

# Lecture 6

# Auctions (拍卖)



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# Overview

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- First-price Sealed Bid Auction
- Second-price Sealed Bid Auction (Vickrey Auction)
- Ascending-price Auction (English Auction)
- Descending-price Auction (Dutch Auction)

# First-price Sealed Bid Auction

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- Each bidder submits a sealed bid  $b_i$
- Auctioneer opens the bids, and then:
  - Bidder  $i$  with highest  $b_i$  wins.
  - Bidder  $i$  pays her bid amount  $b_i$ .
- No dominant strategy
- Players have to reason about other player's values and strategies to come up with a bid.

# First-price Sealed Bid Auction

- $N$  bidders, with values uniformly distributed in  $[0,1]$ .
- $b(v)$  must be strictly increasing in  $v$
- There is a unique symmetric Bayes-Nash equilibrium, in which any bidder with valuation  $v$  bids:  $b(v) = [(N-1)/N] v$
- In this equilibrium, bidder with highest valuation wins

# Second-price Sealed Bid



- William Vickrey (1961)
- Each bidder submits a sealed bid  $b_i$
- Auctioneer opens the bids, and then:
  - Bidder  $i$  with highest  $b_i$  wins.
  - Bidder  $i$  pays an amount equal to the second-highest bid  $b_j$ .
- If bidders have private values  $t_i$ ,
  - It is a dominant strategy for bidders to bid  $b_i = t_i$ .
  - Very simple for bidders to play.
  - Revenue is second-highest bid  $b_j$ .

# Second-price Sealed Bid

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- Note: for common-value auctions, or auctions with side-effects, bidding truthfully may not be optimal.
- Vickrey auctions are much studied in economic literature, but are not particularly common in practice.

# Ascending-price Auction

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- Also called English auction.
- This is an example of an oral/iterative/open outcry auction.
- Auction procedure
  - Bidding starts from 0 or base price.
  - At any time, any bidder can raise the price by bidding.
  - When no one wants to raise the price any more, the auction ends.
  - Last bidder gets the item, at the price he bid.

# Ascending-price Auction

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- Variation – Japanese auction
  - Auctioneer calls out increasing prices until only one bidder left.
  - At any price, bidder can quit but cannot reenter the auction.



# Descending-price Auction

- Also called Dutch auction.
- This is an example of an oral/iterative/open outcry auction.
- Auction procedure
  - Bidding starts from a high price.
  - Auctioneer calls out a decreasing sequence of prices.
  - If bidder  $i$  wants to buy at the current price, she raises her hand.
  - At that point, auction stops, and  $i$  wins the item at the current price.

# Descending-price Auction

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- Usually fast, because auction requires only one bid.
- Bidder must reason about other bidders' strategies, take risk tolerance into account.

## Equivalence between SP-SB and English auction

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- If bidders in an English auction have fixed private valuations
  - Dominant strategy is to keep raising your bid until either
    - No other bidders left, or
    - Current price exceeds your valuation
  - Result: Player with highest valuation wins, pays (a little more than) second highest valuation.
  - This is the same as the Vickrey (SP-SB) auction!

## Equivalence between SP-SB and English auction

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### ■ Revenue


- English auction revenue is (approximately) the second highest valuation.

# Proxy bidding on eBay



## Place Bid

Hello auctions! ([Not you?](#))

 **Item you're bidding on:**  
Canon Digital Camera ELPH PowerShot SD700 IS  
Current bid: US \$197.50

Your maximum bid: US \$  (Enter US \$200.00 or more)

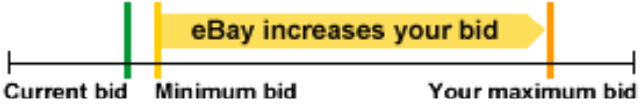
[Continue >](#)

You'll review your maximum bid, shipping cost, and payment methods in the next step.

### What is a maximum bid?

A maximum bid is the highest price you're willing to pay for an item.

You won't necessarily pay the amount of your maximum bid. eBay will increase your bid on your behalf, using **only as much of your bid as is necessary** to maintain your high bid position. Your maximum bid is kept confidential.



[Learn more about bidding and bid increments.](#)

## Equivalence between FP-SB and Dutch auctions

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- In a Dutch auction:
  - Strategies for player  $i$  are of the form “Bid if price reaches  $b_i$  and no one else has bid”
  - Winning bidder is player  $i$  with highest  $b_i$ , pays  $b_i$
  - Equivalent to each player  $i$  bidding  $b_i$  in a FP-SB auction.
- Does not require independence of valuation
- Revenue of Dutch and FP-SB are the same.

# Common Value Auctions

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- There is a true common value for the item, but players know only an approximation of the value.
- Example: “Signals” of value distributed about the true value.

# Common Value Auctions

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- *Winner's curse:*
  - Winning bidder probably has a higher signal than true value.
  - May actually incur a loss when true value is accounted for.
  
