

Online Auctions

Goods, Links, People

Alessandro Bonatti

MIT Sloan

Today's Learning Goals

1. Beware of the auction design, exploit opportunities, read behind the lines
2. Reinforce learning from auction theory
3. Understand the design of a game (auction) as a source of competitive advantage

Online Auctions: 4 Common Features

- Second-price mechanisms
(e.g., the English auction)
- Per-click payments
(e.g., pay if customer reacts to the ad)
- Reserve prices
(e.g., minimum price to display any ad)
- Targeting opportunities
(e.g., demographic, intent, behavioral)

Why???

Market history & evolution

Early banner ads (circa 1994)

- Per-impression pricing
- Limited targeting
- Person-to-person negotiations

Overture (Goto.com) (1997)

- Keyword targeting
- Automated acceptance of revised bids
- Generalized first-price auction rules
- Per-click pricing

Generalized First Price

- Sponsored links auction:
 - **N** slots for sponsored links
 - Highest bidder wins 1st slot (best) and pays his own bid.
 - 2nd-highest wins 2nd slot, pays his own bid.
- Simpler than asking for **N** different bids
- Is this a simple auction?

The Original Yahoo Auction

| Position | Bidder | Bid | Payment |
|----------|--------|-----|---------|
| 1 | A | \$8 | \$8 |
| 2 | B | \$5 | \$5 |
| 3 | C | \$4 | \$4 |
| -- | D | \$1 | \$0 |

Generalized First Price

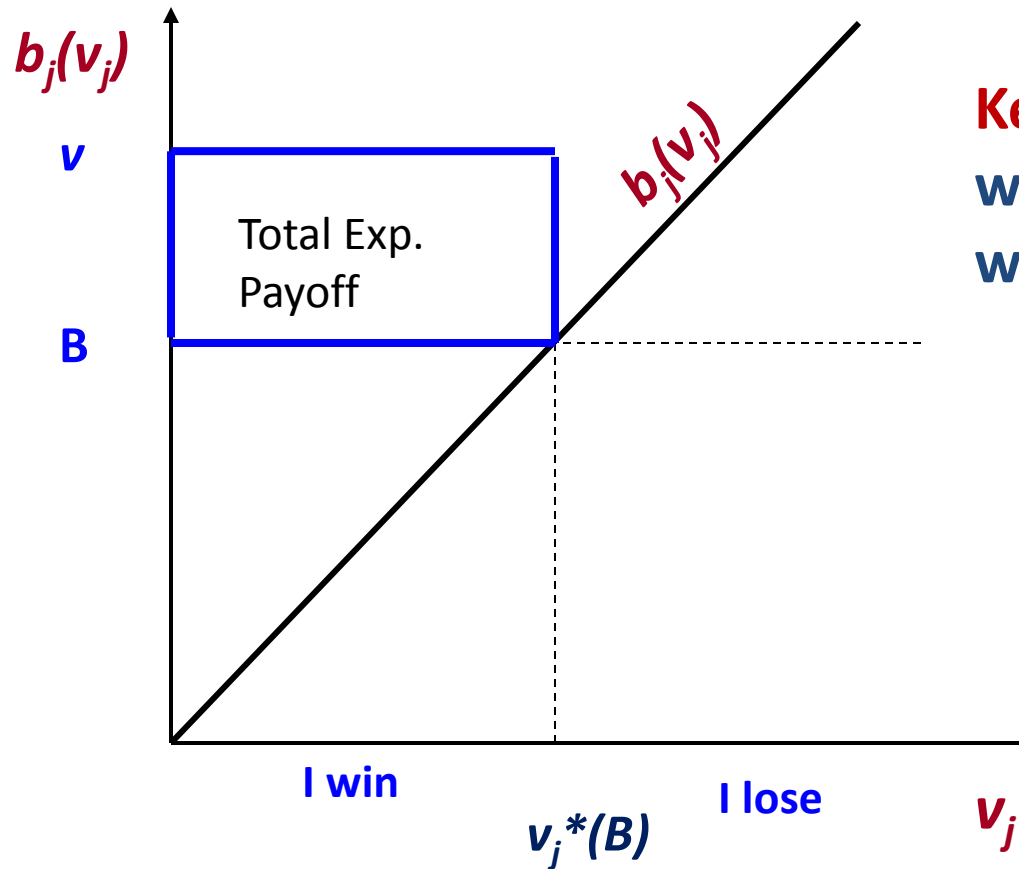
- **Problem: GFP auctions are inherently unstable.**
- No pure strategy equilibrium, and bids can be adjusted dynamically. Bidders want to revise their bids as often as possible.
- Not very practical, either.

