Kosmas Marinakis, Ph.D.

Last lecture

Game Theory – part III

micro2
first module

Empty threats

Firm 1 \ Firm 2	High price	Low price
High price	100, 80	80, 100
Low price	20, 0	10, 20

- Firm 2 goes ***first***
  - it will ***surely*** play "*Low*", causing firm 1 to play "*High*"
- Firm 1, however, ***prefers*** the (*High*, *High*) outcome
- What if firm 1 ***threatens*** to play "*Low*" if firm 2 plays "*Low*"?
  - ***After*** firm 2 has played low, firm 1 will lose ***if it materializes*** its threat, so it will not
  - This threat is ***empty!***

Threats, commitment and credibility

- Threats have to be ***credible***
  - competitors must understand that you "mean business"
- Scenario
  - *Orange Inc.* produces ***cellphones***
  - *Energon* produces ***batteries*** for cellphones
  - Sequential game with *Orange* as the ***first-mover***
  - *Energon* wants to ***affect*** the decision of *Orange*

Payoffs

Energon \ Orange (1st)	Small frame	Big frame
Small battery	3, 6	3, 0
Big battery	1, 1	8, 3

- *Orange* does best by producing ***small cellphones***
  - *Orange* ***knows*** that *Energon* will then ***produce small batteries***
- *Energon* prefers to make ***big batteries***
- Can *Energon* ***induce*** *Orange* to produce big frames instead?
  - notice that *Energon* ***moves after*** *Orange*

Threat

Energon \ Orange (1st)	Small frame	Big frame
Small battery	3, 6	3, 0
Big battery	1, 1	8, 3

- Suppose *Energon* ***threatens*** to produce ***big batteries*** no matter what *Orange* does
  - Not ***credible***!
  - Once *Orange* goes ahead producing small frames, *Energon* ***will lose if*** carries out its threat
- ***Can*** *Energon* make the threat ***credible***?

A credible threat

Energon \ Orange (1st)	Small frame	Big frame
Small battery	0, 6	0, 0
Big battery	1, 1	8, 3

- *Energon* ***burns down (!)*** the production line of small batteries
- *Energon* can now ***credibly threaten*** that it will produce "big batteries"
- *Energon* wants to make sure that *Orange* executives ***hear*** about the fire ;)

Commitment

Irrationality

- If a player gets the ***reputation of being "irrational"*** threats might be in fact credible
  - irrational individuals do ***not*** always make ***profit maximizing*** decisions
- In some occasions reputation of irrationality can lead to a ***significant advantage***
  - Opponents ***cannot estimate*** you with logic
  - Your ***threats*** will be taken more ***seriously***

Entry deterrence

- ***Barriers to entry*** are important for market power
  - economies of scale, patents and licenses, access to critical inputs
- ***Incumbent*** firms can also ***deter entry strategically***
  - by convincing potential ***entrants*** that entry will be unprofitable

Deterrence

Entry scenario

		Entrant (E)	
		Enter	Pass
Inc. (I)	Accommodate	100, 20	200, 0
	Fight	70, -10	130, 0

- Entrant can ***either*** *enter* ***or*** *pass* (not enter)
- Incumbent can ***either*** *accommodate* the entrant by maintaining a high price ***or*** *fight* him by lowering the price
- Entrant ***moves first***

Deterrence

Threat

		Entrant (E)	
		Enter	Pass
Inc. (I)	Accommodate	100, 20	200, 0
	Fight	70, -10	130, 0

- The incumbent could ***threaten*** the entrant with war if enters market
- ***Not credible***!
  - once the entrant has entered, it is in incumbent's ***best interest*** to ***accommodate*** and maintain high price

Deterrence

Excess capacity

		Entrant (E)	
		Enter	Pass
Inc. (I)	Accommodate	50, 20	150, 0
	Fight	75, -10	135, 0

- Incumbent wants to ***preempt entry***
  - Invests 50 million in ***excess capacity!***
  - This ***decreases payoff*** by 50 in case of accommodation
  - But allows her to ***produce (a bit) cheaper*** in case of fight
- The threat is now ***completely credible***
  - it is rational for entrant ***to stay out*** of the market

Deterrence

Rent seeking

- The monopolist ***didn't really*** invest in capacity to just earn 5 additional units of profit in case of fight
- She just ***"burned"*** the 50 million to ***bar the entrance***
  - Now the entrant will *pass* and profit will be 150
  - If the monopolist didn't spend the 50, entry would occur and her profit would fall to 100
- Fight was ***never meant*** to occur – the excess capacity will ***never be used*** in production – it is pure ***rent seeking***

Auctions

- ***Markets*** in which products are bought and sold through a ***formal bidding processes***
- ***Advantages*** of auctions:
  - ***Price discovery***
  - ***Encourage competition*** that increases seller's revenue
  - ***Low cost*** of transactions
  - Useful for ***unique items*** or those with ***fluctuating value***
- There are 3 main auction ***formats***
  - English – Dutch – Sealed-bid

