ECOMMERCE AND COMPUTATIONAL ECONOMICS

Ecommerce and Computational Economics

T 11.45 - 1.45pm

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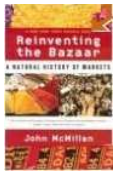
Format

- Some lectures.
- Some discussion.
- Some student presentations.
- Some project work.

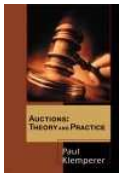
"Textbook"

- There is no textbook as such, but the following books are good background for those who are interested.
  - Pretty light reading. Covers a lot of background and argument for well regulated market economies.



  - Reinventing the Bazaar: A Natural History of Markets by John McMillan, W. W. Norton & Company.

– More techical, but still very readable, introduction to auction theory and the 3G auctions.



– Auctions: Theory and Practice (The Toulouse Lectures in Economics) by Paul Klemperer, Princeton University Press.

Office hours

- I won't have conventional office hours this semester — that never seems to work satisfactorily at the GC.
- However, I'll be around after most classes (usually in the cafeteria) and you are welcome to come talk to me then.
- I'll also be running *virtual* office hours, online (on AIM) under the screen name:

  profSimonParsons

  I'll be online Tuesday and Thursday nights, between 10 and 12 if you want to ask questions, or just come say "hi".
- Outside of that time, drop me an email and I'll get back to you as quick as I can.

Syllabus

- Simple auction types
- Auction theory
- Game theory (just a little).
- Mechanism design
- Social choice theory
- Double auctions and exchanges
- Computational methods
- Automated mechanism design
- Network markets

Simple auction types

- Most auction theory has looked at four basic auction types:
  - English auction.
  - Dutch auction.
  - First-price sealed-bid auction.
  - Second-price sealed-bid auction.
- We will be no exception, but we'll also mention some more obscure things.

Auction theory

- How do we answer questions about auctions like:
  - Which makes the most money?
  - Which is the most efficient?
- Need to make assumptions about the participants:
  - Know what they are willing to pay.but this value is not known to any one else.
  - Value does not depend on any other participant.
  - Risk neutral.
  - Basically the same as other participants.
- Revenue equivalence, winner's curse.

Game theory

- To do more than simple auction theory we need to look at some game theory.
- In particular games of imperfect information
  - i.e. don't know what the payoff is for others.
- So we'll take a brief look at enough game theory to handle these.
  - Bayesian Nash equilibrium

Mechanism design

- With some game theory behind us, we can look at mechanism design.
- Mechanism design does the opposite of classical game theory.
- We'll look at the positive results:
  - Vickrey-Clarke-Groves.
  - Revelation principle.
- And the negative results
  - Gibbard-Satterthwaite.
  - Hurwicz.

Social choice theory

- We think about mechanisms like so:
  - Mechanisms have a set of possible outcomes.
  - Participants have a set of preferences.
  - The outome is a function of the preferences.
- If you state preferences by *voting* not bidding, then we have social choice theory.

Double auctions and exchanges

- Auctions that involve both buyers and sellers.
  - Stock and commodity exchanges
- Widely used in practice, so lots of academic interest.
- Very hard to analyse.
  - Only results for extreme cases.
- Thus experimental investigations using human traders
  - Vernon Smith

Computational methods

- Computational methods allow us to go beyond experiments with human traders.
  - Bigger markets
  - "Statistical results"
- Of course there are assumptions — models of traders rather than real traders.
- We'll look at:
  - Internet pricing wars.
  - Santa Fe artificial stock market.
  - Trading strategies for double auctions.

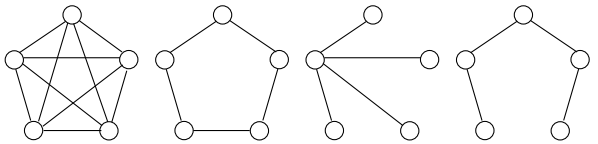
Automated mechanism design

- Given:
  - Models of traders; and
  - A parameter space for a mechanism

  why not apply machine learning to find new kinds of auction?
- Cliff — balance between buyers and sellers.
- Phelps — pricing rule.
- Niu — shout-accepting rule.
- Can also *co-evolve* mechanism and traders.

Network markets

- What happens when we have multiple markets that compete?
- What happens when these mulitple markets are subject to *network effects*?



Project

- We have been working on a part of the *Trading Agent Competition*.
  - Market design game
- Partcipants design a double auction (starting from a set of standard components) that compete to make a profit, accumulate loyal traders, and complete as many transactions as possible.
- Singly or in groups you will design a market which will compete against the rest of the class and past entrants in the competition.

Assessment is based on

- Your presentation of research papers.
- The project.
- A final paper.