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JEB064 Game Theory and Applications

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Objective

This course introduces into classic non-cooperative game theory and its applications in economics. The course develops the game-theoretical toolkit and teaches how to use it in various contexts, especially in modeling of competition (price and quantity competition, labor market competition, promotions, innovations, tournaments, rent-seeking), contracting and bargaining (organizational economics) and policy-making (monetary and fiscal policies, capital taxation, public policies and corporate policies).

In this undergraduate course, we will cover only games with complete information. Therefore, we will focus on problems in which rational agents have identical knowledge about fundamentals of the economy and their interactions, but cope with uncertainty over the actions of their opponents (strategic uncertainty). In contrast, the graduate course JEM013 covers games with incomplete information in which rational agents address both fundamental and strategic uncertainty.

Prerequisites

Introductory microeconomics and introductory knowledge of probability and statistics

Schedule

Wednesdays, 11:00-12:20, 12:30-13:50
12 weeks (no classes on May 10: Rector's Day)

I strongly encourage to attend in present. There will be no recordings of the lectures.

Course requirements

4 homeworks	50%
1 written (three-hour) final exam	50%

Grades ETCS

91-100	A
81-90	B
71-80	C
61-70	D
51-60	E
0-50	F

Home assignments

Each homework will be posted on the course webpage and announced in the lecture. You will have exactly **one week** for preparing your homework.

If everything goes as expected, Homeworks 1-4 will be assigned in Weeks 2, 5, 8 and 11; deadlines will be in Weeks 3, 6, 9 and 12.

Prepare your solution always as a PDF. The PDF should be generated in a text-processing system (e.g., LaTeX, Word) or as a scan of a legibly hand-written solution. Send it to my email martin.gregor@fsv.cuni.cz with "JEB064 Homework" in the title of the email. Deadline is always Wednesday, 11AM.

Each homework should be submitted individually or in a team of two students. If you are working in a team, send me only one solution for the team. If necessary, you may compose a different team for each homework.

Textbook

Tadelis, S. (2013) *Game Theory: An Introduction*. Princeton University Press.

We will closely follow this textbook. The book is available as an e-book.

Core readings

Occasionally, I will assign mandatory readings that will extend the core concepts.

- Aumann, R. J. (2019). A synthesis of behavioural and mainstream economics. *Nature Human Behaviour*, 3(7), 666-670.
- Belleflamme, P., Peitz, M. (2015). *Industrial Organization: Markets and Strategies*. Cambridge University Press. Chapters 3.3; 16.3.2.
- Konrad, K. (2009). *Strategy and Dynamics in Contests*. Oxford University Press. Chapters 1-2.

Extra readings

The following readings refer to applications covered in the class. They are not mandatory.

- Asker, J., Fershtman, C., Pakes, A. (2021). Artificial Intelligence and Pricing: The Impact of Algorithm Design (No. w28535). National Bureau of Economic Research.
- Blavatsky, P., Ortmann, A., Panchenko, V. (2022). On the experimental robustness of the Allais paradox. *American Economic Journal: Microeconomics* 14(1): 143-163.
- Dave, D. M., Friedson, A. I., Matsuzawa, K., McNichols, D., Sabia, J. J. (2020). Did the Wisconsin Supreme Court Restart a COVID-19 Epidemic? Evidence from a Natural Experiment (No. w27322). National Bureau of Economic Research.
- Gregor, M. (2021). Electives Shopping, Grading Policies and Grading Competition. *Economica*, 88(350), 364-398.
- Hindriks, J., Myles, G. (2013). *Intermediate Public Economics*. 2nd edition. Cambridge, MA: MIT Press. Chapter 20.2
- Hortaçsu, A., Luco, F., Puller, S. L., Zhu, D. (2019). Does strategic ability affect efficiency? Evidence from electricity markets. *American Economic Review*, 109(12), 4302-42.

- Kim, S. H., Lan, H., Dobson, P. W. (2021). Identifying price-leadership structures in oligopoly. *Oxford Economic Papers*, 73(1), 350-370.
- Riboni, A., Ruge-Murcia, F. J. (2010). Monetary policy by committee: consensus, chairman dominance, or simple majority?. *The Quarterly Journal of Economics*, 125(1), 363-416.

Content

1. The Single-Person Decision Problem

- Actions, Outcomes, and Preferences
- Evaluating Random Outcomes
- Rational Decision Making with Uncertainty
- Rationality Violations
- Rule-Rationality as a Synthesis of Mainstream and Behavioral Economics

Aumann, R. J. (2019)

Tadelis (2013) Chapters 1-2

- Applications: Let's make a deal, Money pumping, Allais paradox, Ambiguity aversion

Blavatsky et al. (2022)

2. Normal-Form Games with Pure Strategies

- Dominance in Pure Strategies
- Iterated Elimination of Strictly Dominated Pure Strategies
- Best Responses
- Nash Equilibrium in Pure Strategies
- Level-k Players
- Weak Dominance
- Coordination games, Risk Dominance

Belleflamme and Peitz (2015) Chapter 3.3

Tadelis (2013) Chapters 3-5

- Applications: The Samaritan's dilemma, Discrete-bid auctions, Cournot and Bertrand duopoly, Bertrand duopoly with limited production capacities, Firm's choices of price-setting vs. quantity-setting, AI algorithms and pricing, Budgetary commons, Benefit of smallness, Perfect and imperfect tax competition, Texas electricity market, Approval voting, Covid-19 shelter-in-place orders

Asker, Fershtman, and Pakes (2021)

Dave et al. (2020)

Hindriks and Myles (2013) Chapter 20.2

Hortaçsu et al. (2019)

3. Normal-Form Games with Mixed Strategies

- Mixed Strategies
- Strategies, Beliefs, and Expected Payoffs
- Mixed-Strategy Nash Equilibrium

- Nash's Existence Theorem
- Contest Theory: Tullock Lottery, All-Pay Auction
- Continuous Lotto Games

Konrad (2009) Chapters 1-2

Tadelis (2013) Chapter 6

- Applications: American and British litigation, Course evaluation schemes at Charles University, Warren Buffett's 'Billionaire's Buyout Plan', Public procurements, Campaign finance cap, Venture capital contracting, Labor unions vs. trade unions, Grading competition

Gregor (2021)

4. Extensive-Form Games

- Normal-Form Representation of Extensive-Form Games
- Mixed versus Behavioral Strategies
- Sequential Rationality
- Backward Induction
- Subgame-Perfect Nash Equilibrium
- The One-Stage Deviation Principle

Belleflamme and Peitz (2015) Chapter 16.3.2

Tadelis (2013) Chapters 7-9

- Applications: Price leadership in British supermarkets, Bundling and entry deterrence, Agenda-setting power of committee chairman, Monetary policy-making, Coordinated and sequential budgeting

Kim, Lan and Dobson (2021)

Riboni and Ruge-Murcia (2010)

5. Multistage and Repeated Games

- Multistage Games
- Infinitely Repeated Games
- The Folk Theorem

Tadelis (2013) Chapter 10

- Applications: Prisoner-Revenge Game

6. Bargaining

- Chicken game
- Waiting games
- Legislative bargaining
- Bilateral bargaining
- The Infinite-Horizon Bargaining

Tadelis (2013) Chapter 11

- Applications: Monetary vs. fiscal policy-makers, Fiscal stabilizations

Communication

Questions and comments are highly appreciated in the class, both in person or via chat. Feel free to ask anything to make sure you can follow me.

Off the lecture time, feel free to write me an email if you need to schedule an online consultation (typically provided in my office hours, Tuesdays 13-15).

Final word

Enjoy the course and good luck!