

Judo Economics: Exercise

- ▶ Consumers have an inelastic demand of size D if $p \leq p_{max}$.
 - ▶ An incumbent I has an installed capacity D and no production cost.
 - ▶ An entrant E has a variable cost $c_E > 0$
1. Determine the price and profit of a monopoly I .
 2. If E chooses to enter the market, he chooses both its capacity K_E and its price p_E . If E enters, I observes K_E and p_E and adapts its price denoted p_I .
 - a. What is the demand for each firm with respect to p_E , p_I and K_E ?
 - b. Given (K_E, p_E) , determine the best pricing strategy of firm I , denoted $p_I(K_E, p_E)$.
 - c. Given the reaction of firm I , determine the optimal decisions (K_E, p_E) of the entrant. What is the effect of c_E on these decisions?
 - d. Determine the profit of the two firms.
 - e. What is the equilibrium if the incumbent can set a personalized price for each customer?

1. A monopolist I sets a price p_{max} and its profit is $p_{max}D$.

2. Entry

a. Demand

- ▶ If $p_I > p_E$ the firm E $D_E = K_E$ and $D_I = D - K_E$
- ▶ If $p_I \leq p_E$, the firm I has a demand $D_I = D$ and $D_E = 0$

b. Given (K_E, p_E) , the firm I can sell at p_{max} and obtain a profit

$$p_{max}(D - K_E)$$

The firm can also sell at p_E and obtain $p_E D$. I chooses the price that maximises its profit i.e.: $p_I = p_{max}$ if $p_E \leq \frac{(D - K_E)p_{max}}{D}$ and p_E otherwise.

c. The firm E can sell if and only if I chooses p_{max} . Therefore, E must set $p_E = \frac{(D - K_E)p_{max}}{D}$, that is a sufficiently low price and maximises

$$K_E \left(\frac{D - K_E}{D} p_{max} - c_E \right)$$

which gives $K_E^* = \frac{D}{2} \left(1 - \frac{c_E}{p_{max}} \right)$ and $p_E^* = \frac{p_{max} + c_E}{2}$. If $c_E = 0$, i.e; the entrant is as efficient as the incumbent, $K_E^* = \frac{D}{2}$, the two firms share the market and the price is $\frac{p_{max}}{2}$.

d. In equilibrium, profits are:

$$\Pi_I = p_{max}(D - K_E^*) = \frac{D(p_{max} + c_E)}{2}$$

$$\Pi_E = \frac{D}{p_{max}} \frac{(p_{max} - c_E)^2}{4}$$

A less efficient entrant can enter the market and realise a positive profit when facing an incumbent more efficient and with more capacity. The entrant chooses a relatively low size to make it very costly for the incumbent to go into a price war.

e. With personalized prices, I would sell at $p_E - \epsilon$ at population K_E but at P_{max} to other consumers and entry would be always deterred.