

賽局實證分析  
Empirical Game Theory Analysis  
ECON 7153  
黃景沂

Time and Location: Tuesdays, 10:20 am – 12:10 pm at 社科604

Office: 社會科學院 (頤賢館) 857

Office Hour: Thursdays, 10:30 am – 11:30 am

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## Course Description

The goal of this course is to familiarize students with tools to empirically analyze static and dynamic games. Game theory has been applied to study the interaction between actions in many fields of economics, including auctions, bargaining, oligopolies, social network formation, social choice theory, . . . . The equilibrium outcome of a game usually depends on model parameters. To determine these parameters from the real world data, we need econometric tools. Nonetheless, estimating a game-theoretical model often faces some methodological challenges, such as existence of multiple equilibria, the curse of dimensionality.

Recent developments in estimation methodology and computing ability have substantially reduced the difficulty in empirically analyzing a game-theoretical model. In this course, we will introduce these methodological innovations. In particular, we will focus on static and dynamic binary choice games. Most of the applications studies in this course come from the field of industrial organization. Many of them studies the entry/exit or open/closing decision by firms in an oligopoly market.

There is no formal prerequisite. However, you should have learned some econometrics. You are expected to have known OLS, IV estimation, MLE, and GMM. You are also expected to have known basic solution concepts in game theory, such as Nash equilibrium, subgame perfect equilibrium, and perfect Bayesian equilibrium.

Because of the covid-19 pandemic, the course will be taught online in the first three weeks (9/28, 10/5, and 10/12). The videos will be recorded and uploaded to NTUCOOL a few days before the scheduled course date. We will hold a live Q&A session at 11:50 am every Tuesday

(the regular course time) to discuss the teaching material. You are expected to have watched the videos before each live session.

Note: This course is complementary with *Empirical Methods in Industrial Organization* (offered in the Spring Semester). In that course, I focus on a firm's price/quantity decisions in an oligopoly game.

## Reference Books

Since this is a new research area, there is no standard textbook available for the course. Please refer to the reading list on the course website for all the references.

## Grades

Grades will be determined by classroom participation (20%), one classroom presentation (30%), a take-home midterm exam (25%), and a take-home final exam (25%).

The take-home exams are scheduled to begin on **November 16** and **January 11**, respectively. You will have seven days to finish the exams. Please make sure you can take the exams (due on November 23 and January 18, respectively) before enrolling this course. There will be NO make-up exam.

In the class presentation, you are going to present an assigned paper which uses some game-theoretical model to empirically study some real-world problems. You should introduce the motivation of the research, outline the research approach, and show the main empirical results. The presentation time for each paper is about 25–30 minutes. In order to prepare the assignment list, **send me your preferences** over the papers with a # mark on the reading list. In case on-campus teaching is suspended due to the pandemic, the classroom presentation will be replaced by a video presentation plus an online live Q&A session.

## Topics

- Introduction (9/28)
  - Structural Estimation
- Static Binary Games (10/5, 10/12, 10/19, 10/26, 11/2)
  - Entry Games with a Unique Equilibrium
  - Entry Games with Multiple Equilibria
  - Applications
- Dynamic Models with a Single Agent (11/9, 11/23, 11/30, 12/7)
  - Optimal Replacement Decision
  - Estimation Using Conditional Choice Probabilities
  - Applications

- Dynamic Games with Multiple Agents (12/14, 12/21, 12/28, 1/4)
  - Markov-Perfect Nash Equilibrium
  - Estimation Approaches
  - Applications