Principles of Economics
When Competitive Markets Cannot Work Optimally
Duopoly, Etc.

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The Set-Up... I

• Every weekend new movie(s) are released
• Gotta release new movies every weekend!
  • The demand for new movies is different from the demand for old movies
• Demand for new movies: \( P_d = 100 - 0.1 \times Q \)
• Each new movie costs 5000 to make
  • Those are the only costs of making a movie
• People don’t care which new movie they see
• Ample space in theaters
We Don’t Nationalize the Movie Industry…

- But we: don’t trust bureaucracy, want to spur innovation, are in the pocket of the Hollywood lobby

- New movies are non-rival: you make it, and then can show it to as many people as are willing to pay that weekend
  - For no additional cost

- But you can charge a price
  - A ticket-taker
  - The first-run movie is excludible

- Consider the case of one new movie produced each week…
What Does This Monopolist Do?

• Profit maximized when: \( Q = \frac{P_d0}{2a} = \frac{100}{2 \times 0.1} = 50 \)

• Revenue = 25000

• Profit = 20000

• CS = 12500

• TS = 32500

• Cf. FBS = 45000
Sony Pictures Says: WB Made 20K on 5K. Why Don’t We Do a Movie too?

• What happens if two movies come out each week?

• Problems of small numbers strategic interaction

• Let’s suppose that each movie company has to commit to printing a fixed number of tickets in advance…
Duopoly with Advance Choice of Number of Tickets Sold...

- $Q_s$ for Sony, $Q_w$ for WB...

- Demand:
  - $P_d = 100 - 0.1(Q_s + Q_w)$

- Profits:
  - $Pr_s = Q_s(100 - 0.1(Q_s + Q_w)) - 5000$
  - $Pr_w = Q_w(100 - 0.1(Q_s + Q_w)) - 5000$
Duopoly with Advance Choice of Number of Tickets Sold... II

- Profits:
  - $\Pr_s = 100Q_s - 0.1Q_wQ_s - 0.1Q_s^2 - 5000$
  - $\Pr_w = 100Q_w - 0.1Q_wQ_s - 0.1Q_w^2 - 5000$
Duopoly with Advance Choice of Number of Tickets Sold... III

- Profits:
  - $P_{rs} = 100Q_s - 0.1Q_wQ_s - 0.1Q_s^2$
  - $P_{rw} = 100Q_w - 0.1Q_wQ_s - 0.1Q_w^2$

- Profit maximization:
  - $0 = \frac{d}{dQ_s}P_{rs} = 100 - 0.1Q_w - 0.2Q_s$
  - $0 = \frac{d}{dQ_w}P_{rw} = 100Q - 0.1Q_s - 0.2Q_w$
Duopoly with Advance Choice of Number of Tickets Sold... IV

- Profit maximization:
  - \( 0 = 100 - 0.1Q_w - 0.2Q_s \)
  - \( 0 = 100Q - 0.1Q_s - 0.2Q_w \)
  - \( 0.2Q_s = 100 - 0.1Q_w \)
  - \( Q_s = 500 - Q_w/2 \)
  - And: \( Q_w = 500 - Q_s/2 \)
Duopoly with Advance Choice of Number of Tickets Sold... V

- \( Q_s = 500 - Q_w/2 \)
- \( Q_w = 500 - Q_s/2 \)
- 500 -> 250
- 250 -> 375
- 375 -> 312.50
- 312.50 -> 343.75

| \( Q_s \)    | 500
|-------------|----
| \( Q_w \)   | 250
| \( Q_w \)   | 375
| \( Q_s \)   | 312.5
| \( Q_s \)   | 343.75
| \( Q_w \)   | 328.125
| \( Q_s \)   | 335.9375
| \( Q_s \)   | 332.03125
| \( Q_w \)   | 333.984375
| \( Q_w \)   | 333.007813
| \( Q_w \)   | 333.496094
Duopoly with Advance Choice of Number of Tickets Sold: Solution

- $Q_s = Q_w = 333$
- $P = 33.33$
- Per-movie profits = $333 \times 33.33 - 5000 = 6109$
- Consumer surplus = $33.33 \times 667 = 22,222$
- Total surplus = $34441.78$
Duopoly with Advance Choice of Number of Tickets Sold: Solution II

- $Q_s = Q_w = 333$
- $P = 33.33$
- Per-movie profits = $333 \times 33.33 - 5000 = 6109$
- Consumer surplus = $33.33 \times 667 = 22,222$
- Total surplus = 34441.78
- Cf:
  - Monopoly surplus: 32,500
  - FBS: 45,000
Would a Third Competitor Enter?

- $Q_s$, $Q_w$, $Q_d$

- Let's make the same assumptions about strategic interaction as before...

- That only one film company gets to change its quantity each week...

- And each picks the quantity best for it for that week
  
  - This is naive...
  
  - Limit pricing...
Would a Third Competitor Enter? II

- \( Q_s = Q_w = Q_d = 250 \)
- \( P = 25 \)
- Profits when the situation settles down…
  - \( 250 \times 25 - 5000 = 1250 \)
Would a Third Competitor Enter? III

• $Q_s = Q_w = Q_d = 250$

• $P = 25$

• Profits when the situation settles down…
  • $250 \times 25 - 5000 = 1250$

• $CS = 28125$

• $PS = 3 \times 1250 = 3750$

• $TS = 31,875$
Would a Third Competitor Enter? IV

- $Q_s = Q_w = Q_d = 250$. $P = 25$. Profits = 1250

- $CS = 28125$. $PS = 3 \times 1250 = 3750$. $TS = 31,875$

- Cf:
  - Monopolist: 32500
  - Duopoly: 34442
  - FBS: 45000
  - RM: 44859
Would a Fourth Competitor Enter?

• NO
Would a Third Competitor Really Enter?

- Suppose Sony and WB credibly commit to keep $Q_s = Q_w = 333$
  
  - Then $Q_d = 167$
  
  - Profits\(d\) = $167 \times 16.7 - 5000$
  
  - Profits\(d\) = -2211
  
  - Profits\(s,w\) = +561
Summing Up…

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- Three potential sources of social waste here, two market and one government: (i) not letting “the right” number of people (i.e. 1000) see movies because of price; (ii) making “too many” movies because of profits; (iii) bureaucratic inefficiencies because of regulation/public provision
Summing Up… II

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- It's a matter of “pick your poison” when commodities are non-rival/returns-to-scale are increasing…