Empirical Industrial Organization

Renmin University of China
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Course Web: TBA

Class Hours: Monday 6 -8:30pm
Class Location: Lide Building 0504
Credit Hours: 3/51

Course Description

This is an **empirical course in the Graduate Industrial Organization sequence**, with an emphasis on **combining data, economic models, and appropriate identification strategies and econometric techniques**. The goal of this course is to equip students with economic theory and quantitative skills necessary to conduct original research on IO issues such as *pricing competition*, *market entry/exit*, *investment*, *innovation*, *product design et.al.* Toward this end, classes will involve lectures by the instructor, student presentations, and class discussion.

This course will focus on research papers using **structural models** to investigate firms' strategic behaviors and market outcomes. In particular, we will first **(theoretically)** investigate how the market structure / design and firms' information and beliefs affect their strategic interactions and eventually market performance; then discuss how to **use micro-level data to identify and estimate** market participants preference and technology parameters that rationalize their observed behaviors, assessing the efficiency of the studied markets.

Prerequisites:

Graduate-level coursework on microeconomics and econometrics is required, preferable with some knowledge on game theory. If you have not taken these courses, please obtain consent of the instructor to enroll.

Course Materials

This course is mainly based on the reading of research papers. In order to comprehend an empirical IO paper, we would need knowledge on IO theory and econometrics. Useful resources are

IO (and Game) Theory

- **Handbook of Industrial Organization, Vol. 1 – 5.**

- **Tirole, J. (1988)**: The Theory of Industrial Organization. MIT Press.

- **Belleflamme, P., Peitz, M. (2016)**: Industrial Organization Markets and Strategies. Cambridge University Press.

- Vives, X. (2009): Oligopoly Pricing: Old Ideas and New Tools. MIT Press.

- Mas-Colell, Whinston, and Green (1997), Microeconomic Theory, Oxford University Press.

- Krishna.V (2010): Auction Theory, 2nd ed. Academic Press

Econometrics for empirical IO

- **Handbook of Industrial Organization, Vol. 1 – 5.**

- **Aguirregabiria, V. (2021)**: Empirical Industrial Organization: Models, Methods, and Applications.

- Paarsch, H.J., Hong, H. (2006). An Introduction to the Structural Econometrics of Auction Data. MIT Press.

- Train, K. (2009): Discrete Choice Methods with Simulation, 2nd ed. Cambridge University Press.

- Cameron, A. C., and P. K. Trivedi. (2005): Microeconometrics: Methods and Applications, Cambridge University Press.

Evaluation

The final evaluation will base on the class participation, including discussion (20%) and presentations (30%) and a replication of classical papers (50%).

Presentation

Depending on the size of final enrollment and class schedule, each student (or group of students) will be required to present 1 – 2 research papers. Each presentation should last for 60 minutes including questions and responses. The presentation should

- summarize the paper;

- locate the paper's contributions in the literature;

- discuss weaknesses of the paper;

- make suggestions for further research.

Replication

For each student (or group of students), I will assign a classical paper to replicate using **R / Python**. You may use another programming language if you wish, but I expect that will be more difficult. You may also find the paper of your interest to replicate, but it has to involve structural estimation and you should discuss your choice of paper(s) with me. Eventually, you need submit a summarized draft with code in **ONE Jupyter notebook** file.[1].

- 30% for the code and the generated results (tables and graphs): integrity and clarity;

- 20% for the summary.

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[1] https://jupyter.org

Lecture outline and Reading List

The topics of the course and some related readings are listed below. I will announce required readings one week before each lecture. Some topics may be adjusted over the course to account for time constraints and class interests.

