

Economics 204. Contract and Games: Foundations and Applications

Fall 2019, Professor Joel Watson

This is course on contract and game theory is meant for both theory students and more applied students for whom a grounding in the basic theory would prove useful, in particular for modeling exercises in the following fields: behavioral/experimental, development, environmental, international, labor, law, and macro. A prerequisite for this course is a solid understanding of the concepts and techniques taught in the micro and macro core sequences, including all of the game-theory material, basic mechanism design theory, and the recursive formulation of dynamic optimization problems.

A topic list is shown on the next page. Not all of the topics will be covered in the course. Adjustments will be made depending on the interests of the enrolled students. We will aim to cover each topic by way of a simple example or application that should be accessible to everyone in the class. For some of the topics, the simple example will be followed by a more technical presentation intended to highlight recent advances and key techniques in the literature.

Schedule: Mondays and Wednesdays from 9:00 to 10:50 a.m. in Econ 300.

Assignments: A few technical exercises and theoretical challenges will be recommended. Students will also have the opportunity to submit reading reports on papers in the literature. Students enrolled for a letter grade are responsible for all of these assignments and will be graded on the basis of their answers and reports. Satisfactory performance on solely the reading reports will be sufficient for a passing grade, so students taking the course on a pass/no-pass (or S/U) basis can pass without submitting answers to the technical exercises.

Watson's Office Hours: These will be determined soon. **Please do not disturb Watson outside of office hours unless you have an appointment.**

Readings: Various journal articles and working papers will be suggested. The following textbooks also may be useful.

Bolton and Dewatripont, *Contract Theory*

Fudenberg and Tirole, *Game Theory*

Laffont and Martimort, *The Theory of Incentives: The Principal-Agent Model*

Gibbons, *Game Theory for Applied Economists*

Osborne and Rubinstein, *Game Theory*

Salanie, *The Economics of Contracts: A Primer*

Watson, *Strategy: An Introduction to Game Theory*

Preliminary Topic List

1. Introduction

- a. Fundamentals
- b. Key definitions and concepts
- c. Modes of enforcement in game theory, activeness in contracting

2. Bargaining theory

- a. Axiomatic approach and “cooperative” solution concepts
- b. Review of basic “noncooperative” models
 - ultimatum and random-proposer
 - alternating offer
 - Nash demand
- c. Variants, outside options and separation
- d. Relation between noncooperative models and cooperative solution concepts
- e. Incomplete information, mechanisms, durability
- f. Representing internal (self-enforced) and external contractual elements

3. Contracting in short-term relationships

- a. Principal-agent model
 - private information, screening (adverse selection)
 - private information, signaling
 - moral hazard and risk aversion
 - moral hazard and limited liability/liquidity
 - power and the effect on welfare
 - multiple dimensions, multiple tasks
- b. Standard applications of the principal-agent model
 - financial contracts and credit rationing
 - non-linear pricing
 - income taxation
 - employment
 - regulation
- c. Team production
 - optimal centralized contracting with limited verifiability
 - monitoring technologies and cross-monitoring arrangements
 - collusion, decentralized contracting
- d. Verification, costly state-verification
 - incentives to disclose hard evidence
 - incentives to gather evidence, commitment to an auditing rule
- e. Allocation mechanisms, auctions
- f. Ambiguity in contract formation

4. Multi-stage productive actions and renegotiation, the hold-up problem

- a. Illustration of the hold-up problem
 - investment prior to contracting
 - contracting with unverifiable investment and renegotiation
- b. Contract and mechanism design with complete information
- c. Application to contracting with unverifiable investment and renegotiation
 - contractual form, characterization
 - asset allocation
 - extensions and variations
- e. New directions
 - incomplete information
 - behavioral elements (miscalibration, dispute haze, focal points, ambiguity)
 - technology design, task assignment

5. Contracting in long-term relationships, relational contracts

- a. Two variations of the principal-agent model
 - multiple periods, adverse selection, and the ratchet effect
 - multiple periods, moral hazard, and deferred compensation
- b. Asymmetries and nonstationarities
 - joint uncertainty, starting small
 - asymmetric information in teams, starting small
 - other implications of asymmetric information
 - contracting to produce an innovation
 - other examples and applications
- c. Recursive methods in repeated games
 - finitely repeated games
 - infinitely repeated games
 - notions of renegotiation-proofness
- d. Repeated games with transfers
 - characterization of equilibrium values
 - conditions for pooled incentive constraints
 - separation
- e. Contractual equilibrium, self-enforcement
 - foundation and characterization
 - applications
 - extensions and variations
- f. Interaction of internally (self-) and externally enforced elements
 - complements and substitutes, partial use of verifiability
 - models with varying degrees of active contracting and/or renegotiation
 - contractual equilibrium with external enforcement of long-term contracts
 - applications
 - extensions and variations
- g. Possible behavioral factors

6. Matching, search, and relational contracts

- a. Foundations of frictional matching models without an information trail
- b. Efficiency wage models (firms commit to a wage policy)
- c. Game-theoretic models
 - consideration of active contracting
 - equilibrium characterization
 - variations, information across matches, Markov assumptions
- d. Modern macro/labor models
 - magnification and propagation of shocks
 - match value and creative destruction
 - effort incentives and efficiency wage-style issues
 - variations in the modeling of disagreement points and separation
 - policies such as minimum wages, unemployment insurance, and separation penalties
 - liquidity flows
- e. Recent models of search and wage distribution

7. Externalities and networks of short-term contractual relationships

- a. Foundations, types of externalities
- b. Common agency, menu auctions
- c. Common principal
- d. Contractual chains
 - private contracting with globally verifiable productive actions
 - partial global verifiability, stronger modes of contractual linkages
 - other settings
 - applications and future directions

8. Long-term contractual relationships in a society

- a. Coalitional bargaining
- b. Community interaction
 - community enforcement
 - applications and variations
- c. Networked societies
 - community enforcement
 - communication
 - renegotiation-proofness
- d. Institutions and technologies of trade and communication
 - survey of examples and applications
- e. Transitions and the interaction of internal and external enforcement
- f. Toward a general theory of layered contracts

9. Organizations

- a. Questions and foundations
- b. Firms
 - theories of the boundaries of firms
 - contractual form
 - internal organization, authority, task assignment, dynamics
- c. Future directions