Econ 476: Industrial Organization
Entry Deterrence and Predatory Pricing

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Lecture 12

Intro

- ▶ If incumbent firms are earning economic profits, why are there no market entrants?
- ▶ Barriers to entry vs. entry deterrence?
  - ▶ barriers to entry: conditions not controlled by incumbent firms
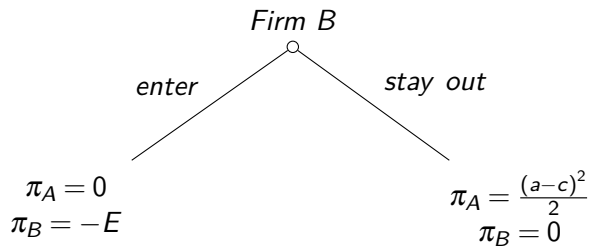 - ▶ entry deterrence: strategic actions by incumbent firms

Entry barriers

Let Firm A be the incumbent and Firm B be the potential entrant into the market. Inverse demand is $P = a - Q$ and unit cost is c_A and c_B. Assume the fixed cost of entry is $E > 0$. Also assume that the product is homogeneous. The game can be characterized as follows:

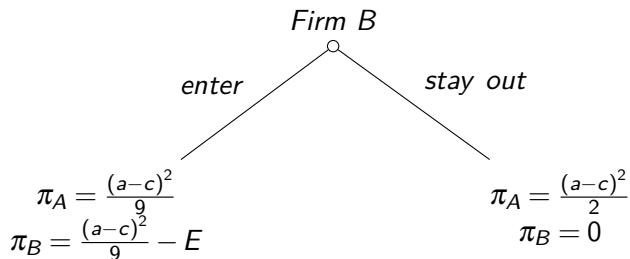*Firm B*

enter

stay out

π_A
π_B

π_A
π_B
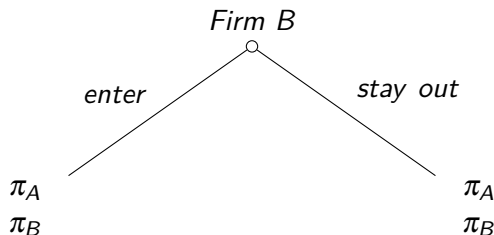
Entry barriers - questions

- What are the payoffs for Firms A and B assuming Bertrand competition (and unit costs are equal)?
- .... Cournot market structure?
- .... Stackelberg market structure?

Entry barriers - Bertrand

$$\text{Firm } B$$

enter   stay out

$\pi_A = 0$
$\pi_B = -E$

$\pi_A = \frac{(a-c)^2}{2}$
$\pi_B = 0$

Entry barriers - Cournot

Firm B

enter   *stay out*

$\pi_A = \frac{(a-c)^2}{9}$
$\pi_B = \frac{(a-c)^2}{9} - E$

$\pi_A = \frac{(a-c)^2}{2}$
$\pi_B = 0$

Entry barriers - Stackelberg

Firm B

enter   stay out

$\pi_A = \frac{(a-c)^2}{8}$
$\pi_B = \frac{(a-c)^2}{16} - E$

$\pi_A = \frac{(a-c)^2}{2}$
$\pi_B = 0$
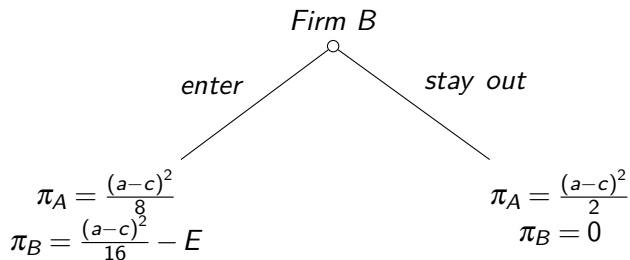
Entry deterrence

▶ What are some ways that an incumbent firm(s) can signal to the potential entrant that entering the market is not profitable? What else can the incumbent(s) do to deter entry?

Predatory pricing

Definition: temporarily setting prices low enough such that competitors are driven out of the market or choose not to enter the market.

- ▶ illegal
- ▶ does not have to set prices below average cost to be considered predatory

Predatory pricing - courts

- Burden of proof falls on the defendant
  - must show that price is above average cost
  - or that low prices are temporary and tied to some promotion
- Theoretically, once all competitors leave the market, the remaining firm would be a monopoly.
  - However, may not be in the best interest of the firm to raise prices to the monopoly level to avoid prosecution.