- **From the revenue point of view: a disaster.**
 - How much are these links actually worth?
 - What if nobody follows through (with a purchase)?
 - What if I'm the only high bidder?

The Google Auction

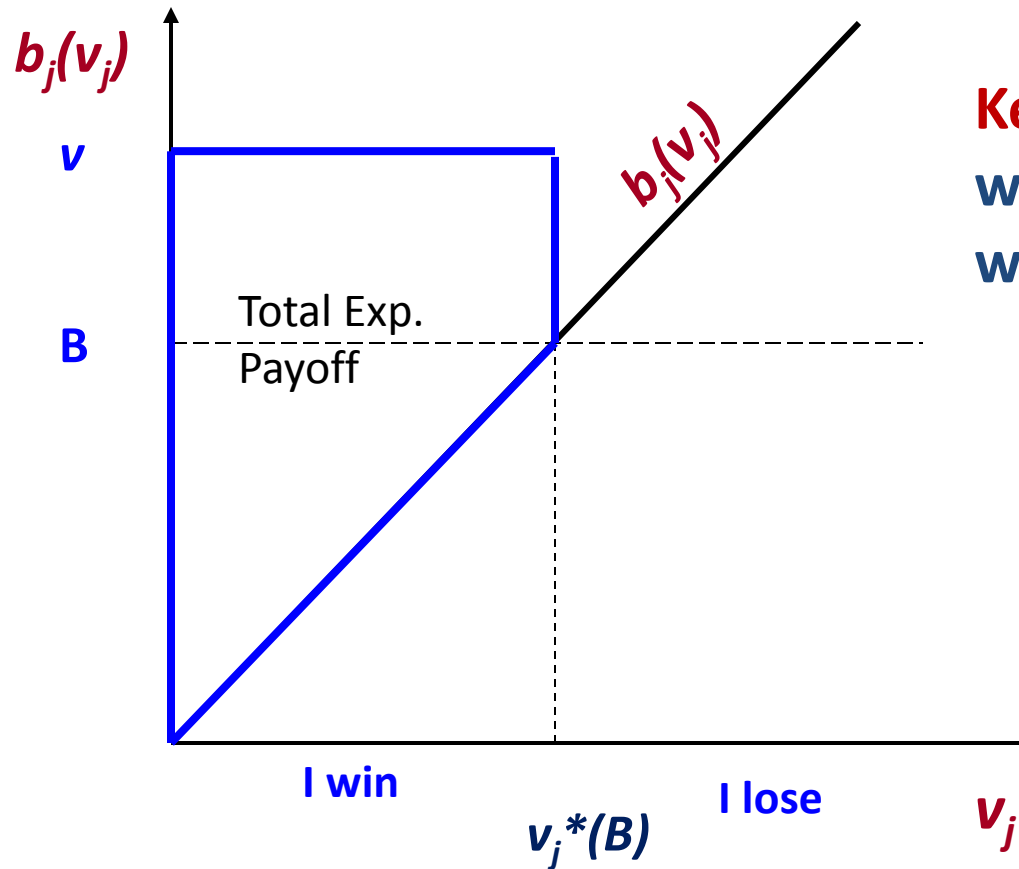
| Position | Bidder | Bid | Payment |
|----------|--------|-----|---------|
| 1 | A | \$8 | \$5.01 |
| 2 | B | \$5 | \$4.01 |
| 3 | C | \$4 | \$1.01 |
| -- | D | \$1 | \$0 |