- *Winner's curse: Why?*
  - Overconfidence: people think they know more than they do
  - Disregard: people think others know less (or think less about what others know)



# Common Value Auctions

- Milgrom & Weber(1982) studied the case of auctions in which player valuations are affiliated: higher value for a competitor makes a higher value more likely.
- $ER(\text{Ascending auction}) \geq ER(\text{Vickrey}) \geq ER(\text{FP-SB})$ 
  - (Assuming bidders can see other bidders drop out in ascending auction)
- Intuition: In this kind of setting, more information about other players reduces the risk of bidding too high

# Reverse Auction

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- Seller-bid (Reverse) Auction
  - Sellers bid the prices at which they are willing to sell. The buyer can accept the lowest offer

# Reverse Auction

The screenshot shows a search for 470 hotels in New York City for the dates Sat, Nov 17, 2012 - Mon, Nov 19, 2012, for 1 room. The search filters include Hotel Area (New York City), Hotel Amenities (Showing All Amenities), Star Rating (Choose Stars), Price Range (\$0 to \$300+), Guest Rating (1 to 10), and Hotel Brand (Choose One). A prominent 'Name Your Own Price' banner offers up to 60% off. The search results are sorted by 'Most Popular' and list three hotels: Westin New York Times Square (\$287/night), Courtyard New York Manhattan/Upper East Side (\$299/night), and Flatotel At Times Square (\$201/night). A 'chat now' button is visible in the bottom right corner.

470 Hotels in New York City Sat, Nov 17, 2012 - Mon, Nov 19, 2012 - 1 Room

city or airport: New York, NY USA check-in: 11/17/2012 check-out: 11/19/2012 1 Room [update search](#)

[list view](#) [best deal](#) [express deals](#) **NEW!**

Hotel Area: New York City (all a...) Hotel Amenities: Showing All Amenities Star Rating: Choose Stars

Price Range: \$0 to \$300+ Guest Rating: 1 to 10 Hotel Brand: Choose One

470 matching hotels [update hotel list](#)

**Name Your Own Price** Save up to 60% Off in New York City

change my search city or airport: New York, NY USA check-in: 11/17/2012 check-out: 11/19/2012 1 Room [update search](#)

Sort by: **Most Popular** | Lowest Price | Star Rating | Hotel Name | Hotels Near

- Westin New York Times Square** ★★★★★ [out of 10 from 900 guest reviews](#) **\$287** per night [Choose](#)
- Courtyard New York Manhattan/Upper East Side** ★★★ [out of 10 from 156 guest reviews](#) **\$299** per night [Choose](#) **Freebies:** Free internet in room
- Flatotel At Times Square** ★★★★★ [out of 10 from 149 guest reviews](#) **\$201** per night [Choose](#) **Freebies:** On Sale Now - Save 15% on this stay (on select rooms)

Let us help you shop [chat now](#)

# All Pay Auction

The screenshot shows the Taskcn website interface. At the top, there's a navigation bar with the site name '威客-任务中国' and a search bar. Below that, a status bar displays key statistics: '任务总金额: 34216380元', '任务总数: 51073个', '已发放任务款: 33720043元', '获得收入的威客: 260947个', and '威客总数: 3294004个'. The main content area is divided into several sections:

- 公告 (Announcements):** A list of recent news items, including '新招标任务和高级威客正式上线' and '威客“搜索直通车”正式启动'.
- 最新交易 (Latest Transactions):** A list of recent transactions, such as '邀请: 雇主laure177向任务中国发出工作邀请'.
- 需求 (Needs):** A section titled '有项目, 我要外包' (Have a project, I want to outsource) with a subtext '任务中国有200万的威客为您服务'.
- 供应 (Supply):** A section titled '有才能, 我要接单' (Have skills, I want to take orders) with a subtext '有才能的在这做威客, 赚得真金白银'.
- 交易安全 (Transaction Safety):** A section titled '任务宝' (Task Treasure) with a subtext '什么是任务宝?' and '为何使用任务宝收支任务款?'.
- 一周排行榜 (Weekly Ranking):** A table showing the top tasks of the week, ranked by amount.
- 发布任务 (Post Task):** A large blue section with a flowchart showing the steps to post a task: '明确任务需求' (Clarify task requirements), '选择任务类型' (Select task type), '提交任务内容' (Submit task content), '托管任务款项' (Escrow task funds), and '成功发出任务' (Successfully post task). Below this is a large orange button that says '我要发布任务' (I want to post a task).
- 推荐任务 (Recommended Tasks):** A grid of task listings with columns for '推荐任务', '最新任务', '发帖任务', '加价悬赏', and '招标任务'. Each listing includes a price and a brief description of the task.

# Other Design Choices

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- Reserve price
  - Price below which item will not be sold.
  - Can be treated as seller's bid.
  - Any of the classic auction forms can accommodate reserve prices.
- Stopping rule
  - Fixed time (e.g., eBay)
  - 5 minutes after last bid (e.g., Amazon (still?), Yahoo (seller's choice))
- Bid units and increments.
- Information revealed during open outcry auctions

# Other Design Choices

- Tricks to encourage entry (esp. of weaker bidders)
  - Discount on final price.
  - Premium to second-highest bidder.
  - Not-always-efficient auctions.
- Auction fees
  - Listing fee
  - Closing fee
- Preferential treatment to selected bidders.
- Include non-price attributes (usually for procurement auctions).

# Behaviors in Auctions

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- Seller Bidding
- Sniping