G5212: Game Theory

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Spring 2017

Introduction

- We are now ready to start the second half of the course proper
- This is basically going to cover 'Contract Theory'
- An area of economics which deals with the fact
  - Different agents in the economy have different information
  - They will behave strategically based on this information
- General equilibrium allows for the first of these effects, but not the second
  - Agents interact only through prices
  - Treat these as given
  - Typically, these prices will reveal all information in equilibrium

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- Example 1: Price Discrimination
  - Different types of New Yorkers have different preferences over Mets tickets
  - Some want to go to the game for a cheap day out (Cheapskates)
  - Some love baseball, and really want the best seats (Afficionados)
  - The Mets do not know which person is which, so can't offer different prices to Cheapskates and Afficianados
  - How do they design their prices so that Afficionados buy the good seats and the Cheapskates get the nosebleeds?
  - Does this maximize profit?

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- Example 2: Education
  - People have different levels of ability
  - These are not directly observable by an employer
  - However, people can get an education, which is observable to the employer
  - Assume that education is useless (!) but is harder for people of lower ability
  - Can high ability types use education to signal that they are of high ability?

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- Example 3: Workers and Bosses
    - A professor has to decide how hard to work in preparing his class
    - The head of department cannot observe this effort level directly
    - But can observe class reviews
    - However, these class reviews are only noisily related to how hard the professor works
    - Can the head of department design a payment contract which encourages the professor to work hard?
    - Is it in their interests to do so?

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- These three example share some features
- What?

1. There is an **informed** and **uninformed** party
   - Informed: Ticket buyer, potential student, professor
   - Uninformed: Mets, employer, head of department
2. There is a **leader** and a **follower**
   - Leader: Mets, potential student, head of department
   - Follower: Ticket Buyer, employer, professor

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- This describes the **principal-agent** model
- Obviously simplifies in lots of ways
  - Only two agents
  - Only two periods
- The leader/follower set up also simplifies bargaining
  - No negotiation
  - Leader makes a take it or leave it offer
    - Mets choose a pricing structure
    - Student chooses an education level
    - HoD chooses an incentive structure

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- But the examples are also different
- How?
  1. What is it that the uninformed person does not know
     - **Type** of the informed person (ticket buyers, students)
     - **Action** of the informed person (professor)
  2. Who moves first
     - Uninformed person (Price discrimination, workers and bosses)
     - Informed person (Education)

Models

- This gives rise to three classes of models
  1. Screening/Adverse selection
     - Uninformed party moves first
     - Uncertainty about the type of the informed party
     - Pricing example
     - Called adverse selection due to insurance
  2. Signalling
     - Informed party moves first
     - Uncertainty about the type of informed party (broadly defined)
     - Education example
  3. Moral Hazard
     - Uninformed party moves first
     - Uncertainty about the action of the informed party
     - Professor example