First-Price Auction



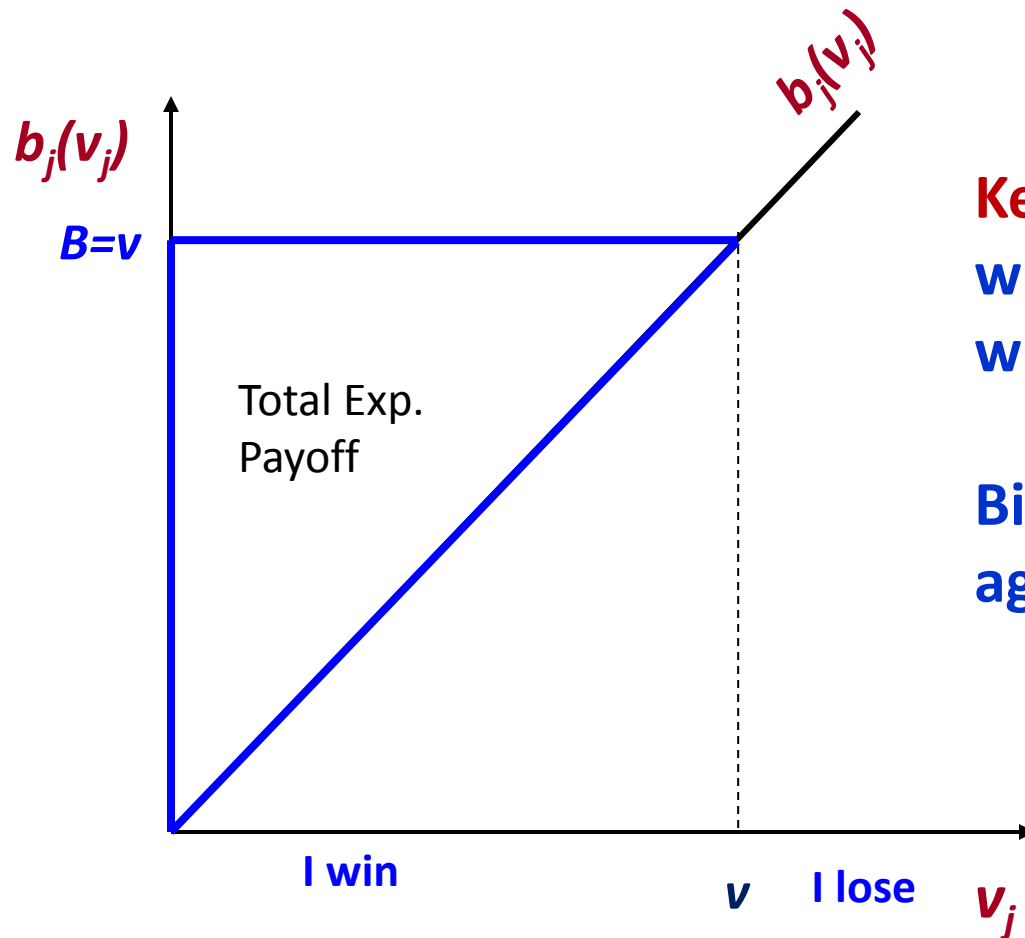
Key Calculation:
who do I beat?
who do I lose to?

Second-Price Auction



Key Calculation:
who do I beat?
who do I lose to?

