Advanced Microeconomics

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Lecture 1 – Introduction

- Gibbons, chapter 1
- Tadelis, chapter 1
- Osborne, chapter 1
- Gilboa, Postlewaite, Samuelson & Schmeidler (2014): Economic Models as Analogies, *The Economic Journal*, Vol. 124, 513-533.

Historical development of game theory

- At the turn of the century: mathematical analysis of board games

- Initial focus on zero-sum games

  – One person's gain is another person's loss

- John von Neumann und Oskar Morgenstern: "The Theory of Games and Economic Behavior" (1944)

- Cooperative vs. non-cooperative game theory

Historical development of game theory

- dominance of **non-cooperative game theory**
  - Since the 80s to explain numerous phenomena in industrial economics, foreign trade theory, macroeconomics, political economy, ...

- **Evolutionary** game theory, theories of **learning** and **bounded rationality** as well as **contract theory** are based on insights and methods of game theory

- Successful applications
  - UMTS auctions, auctioning of permits in the EU Emissions Trading System (ETS), B2B/B2C/B2E commerce, energy markets, "matching" of students and organ donations, ...

(Memory) Nobel prizes

- ## 1994: Nash, Harsanyi and Selten
  - pioneering analysis of equilibria in the theory of non-cooperative games
- ## 1996: Mirrlees, Vickrey
  - fundamental contributions to the economic theory of incentives under asymmetric information
- ## 2001: Akerlof, Spence and Stiglitz
  - analyses of markets with asymmetric information
- ## 2005: Aumann and Schelling
  - for having enhanced our understanding of conflict and cooperation through game-theory analysis
- ## 2007: Machine, Myerson und Hurwicz
  - Foundations of mechanism design theory
- ## 2012: Roth and Shapley
  - Theory of stable allocations and practice of market design

(Memory) Nobel prizes

- ## 2014: Jean Tirole
  - analysis of market power and regulation

- ## 2016: Hart and Holmström
  - contributions to contract theory

- ## 2017: Richard Thaler
  - contributions to behavioural economics

- ## 2019: Banerjee, Duflo and Kremer
  - experimental approach to alleviating global poverty

- ## 2020: Paul R. Milgrom and Robert B. Wilson
  - improvements to auction theory and inventions of new auction formats
  - There is a nice video on the attempt of the nobel price committee to reach Paul Milgrom: https://www.youtube.com/watch?v=JhfDyBLRnrM

- **Definition.** A preference relation that is complete and transitive is called a **rational preference relation**

- **Proposition.** If the set of outcomes X is finite then any rational preference relation over X can be represented by a payoff function.

  - Idea: rational preference relation allows ranking of all alternatives
    - payoff function gives higher number to more preferred alternatives

- Definition **Homo Oeconomicus.** A player facing a decision problem with a payoff function $v(.)$ over actions is rational if he chooses an action $a \in A$ that maximizes his payoff. That is, $a^* \in A$ is chosen if and only if $v(a^*) \geq v(a)$ for all $a \in A$.

- Remark 1: Rationality is not an assumption about the type of preferences that people have
  - i.e., Homo Oeconomicus need not be selfish
    - for persons with altruistic preferences, donating money is rational

- Remark 2: the paradigm of rationale choice imposes the implicit assumption that the player fully understands the decision problem by knowing:
  1. all possible actions, A
  2. all possible outcomes, X
  3. exactly how each action affects which outcome will materialize
  4. his rational preferences (payoffs) over outcomes.

Normative Interpretation of rationality

- It is not claimed that all individuals are actually perfectly rational.

- Rather, it is asked ...
  - What does "rationality" mean in strategic interaction?
  - What are "rational expectations"?
  - How should an equilibrium be defined if there is rational behavior?

- In this interpretation, game theory is a branch of philosophy

Positive Interpretation of rationality

- Even if individuals are only rational to a limited extent, rational behavior will prevail in the long run.
    - People learn and adapt their behavior
    - Successful behavior is passed on to the next generations through social norms (and laws, perhaps also through genes)

- Analysis of perfectly rational behavior should (by and large) predict actual behavior well

Q: Why did God create economists?

A:

- Economics is criticized for several reasons

  1. Disappointment about the quality of economic forecasts

  2. Fundamental assumptions of economic theories are harshly criticized by psychologists - and increasingly also by experimental economists - who show in laboratory experiments that the underlying assumptions often do not hold

     - Nobel Prize 2017 awarded to behavioural economist Richard Thaler

- Economists would like to make better predictions, but this is not always possible

  – People react to theories (e.g. about fluctuations on stock markets, the spread of viruses, …)

    - Therefore, the prediction of human behavior has theoretical limits beyond those shared with the natural sciences.

  – Not many social scientists make predictions at all

    - ... and rarely do they reveal their assumptions the way economists do

- that assumptions in economics are (often) wrong is one of the worst kept secrets in science,
    - Milton Friedmann (1953, Nobel Prize winner 1976): Economists should not worry that their assumptions (about individual behaviour) are wrong as long as their conclusions (about market phenomena) are relatively accurate.
    - However, (nowadays) most economists would reject this "instrumentalist view" of assumptions

- Gibbard and Varian (1978) compare economic models with pictures, drawings and cartoons.

  – Some economic models are meant to **mimic reality**, like pictures

  – Others are meant to **simplify reality**, like drawings

  – Others are **exaggerated and distorted representations of** reality, such as caricatures

- Rubinstein (2006): Economic models are fables or fairy tales

  – The key message is important (The moral of the story ...)

  – Simplifications, so that the core message stands out

- According to Sugden (2011), economic models are "credible worlds" for reasoning about reality.