of Economic Studies* 78(4), 1264–1298.

We will discuss how random set theory and optimal transportation can be used as tools for identification. We will discuss specific applications of this general framework to, for example:

- Binary response model.
- Regressions with interval-valued data.
- Model of market entry.
- English auctions.
- Nonparametric IV models.

References:

- [1] Ciliberto, F., and Tamer, E. (2009). “Market Structure and Multiple Equilibria in Airline Markets.” *Econometrica*, 77(6), 1791–1828.
- [2] Chernozhukov, V., and Hansen, C. (2005). “An IV Model of Quantile Treatment Effects.” *Econometrica*, 73(1), 245–261.
- [3] Chesher, A., and Rosen, A. M. (2017). “Generalized Instrumental Variable Models.” *Econometrica*, 85(3), 959–989.
- [4] Galichon, A., and Henry, M. (2011). “Set Identification in Models with Multiple Equilibria.” *The Review of Economic Studies*, 78(4), 1264–1298.
- [5] Manski, C. F., and Tamer, E. (2002). “Inference on Regressions with Interval Data on a Regressor or Outcome.” *Econometrica*, 70(2), 519–546.

Topic 2: Treatment Effects and Policy Evaluation (IV methods)

Evaluating the impact of an intervention (treatment) is fundamental for policy and funding allocation decisions. It generates knowledge about what works and determines whether a program should be scaled up or discontinued. However, the effects of a treatment/program may vary widely across economic agents (heterogeneous treatment effect) and individual’s knowledge or expectations about treatment effects may trigger strategic participation (endogenous selection). Uncovering aggregate causal/treatment effect in an environment with high degree of heterogeneity and endogenous selection is very challenging.

In this topic, we will introduce the notions of causal effects and other empirically relevant parameters within the potential outcome framework. We will then visit some recent methods that have been proposed

to (partially) identify causal effects in the challenging environment and discuss how they could be used to inform policymakers. We will essentially focus on IV methods. Additional methods are visited in ECO2403H “Topics in Econometrics” by Professor Yuanyuan Wan or me.

1. Potential outcome models, counterfactual, causality, heterogenous treatment effects.
2. IV Estimation and the local average treatment effects (LATE).
3. The marginal treatment effect (MTE) framework.
4. Falsifiability of the IV framework.

References:

- [1] Bhuller, M., Dahl, G. B., Løken, K. V., and Mogstad, M. (2020). “Incarceration, Recidivism, and Employment.” *Journal of Political Economy*, 128(4), 1269–1324.
- [2] Deaton, A. S., Heckman, J. J., and Imbens, G. W. (2010). “Forum on the Estimation of Treatment Effects.” *The Journal of Economic Literature*, 48(2), 356–455.
- [3] Heckman, J. J., and Vytlacil, E. (2005). “Structural Equations, Treatment Effects, and Econometric Policy Evaluation.” *Econometrica*, 73(3), 669–738.
- [4] Imbens, G. W., and Angrist, J. D. (1994). “Identification and Estimation of Local Average Treatment Effects.” *Econometrica*, 62(2), 467–475.
- [5] Kitagawa, T. (2015). “A Test for Instrument Validity.” *Econometrica*, 83(5), 2043–2063.
- [6] Mourifié, I., and Wan, Y. (2017). “Testing Local Average Treatment Effect Assumptions.” *Review of Economics and Statistics*, 99(2), 305–313.
- [7] Mogstad, M., Santos, A., and Torgovitsky, A. (2018). “Using Instrumental Variables for Inference about Policy Relevant Treatment Parameters.” *Econometrica*, 86(5), 1589–1619.
- [8] Mogstad, M., Santos, A., and Walters, C. R. (2019). “The Causal Interpretation of Two-Stage Least Squares with Multiple Instrumental Variables.” NBER Working Paper. R&R AER.

Topic 3: Optimal Treatment Assignment (if time permits)

Another challenge brought by heterogeneous treatment effects is the varying welfare consequences across different treatment allocation choices. In this topic, we will investigate how sample data and observable covariates from (quasi) experiments on treatment responses can help inform policy decisions in the presence of a (large) menu of treatment allocation choices. We will discuss the econometric challenges related to the problem and some recently proposed methods.

References:

- [1] Manski, C. F. (2004). “Statistical Treatment Rules for Heterogeneous Populations.” *Econometrica*, 72(4), 1221–1246.
- [2] Kitagawa, T., and Tetenov, A. (2018). “Who Should Be Treated? Empirical Welfare Maximization Methods for Treatment Choice.” *Econometrica*, 86(2), 591–616.
- [3] Stoye, J. (2009). “Minimax Regret Treatment Choice with Finite Samples.” *Journal of Econometrics*, 151(1), 70–81.

Topic 4: Guest Lectures

We will invite promising young econometricians/applied econometricians working on econometric questions that are of direct interest to applied researchers. They will present some of their work in 2 hours. Part of your final assessment will be to write a referee report on one of the papers presented. You will also be given some questions to answer about some of the papers. So, read carefully their papers before

their lectures and be prepared to ask as many questions as possible. The list of guest lecturers and references will be announced mid-course.

1. Pedro Sant'Anna <https://pedrohcg.github.io>
"Difference-in-difference with multiple time periods" Journal of Econometrics, Forthcoming
2. Jack Mountjoy <https://sites.google.com/site/jackmountjoyeconomics/>
"Community Colleges and Upward Mobility" R & R American Economic Review.

3. Tentative Lecture Schedule

Week	Date	Topic
1	Tues. March 2	Topic 1: Identification (1)
2	Thur. March 4	Topic 1: Identification (2)
3	Tues. March 9	Topic 1: Identification (3)
4	Thur. March 11	Topic 1: Identification (4)
5	Tues. March 16	Topic 2: Treatment Effects and Policy Evaluation (1)
6	Thur. March 18	Topic 2: Treatment Effects and Policy Evaluation (2)
7	Tues. March 23	Topic 2: Treatment Effects and Policy Evaluation (3)
8	Thur. March 25	Topic 2: Treatment Effects and Policy Evaluation (4)
9	Tues. March 30	Guest lecture 1: Pedro Sant'Anna
10	Thur. April 1	Optimal Treatment Assignment
11	Tues. April 6	Guest Lecture 2: Jack Mountjoy
12	Thur. April 8	Optimal Treatment Assignment