Lecture 1: Introduction to (New) Empirical Industrial Organization

Required Reading: Bresnahan (1989); Reiss and Wolak (2007), Chapter 1 of Aguirregabiria (2021)

- Economic questions and data in EIO;

- Examples of structural models in EIO;

- Skills required to conduct EIO researches

Lecture 2: Demand Estimation

Required Reading: Chapter 2 of Aguirregabiria (2021)

Lecture 3: Production Estimation

Required Reading: Chapter 3 of Aguirregabiria (2021)

Lecture 4: Oligopoly Theory I: Competition and Game

Required Reading: Part II in MWG (Game Theory, Chapters 7, 8 and 9)

- Dominant strategies and rationalizable strategies;

- Nash Equilibrium (NE) in static games of complete information;

- Bayesian Nash Equilibrium (BNE) in static games of incomplete information;

- Subgame Perfect Nash Equilibrium (SPNE) in dynamic games of complete information

- **(Optional)** Perfect Bayesian Equilibrium (PBE) in dynamic games of incomplete information

Lecture 5: Oligopoly Theory II: Classical Oligopoly Models

Required Reading: Chapter 5 of Tirole (1988) and Chapters 4, 5 and 7 of Vives (2009)
Useful Reading: Kreps and Scheinkman (1983); Klemperer and Meyer (1989)

- Bertand competition and its variants with asymmetric costs, capacity constraint, uncertain costs; DRS (IRS) technology;

- Capacity-then-Bertrand Competition;

- Commitment and Stackelberg Model;

- **(Optional)** Supply Function Equilibrium (SFE)

Lecture 6&7: Empirical Static Oligopoly Models with Complete Information

Read Chapter 4 of Aguirregabiria (2021) and Bresnahan (1982) to understand the identification of static oligopoly models with complete information. Then read Genesove and Mullin (1998) for testing conducts in U.S. suger industry, and Wolfram (1999); Sweeting (2007) for measuring market power in British electricity market.

- Identification of marginal cost and/or market conduct (or structure or ownership) for markets with

- Estimation using IV and GMM

Empirical Applications

- Genesove and Mullin (1998)

- Wolfram (1999); Sweeting (2007)

Lecture 7&8: Empirical Models of Static Oligopoly Models with Incomplete Information

Read Chapter 8 of Vives (2009) for game-theoretic treatment of competition with incomplete information; then read Chapters 2 and 3 of Krishna (2010) for some basic knowledge of auction theory. Laffont and Vuong (1996); Guerre, Perrigne, and Vuong (2000) are seminal for identification of auction models. Wolak (2003) provides results for identification and estimation of cost functions using bidding data from electricity market, and Hortaçsu and Puller (2008) aims for identification of forward positions using bidding data and observed costs.

- Standard auctions and bidding strategies;

- Revenue Equivalence Theorem and optimal auction;

- Identification of standard auctions in symmetric IPV paradigm

Empirical Applications

- Wolak (2003)

- Hortaçsu and Puller (2008)

Lecture 9: Empirical Models of Oligopoly Models with Entry

Read Bresnahan and Reiss (1991)

Lecture 10: Empirical Models of Two-Stage Oligopoly Models

Read Allaz and Vila (1993); Bushnell (2007) for theoretical models of two-stage oligopoly models.

Empirical Applications:

- Wolak (2007)

Lecture 11: Empirical Auction I: Direct Estimation

Read Athey and Haile (2002, 2007) for the state-of-art identification of auction models. **Empirical Applications:**

- Li, Perrigne, and Vuong (2000)

Lecture 12: Empirical Auctions: Simulation-Based Methods

Read Chapters 9 and 10 of Train (2009) and Chapters 12 and 13 of Cameron and Trivedi (2005) for background knowledge of simulation methods.

Empirical Applications

- Laffont, Ossard, and Vuong (1995)

Lecture 13&14: Advanced Topic: Games with Non-equilibrium Beliefs

Read Camerer, Ho, and Chong (2004) for the theoretical model of non-equilibrium beliefs.

Empirical Applications

- Hortaçsu, Luco, Puller, and Zhu (2019)

Suggested Topics for Student Presentation

Student presentation is planned in In **weeks 15 - 17**. You can choose from the suggested topics below for presentation. Please take the **suggested papers as the starting point** and supplement institutional and theoretical background in your presentation.