Entry deterrence - capital

- ▶ Why choose capital (investment) instead of quantity?
    - ▶ credible vs incredible threats
    - ▶ $Q = f(k)$ and $capacity = f(k)$

Entry deterrence - model

Consider a 2-stage game. The incumbent moves first and chooses capacity (capital expenditures), k_1. In the second stage, the potential entrant sees the capital investment of the incumbent and chooses whether to enter the market and how much to invest in capacity, k_1. The cost to enter the market is $E > 0$. Assume that the entrant will not enter if $\pi_2 = 0$. The profit function for the incumbent and potential entrant are

$$\pi_1 = \begin{cases} (1 - k_1 - k_2) k_2 & \text{if entry occurs} \\ (1 - k_1) k_1 & \text{otherwise} \end{cases}$$

$$\pi_2 = \begin{cases} (1 - k_1 - k_2) k_2 - E & \text{if entry occurs} \\ 0 & \text{otherwise} \end{cases}$$

Solve the second stage.

Entry deterrence - results

Results:

(stage 2)

- $\pi_2 = \begin{cases} (1 - k_1 - k_2) k_2 - E & \text{if entry occurs} \\ 0 & \text{otherwise} \end{cases}$

- $R^2 = \begin{cases} \frac{1-k_1}{2} & \text{if } k_1 < 1 - 2\sqrt{E} \\ 0 & \text{otherwise} \end{cases}$

  - The potential entrant will only enter if $k_1 < 1 - 2\sqrt{E}$.
  - $\pi_2 = \left[1 - k_1 - \left(\frac{1-k_1}{2} \right) \right] \left(\frac{1-k_1}{2} \right) - E = 0$

For what values of E (entry cost) will the incumbent:

1. collect the monopoly profits?
2. be indifferent between accommodating entry and deterring entry?
3. deter entry?
4. accommodate entry?

Entry deterrence - results

Results:

1. $E \geq 0.0625$
   - $k_1^* = \frac{1}{2} > 1 - 2\sqrt{E}$
2. $E \approx 0.00536$
   - $k_1^{deter} = 1 - 2\sqrt{E}$; $k_1^{acc} = \frac{1}{2}$
   - $\pi_1^{deter} = 2\sqrt{E}\left(1 - 2\sqrt{E}\right)$; $\pi_1^{acc} = \frac{1}{8}$
3. $0.00536 < E < 0.0625$
4. $E \lesssim 0.00536$

Judo economics

What does "judo economics" even mean??

- ▶ Gelman and Salop (1983)
    - ▶ *"Judo Economics: Capacity Limitation and Coupon Competition"*
- ▶ "One of the major aspects of judo is to use the size of the opponent against him or herself." –investopedia.com

Judo - model

Consider a 2-stage game. In the first stage the potential entrant decides (a) whether to enter, (b) its capacity, k, and (c) its price, p^e. In the second stage, the incumbent chooses its price, p^I.

- ▶ Assume that production is costless.
- ▶ Inverse demand: $P = 100 - Q$
- ▶ homogeneous good
- ▶ Similar to sequential Bertrand, except that consumers prefer incumbent's product at equal prices:

$$q^I = \left\{ \begin{array}{ll} 100 - p^I & \text{if } p^I \leq p^e \\ 100 - k - p^I & \text{if } p^I > p^e \end{array} \right.$$
$$q^e = \left\{ \begin{array}{ll} k & \text{if } p^e < p^I \\ 0 & \text{if } p^e \geq p^I \end{array} \right.$$

Judo - model

- The incumbent has 2 general choices
  - accommodate entry $(p^I > p^e)$
  - deter entry $(p^I = p^e)$

Set up the profit functions for each firm if the incumbent accommodates/deters entry.

Judo - results

- $\pi^I = \begin{cases} (100 - k - p^I)\, p^I & \text{if } p^I > p^e \\ (100 - p^e)\, p^e & \text{if } p^I = p^e \end{cases}$

- $\pi^e = \begin{cases} k p^e & \text{if } p^e < p^I \\ 0 & \text{if } p^I = p^e \end{cases}$

Under what conditions will the incumbent accommodate entry? Graph the solution.

Judo - results

- $\pi_{acc}^I \geq \pi_{deter}^I \longrightarrow \frac{(100-k)^2}{4} \geq (100-p^e)\,p^e$
- [graph]