

ECON 201
Advanced Economic Theory
Learning and Reputation in Dynamic Games
SPRING 2008

Instructor: Nageeb Ali, email: snali@ucsd.edu, Economics 214.

Time and Location: M, W 8:00 - 9:20, ECON 304.

Office Hours: By appointment.

Textbook: Repeated Games and Reputation, George J. Mailath and Larry Samuelson (MS).

Pre-requisites: You should have taken the first year Ph.D. sequence in the Economics department or have received consent from me. It would be good to have also taken ECON 208, though this is not strictly necessary; you're welcome to sit in the first few lectures to gauge whether this is the right course for you. In general, you should be comfortable with standard equilibrium concepts in dynamic games (such as sub-game perfection and sequential equilibria).

Description of the Course

ECON 201 is an advanced topics course in Microeconomics, whose goal is to provide you with tools and techniques to transition from coursework to research. The course content and style varies by instructor. This year, the course will be focused on dynamic games and their application, examining recent foundational contributions to dynamic games, their applications, and questions that I believe are unresolved. While we will study particular topics, the tools that we pick up should be interesting and useful for anyone interested in studying dynamic behavior; we will discuss applications of these ideas to political economy, psychology and economics, and macroeconomics. The course will have 3 components, focusing on learning and information aggregation, repeated games, and reputation.

In the first part of this course, we will study questions of learning and private information. In most settings, it is the case that individuals do not possess all that they would like to know about the environment, and they face the question of how to acquire information individually, aggregate it, or learn over time. We will begin by examining standard *herding games* where individuals obtain information, act sequentially, and observe the behavior of those prior to them. We will see that learning generates conformity but individuals may collectively make wrong choices. We will then focus on fascinating methodological questions of multi-agent learning: a common assumption in most economic models is that individuals share a common understanding about their environment, and yet in practice, disagreement appears to be the norm. While the common prior and common knowledge assumptions that we make yield tractable models, how justifiable are they? When do individuals indeed agree and when would they disagree? What is the appropriate solution-concept when individuals disagree about their environment? What happens if we think of decisionmakers as statisticians rather than Bayesians? Time permitting, we will then look at some interesting applied papers on some of these issues. We will examine questions of intergenerational communication and how different groups in society can form different beliefs about the returns to education and social mobility, for example.

We will then switch from learning to analyzing how the prospect of future interaction affects behavior. We will study repeated games with perfect and imperfect public monitoring and learn some great tools and techniques to characterize equilibria of these games. These tools have proven very useful in answering questions in applied microeconomics on IO and theory of the firm, and also in macroeconomic settings in terms of understanding dynamic contracts and risk-sharing. We shall apply these insights to optimal collusion

where firms have imperfect information about the actions or costs of their partners. In these settings, the effectiveness of collusive arrangements will critically depend on each partner's ability to distinguish cooperation from betrayal (using some form of statistical inference). We will see that this becomes difficult at the continuous-time limit of the game where agents make frequent moves and receive noisy signals about each other's choices.

In the final part of this course, we shall mesh our insights from learning with questions of repeated interaction. We will study *reputation* games where players attempt to learn about the characteristics of other players, and this creates strategic incentives to mimic other types. Reputation, apart from its real-world relevance, also has interesting implications for the multiplicity of equilibria in repeated games. We will first look at reputation games with a single Long Run player playing against a sequence of Short Run opponents. In the absence of reputation effects, such a game would have a folk theorem with equilibria in which the LR player does no better than static NE payoffs. However, with rich reputational possibilities, the LR player can leverage reputation to obtain her best possible payoffs. What is striking, however, is that this reputation cannot be permanent: as the game goes on, the LR player will eventually dissipate her reputation. We will study these payoff bounds and the transience of reputation (as we understand it in these models), and also look at papers where the LR player actually does worse when she can form a reputation. We will subsequently move onto analyzing the behavior of multiple LR players in finite-horizon games, and highlight how reputation can dramatically change the outcome (we will also understand how to analyze the continuous-time limits of these games, which are quite tractable). Finally, we shall look at models of reputation in bargaining and markets, where reputational models have been used to understand how firms may try (and fail) to screen customers, how to understand *bargaining posture* in a game-theoretic framework, and how reputations can be bought and sold in a marketplace.

I don't expect to cover all the papers mentioned here and will adjust which papers to study based on our interests, pace, and progress. I will announce these in class at least a week prior to the lecture. You should read all the papers that we cover in class: many of these are "classics," not just for their formal innovation but also because they have a powerful intuition and economic story. Reading papers at this stage is a great way to help you think about how to ask and answer research questions, and exposit your ideas as a paper. As part of this transition from coursework to research, you should also attend the Wednesday Theory Seminar; this will expose you to the research frontier (David Miller has a very exciting line-up), and also give you a way to see what makes great theory presentations (and what makes ones that are well, less than great).

Grading: There will be several assignments and a final. Assignments will be due in my mailbox by 5pm on the due date, and all assignments together will count for 80% of the grade (with each question weighted equally). You are encouraged to work together on these problems, but the goal is that every student understands the relevant material. As such, assignments should be submitted individually acknowledging all those with whom problems were discussed. The take-home final, which must be completed without consulting anyone other than me, will count for the remaining 20% of the grade.

Schedule of Readings

(Note that there will be no class on 5/12 and that there will be make-up classes on 5/16 and 5/30)

1. Learning

a) **Herding and Information Cascades (3/31-4/2):** Bikhchandani et al. (1992, 1998), Smith and Sorensen (2000).

b) **The Common Prior Assumption and Its Implications (4/7):** Aumann (1976), Geanakoplos and Polemarchakis (1982), Sebenius and Geanakoplos (1983), Rubinstein and Wolinsky (1990), Morris (1995).

c) **Heterogeneous Views in Society (4/9-4/14) (Presented by Aislinn and Troy):** Piketty (1995), Banerjee and Somanathan (2001).

d) **Belief Convergence (4/16-4/21):** Blackwell and Dubins (1962), Acemoglu et al. (2008).

e) **Equilibrium Concepts And Heterogeneous Beliefs (4/21-4/23):** Fudenberg and Levine (1993a,b), Dekel et al. (2004).

f) **Guest Lecture (4/30): Vince Crawford on Learning in Games** Crawford and Broseta (1998), Crawford (1995, 2001), Huyck et al. (1990, 1991, 1993).

2. Repeated Games

a) **Self-Generation Techniques (5/2-5/5):** MS Ch.2, 7, Abreu et al. (1990).

b) **Optimal Collusion (5/5-5/7):** MS Ch. 11.1, 9.8, Abreu et al. (1991), Sannikov and Skrzypacz (2007).

c) **Guest Lecture (5/14): David Miller on Repeated Games** Athey and Miller (2007)

d) **Political Economy Application (by Tim) (5/16):** Anderlini et al. (2007)

3. Reputation

a) **One Long Run Player (5/19 - 5/21):** MS Ch. 15, Fudenberg and Levine (1989, 1992), Cripps et al. (2004), MS 18.6, Ely and Valimaki (2003).

b) **Multiple Long Run Players (5/28):** MS Ch. 17, Kreps and Wilson (1982), Kreps et al. (1982), Milgrom and Roberts (1982).

c) **Reputation in Bargaining and Markets (5/30-6/4):** Fudenberg and Tirole (1991) Ch. 10, Gul et al. (1986), Ausubel et al. (2002), Feinberg and Skrzypacz (2005), Abreu and Gul (2000), Abreu and Pearce (2007), MS Ch. 18.7, Tadelis (1999, 2002), Bar-Isaac (2003).

References

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