Topic 1: Automobile Lottery v.s. Auction in China

Li (2018)

Topic 2: Forward Contracting and Vertical Integration

Bushnell, Mansur, and Saravia (2008) and Puller (2007)

Topic 3: Subsidizing EVs v.s. Charging Stations

Springel (2021) and Li, Tong, Xing, and Zhou (2017)

Topic 4: Land Market Auctions in China

Cai, Henderson, and Zhang (2013) and Fang, Gu, and Zhou (2019)

Topic 5: Marginal Cost of Traffic Congestion in China

Yang, Purevjav, and Li (2020)

Topic 6: Imperfect Monitoring and Regulatory Costs of Enforcement

Kang and Silveira (2021)

References

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ATHEY, S., AND P. A. HAILE (2002): "Identification of Standard Auction Models," *Econometrica*, 70(6), 2107–2140.

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BRESNAHAN, T. F. (1982): "The Oligopoly Solution Concept Is Identified," *Economics Letters*, 10(1-2), 87–92.

——— (1989): "Chapter 17 Empirical Studies of Industries with Market Power," in *Handbook of Industrial Organization*, vol. 2, pp. 1011–1057. Elsevier.

BRESNAHAN, T. F., AND P. C. REISS (1991): "Entry and Competition in Concentrated Markets," *Journal of Political Economy*, 99(5), 977–1009.

BUSHNELL, J. (2007): "Oligopoly Equilibria in Electricity Contract Markets," *Journal of Regulatory Economics*, 32(3), 225–245.

BUSHNELL, J. B., E. T. MANSUR, AND C. SARAVIA (2008): "Vertical Arrangements, Market Structure, and Competition: An Analysis of Restructured US Electricity Markets," *American Economic Review*, 98(1), 237–266.

CAI, H., J. V. HENDERSON, AND Q. ZHANG (2013): "China's Land Market Auctions: Evidence of Corruption?," *The RAND Journal of Economics*, 44(3), 488–521.

CAMERER, C. F., T.-H. HO, AND J.-K. CHONG (2004): "A Cognitive Hierarchy Model of Games," *The Quarterly Journal of Economics*, 119(3), 861–898.

CAMERON, A. C., AND P. K. TRIVEDI (2005): *Microeconometrics: Methods and Applications*. Cambridge University Press, Cambridge ; New York.

FANG, H., Q. GU, AND L.-A. ZHOU (2019): "The Gradients of Power: Evidence from the Chinese Housing Market," *Journal of Public Economics*, 176, 32–52.

GENESOVE, D., AND W. P. MULLIN (1998): "Testing Static Oligopoly Models: Conduct and Cost in the Sugar Industry, 1890-1914," *The RAND Journal of Economics*, 29(2), 355–377.

GUERRE, E., I. PERRIGNE, AND Q. VUONG (2000): "Optimal Nonparametric Estimation of First-price Auctions," *Econometrica*, 68(3), 525–574.

HORTAÇSU, A., F. LUCO, S. L. PULLER, AND D. ZHU (2019): "Does Strategic Ability Affect Efficiency? Evidence from Electricity Markets," *American Economic Review*, 109(12), 4302–4342.

HORTAÇSU, A., AND S. L. PULLER (2008): "Understanding Strategic Bidding in Multi-Unit Auctions: A Case Study of the Texas Electricity Spot Market," *The RAND Journal of Economics*, 39(1), 86–114.

KANG, K., AND B. S. SILVEIRA (2021): "Understanding Disparities in Punishment: Regulator Preferences and Expertise," *Journal of Political Economy*, 129(10), 2947–2992.

KLEMPERER, P. D., AND M. A. MEYER (1989): "Supply Function Equilibria in Oligopoly under Uncertainty," *Econometrica*, 57(6), 1243.

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TRAIN, K. (2009): *Discrete Choice Methods with Simulation*. Cambridge University Press, Cambridge ; New York, 2nd ed edn.

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YANG, J., A.-O. PUREVJAV, AND S. LI (2020): "The Marginal Cost of Traffic Congestion and Road Pricing: Evidence from a Natural Experiment in Beijing," *American Economic Journal: Economic Policy*, 12(1), 418–453.