Game Theory

M.A. Development Economics

This course provides economics students with a strong foundation in game theory. Game theory is a tool for analyzing strategic situations. In these situations, an individual agent's payoff depends on the actions of all agents. This course focuses almost entirely on non-cooperative games, where agents make decisions independently.

Course Outline

Static Games of Complete Information

This section introduces the fundamental concepts of games where players know all relevant information.

A Normal-Form Representation of Games

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 1.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 2.
- Nash, John F. "Non-cooperative games." *Annals of Mathematics* (1951): 286-295.

Iterated Elimination of Strictly Dominated Strategies

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 1.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 2.

Nash Equilibrium and its applications

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 1.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 2.
- Kawakami, Toshikazu, and Yoshida Yoshihiro. "Collusion under financial constraints: Collusion or predation when the discount factor is near one?." *Economics Letters* 54, no. 2 (1997): 175-178.
- Hardin, Garrett. "The Tragedy of the Commons." *Science* 162, no. 3859 (1968): 1243-1248. (Classic paper on common pool resources)
- Ostrom, Elinor. "Governing the Commons: The Evolution of Institutions for Collective Action." Cambridge University Press, 1990. (Foundational work on self-governance of common pool resources)

Existence of Nash Equilibrium

- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 2.

Mixed Strategies

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 1.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 3.

Evolutionary Games

This module explores how game theory applies to evolving populations and behaviors.

- Wydick, Bruce. *Games in economic development*. Cambridge University Press, 2007. Chapter 3.
- Maynard Smith, John. "Evolution and the Theory of Games." Cambridge University Press, 1982. (Foundational text)

Equivalence between Nash Equilibrium and Evolutionary Stable Strategies

- Wydick, Bruce. *Games in economic development*. Cambridge University Press, 2007. Chapter 3.

Use of ESS in Development Economics

- Wydick, Bruce. *Games in economic development*. Cambridge University Press, 2007. Chapter 3.
- Bowles, Samuel. "Microeconomics: Behavior, Institutions, and Evolution." Princeton University Press, 2004. (Relevant for behavioral and institutional aspects in development)

Dynamic Games of Complete and Perfect Information

This section covers games where players make sequential decisions with full knowledge of past actions.

Analysis of extensive form games

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 2.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 5.

Backwards Induction

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 2.

- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 5.

Subgame Perfection

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 2.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 5.

Applications

- Murphy, Kevin M., Andrei Shleifer, and Robert W. Vishny. "Industrialization and the big push." *Journal of Political Economy* 97, no. 5 (1989): 1003-1026.
- Dasgupta, Partha. "Common property resources: Economic analytics." *Economic and Political Weekly* (2005): 1610-1622. (Directly relevant to overgrazing/commons)
- Runge, C. Ford. "Common Property and Collective Action in Economic Development." *World Development* 14, no. 5 (1986): 623-635. (Focuses on collective action in development context)

Repeated Games

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 2.
- Pecorino, Paul, and Akram Temimi. "Public good provision in a repeated game: The role of small fixed costs of participation." *Public Choice* 130, no. 3-4 (2007): 337-346.
- Fudenberg, Drew, and Eric Maskin. "The Folk Theorem in Repeated Games with Discounting or with Incomplete Information." *Econometrica: Journal of the Econometric Society* (1986): 533-554. (Key paper for repeated games)

Static Games of Incomplete Information

This module introduces games where players have private information.

Static Bayesian Games and Bayesian Nash Equilibrium

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 3.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 9.
- Harsanyi, John C. "Games with Incomplete Information Played by 'Bayesian' Players, I-III." *Management Science* 14, no. 3 (1967): 159-182. (Foundational work on Bayesian games)

Normal-Form Representation of Static Bayesian Games

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 3.

Dynamic Games of Incomplete Information

This section covers sequential games with private information.

- **Introduction to Perfect Bayesian Equilibrium**
- Gibbons, Robert. *A Primer in Game Theory*. Chapter 4.
- Osborne, Martin J., and Ariel Rubinstein. *A Course in Game Theory*. Chapter 10.

Perfect Bayesian Equilibrium in Signaling

- Gibbons, Robert. *A Primer in Game Theory*. Chapter 4.
- Katayama, Seiichi, and Kaz Miyagiwa. "FDI as a signal of quality." *Economics Letters* 103, no. 3 (2009): 127-130.
- Crawford, Vincent P., and Joel Sobel. "Strategic information transmission." *Econometrica: Journal of the Econometric Society* (1982): 1431-1451.
- Spence, Michael. "Job Market Signaling." *Quarterly Journal of Economics* 87, no. 3 (1973): 355-374. (Classic signaling paper)

Other Applications of Perfect Bayesian Equilibrium

- Scharfstein, David S., and Jeremy C. Stein. "Herd behavior and investment." *American Economic Review* 80, no. 3 (1990): 465-479.

Texts

1. *A Primer in Game Theory* by Robert Gibbons
2. *Game Theory* by Fudenberg and Tirole
3. *A Course in Game Theory* by Osborne and Rubinstein

Course Evaluation

- **40% - Mid Term Exam**
- **20% - Project:** Each student applies a game theoretic concept to a real-life situation. They use the model's prediction to evaluate the outcome in the real world.
- **40% - Final Exam**