

Game Theory Applications: Lecture Notes

Course Website

<http://www.citi.umich.edu/u/galka/games>

- ◆ Galina Albert Schwartz
- ◆ Department of Finance
- ◆ University of Michigan
- ◆ Business School



Summary of last two lectures

- ◆ **Auctions: Dixit, chapter 15**
- ◆ Types of Auctions
- ◆ Winner's Curse
- ◆ Vickrey's Theorem
- ◆ Auction Design
- ◆ Summary of the Course

Auction Design: Types of Auctions

- ◆ Four Major Considerations
 - Types of Auction Settings
 - Bidding Types
 - Pricing Schemes
 - Valuation Methods

Types of Auction Settings

◆ English Auction

- history: used by major auction houses, Christie's and Sotheby's
- Major Feature: Ascending Price

◆ Dutch Auction

- history: used in tulip trading
- Major Feature: Descending Price

Bidding Types

- Sealed bid auction
 - » Advantage: makes collision more difficult
- Open-outcry auction
 - » advantage: casts additional information to the bidders about the object value

Valuation Methods

- ◆ Two major methods [types of objects]
 - private (subjective valuation)
 - » different bidders value the object differently
 - » example: collectibles
 - common (public, objective value)
 - » All bidders have the same value, [but might have different estimates of this value]
 - » example: oil fields

Pricing Schemes

- ◆ First Price Auction
 - no true price revelation
 - price is shaded (lower than the true value)
- ◆ Second Price Auction
 - price is revealed truthfully under `reasonable` conditions
 - [proven by Vickrey (1996 Nobel Price)]

Winner's Curse

- ◆ When the Winner's Curse is a problem
 - common value auctions
 - high level of uncertainty of the object value
- ◆ How to alleviate the Winner's Curse
 - Use Second Price Auction

Revenue Equivalence Theorem

- ◆ `reasonable` conditions are:
 - bidders are risk-neutral
 - object is of a common value
 - bidder's estimates of this value are independent \implies
- ◆ Revenue Equivalence Theorem holds:
All types of auctions on average yield the same outcome (i.e. the same profit [surplus])

Departures from the Theorem's Conditions & Auction Design

- ◆ Assume that bidders are risk-averse & object is of a common value & bidder's estimates of this value are independent
 - Then

Departures from the Theorem's Conditions & Auction Design

- ◆ Assume that bidders are risk-neutral & their valuation estimates are positively correlated
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All-Pay Auctions

- ◆ All bidders pay their bids, but only one [or several] get the object
 - example: athletic competitions
- ◆ Optimal bidding strategy in all-pay auctions:

Use of Mixed strategy

Some Other Considerations

- ◆ Reserve Price of the object
- ◆ Information disclosure
- ◆ Why e-Bay is a second price auction
- ◆ Auctions and Stock market: are there any similarities?
- ◆ Auctions and LBOs: are there any similarities?

Government Objective Function

- ◆ Duality of Government Objective
 - to maximize the auction revenues
 - to maximize the government revenues that auction brings [auction revenue & future tax revenues from the corporations who submitted the winning bids]
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Summary of Auctions I

- ◆ auctions can be
 - » English (ascending) & Dutch (descending)
 - » open outcry & sealed bid
 - » first price & second price
 - » common value & private value
- ◆ Auction Theory major results
 - » Revenue Equivalence Theorem
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- ◆ What matters for auction design
 - bidder's (buyer's) features:
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 - **Lewis**, chapters: ALL (the entire book)
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 - Information Structure

Summary of the Course

- ◆ We learned:
 - **Dixit**, chapters: 1 – 5, 15, 16 + some extras
 - **Lewis**, chapters: ALL (the entire book)
- ◆ Major Lesson from our studies:
 - common sense works
 - `common` theory works better, because it
 - » aggregates the common sense,
 - » structures it, and
 - » makes it from the art into a science