1. Traditional english (oral)

- Seller actively solicits ***progressively higher bids*** from a group of potential buyers
- Buyers are ***always aware*** of highest bid
- Stops when ***no one over-bids*** the highest bid
- ***Winner*** is the player who offered the highest bid

2. Dutch auction

- Seller begins by offering item at a ***relatively high price***
- Then ***reduces price gradually*** until item is sold
- The first bidder who ***accepts the offered price*** terminates the auction and buys item at that price

3. Sealed-bid

- All bids are placed in ***sealed envelopes***
- The auctioneer opens all envelopes ***simultaneously***
- Winner is the one who submitted ***highest bid***
  - A. First-price
    winner pays her or his own bid (i.e. the highest)
  - B. Second-price
    winner pays the second highest bid

Information and valuation

Two main categories of auctions with respect to ***information***:

- ***Private-value*** auctions
  - Bidder knows only ***own valuation*** for the item
  - Valuations may be ***different*** among bidders
  - For ***example*** a painting or a collective item
- ***Common-value*** auctions
  - The item's ***real value is equal*** for everyone
  - Bidders may have ***different estimates*** about the real value
  - For ***example*** an oil well or a football player

Payoffs

- Each bidder i must choose a ***bidding strategy***
  - For bidder i, the item has an ***actual value***, v_i
  - Thus, i will ***bid*** for the item $b_i \leq v_i$
- ***Payoff*** for i
  - $v_i - b_i$, if i wins
  - 0, if i loses
- Overbidding ($b_i > v_i$) is a ***dominated*** strategy
- Underbidding ($b_i < v_i$) involves the ***risk of losing***

Auctions | Private value

How should a gentleman bid?

- A ***charity date*** is auctioned at a fundraiser
  Julia offers a night out for dinner and a movie to the gentleman who will donate the most to an orphanage
- ***Bidding truthfully*** is dominant strategy
  you want neither ***to overpay nor to risk*** losing
- ***English*** auction strategy
  bid toward your valuation ***hoping*** that all others will ***quit*** before
- ***Dutch*** auction strategy
  jump in when price drops at your valuation
- ***Sealed-bid*** auction strategy
  submit your actual valuation

Auctions | Private value

English vs. 2PSB

- 4 gentlemen and their ***private*** valuations:
  Sergei (30K) – Alexei (65K) – Dmitri (100K) – Vlad (150K)
- ***English*** auction
  - Sergei and Alexei will ***drop out*** when bid reaches 30 and 65
  - Dmitri will ***carry on*** till bid reaches 100
  - At around 100 Dmitri will ***drop out***
  - Vlad ***wins*** and ***pays*** around 100K (Dmitri's valuation)
- ***Second price*** sealed-bid auction
  - Everyone ***submits*** their actual valuation
  - Vlad ***wins*** and ***pays*** 100K (Dmitri's valuation)
- The two forms are ***theoretically equivalent***

Auctions | Private value

Dutch vs. 1PSB

- 4 gentlemen and their ***private*** valuations:
  Sergei (30K) – Alexei (65K) – Dmitri (100K) – Vlad (150K)
- ***Dutch*** auction
  - ***Price starts*** dropping from say 500K
  - Vlad ***stops the auction*** when price reaches 150K
  - Vlad ***wins*** and ***pays*** 150K (his valuation)
- ***First price*** sealed-bid auction
  - Everyone ***submits*** their actual valuation
  - Vlad ***wins*** and ***pays*** 150K (his valuation)
- The two forms are ***theoretically equivalent***

Auctions | Private value

Open vs. private format

- Open bidding ***encourages*** many bidders to increase expected bid of winner
  pride, prestige, social pressure
- Open bidding ***reveals information*** about true value of item
  other's willing to pay for the item, increases your ***confidence*** that the item is indeed worth it
- Closed bidding ***in second price sealed bid*** has been shown to often cause overbidding
- Often sellers set ***starting price***
  - To ***protect*** against selling item below its opportunity value
  - To ***signal*** high value for the item

Auctions | Common value

Common value auctions

- If the value of the item is ***common*** and ***known*** with certainty, there is ***no great interest*** in auctioning it
- If value is ***unknown***, bidders may form different expectations (estimations)
- This involves the ***risk*** for the winner ***to overpay***
  if her estimate ***exceeds*** the actual value of the item
- "Win the auction – lose in surplus value"
- This is referred to as the ***Winner's Curse***
  rational players account for winner's curse when bidding

ευχαριστώ!
(thank you!)

Kosmas Marinakis
www.kmarinakis.org
kmarinakis@hse.ru
kosmas_marinakis
Kosmas Marinakis
t.me/kosmas_teaching
@Kos_Marinakis

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