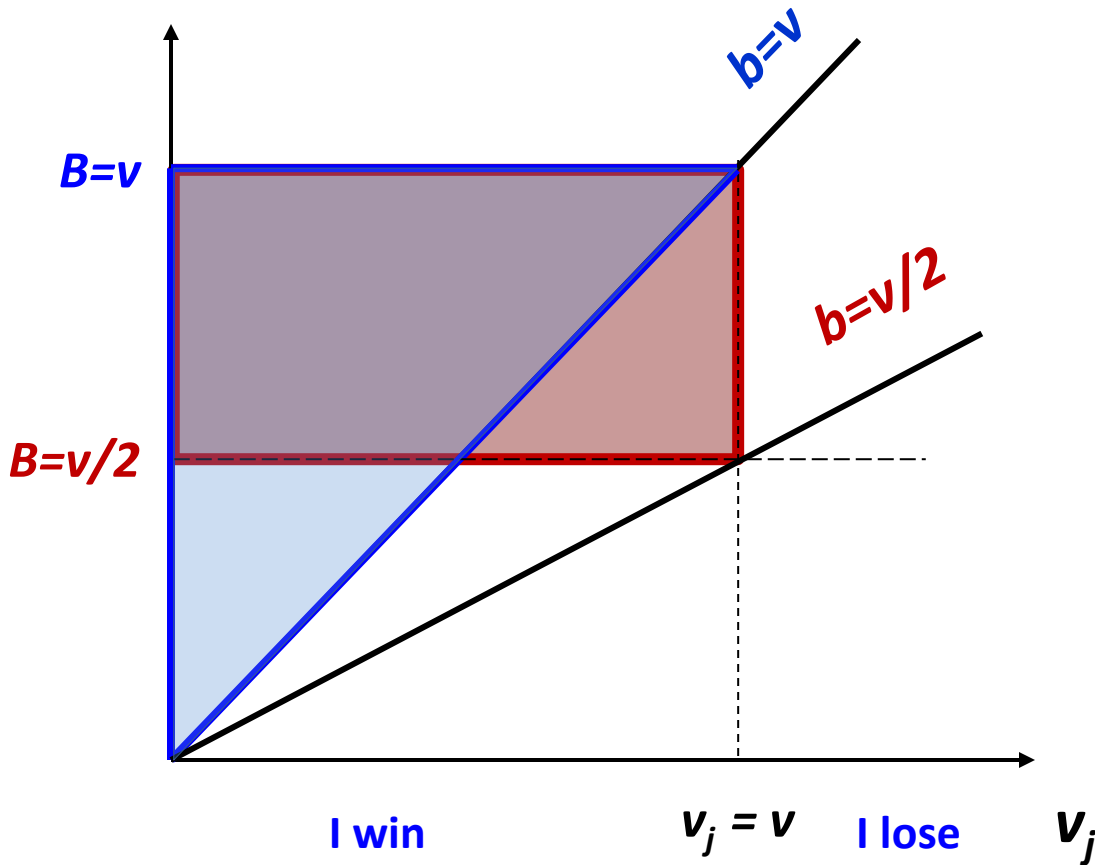
Second-Price Auction



Key Calculation:
who do I beat?
who do I lose to?

Bid your value
against *any* $b_j(v_j)$

Comparison



BIDDER SURPLUS (FPA) = BIDDER SURPLUS (SPA)

Basic Lessons for Sellers

- 1) As an auctioneer, you can never pocket the *entire* valuation of the *highest* bidder.
- 2) However, the more bidders, the closer you get.
- 3) In addition, the format matters

| Second Price | First Price |
|------------------------|-----------------------------------|
| High bids, price = 2nd | Low bids, price = 1 st |
| Transparency | Exploit risk aversion |
| Easy to bid | Avoids “undervalue” |

Generalized Second Price

- **Advantages in new, online market:**
- Easy bidding → no cycles
- Reveals more information to the seller
- **“If I pay a high price, someone else must have thought these clicks were worth something”**
- Remember the wallets game?

Pay-per-Click?

- A good demand-generating model.
- A good **revenue-generating** model?
- Suppose a firm values each click \$1,000, but nobody ever clicks on the link: Google's revenue = \$0!!
- Click Weighting: rank by ***bid*ClickThroughRate***
- How do I generate high CTR? Bid high and win early 😊
- Reward content? Relevance also matters:
bid*ClickThroughRate*relevance

Reserve Prices

- Most overlooked aspect of online auctions.
- Most useful when few bidders are present
- For the seller, a reserve price is like a monopoly price (i.e., high-p → less sales).

Reserve Prices at Yahoo!

- Two slots, two bidders
- Really bidding for *incremental clicks*
- Optimal reserve increases both prices
- Yahoo's revenue goes up ____ % year-on-year
- Microsoft deal comes through

Market Characteristics

- Real Time allocation of “impressions”
- Loads of inventory (intense competition)
- Extremely low “action rate”
- Must be able to **target** valuable users

Targeting and Profitability

- [Second-price auction](#)
- Two bidders & two kinds of users

| Bidder→ | Bidder 1 | Bidder 2 |
|--------------|----------|----------|
| User | | |
| Type A | 4 | 1 |
| Type B | 1 | 3 |
| Unknown type | ?? | ?? |

- Should the seller **Bundle or Split?** (split = targeting)
- **Split** → revenue = second-highest bid = 1 per user
- **Bundle** → Revenue = ??
- Value creation vs. value appropriation

Targeted Ads

- Improve user experience
- Competitive response
- Per click payments → commitment device!

Targeting and Privacy

Targeting = Selling separately =
= Revealing information prior to bidding =
= Information matters =
= Selling information & advertising space

➔ a new market for data

Lessons form Online Auctions

- 1) **Auction design matters:**
 - a. for new products in particular
 - b. provide “guarantees” to attract more bidders

- 2) For Sellers: **innovative design → competitive advantage**

- 3) Design matters even more so in complex settings
 - a. **Success stories from the (FTC) spectrum auctions**
 - b. **“The Greatest Auction in History”**

- 4) For bidders:
 - a. **Beware of “marketing the mechanism.”**
 - b. **Any design can be “gamed”**

MIT OpenCourseWare
<http://ocw.mit.edu>

15.025 Game Theory for Strategic Advantage
Spring 2015

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.