Should see the world as margins and indifference conditions.

In exams, there are usually twists on the questions.

$\sqrt{}_-$ $\sqrt{}_{(-)}$ $\sqrt{}$ $\sqrt{}_{(+)}$ $\sqrt{}_+$ $\sqrt{}_{++}$ grading scale on psets

$\boxed{Q2}$ monopolist maximizes given consumers' strategy → structure of monopolist's strategy

consumer optimizes given monopolist's strategy → structure of consumer strategy

ie we show that linear strategies are a Nash equilibrium.

Will not be dealing with mergers here. (272, 281, 282)

Durable Goods $\theta \sim U[0,1]$

$$U = \begin{cases} 2\theta - p_1 & \text{if buy at } t=1 \\ \theta - p_2 & \text{if buy at } t=2 \\ 0 & \text{if not buy} \end{cases}$$

Under no commitment, $p_1^{NC} = \frac{9}{10}$, $q_1^{NC} = \frac{2}{5}$ $\Rightarrow \pi^{NC} = \frac{45}{100}$
$p_2^{NC} = \frac{3}{10}$, $q_2^{NC} = \frac{3}{10}$

Solution: leasing the product out: $p_1^L = p_2^L = \frac{1}{2}$. Then $q_1^L = \frac{1}{2}$, $q_2^L = 0$, and $\pi = \frac{1}{2}$

Problem: $t=1$ consumer choice reveals information about θ. (ie $\theta \geq \frac{1}{2}$ for those who do not lease) The monopolist now sees

2 groups.

$t=2$: $\theta \geq \theta_1$ leased. Firm wants to (for low types)

$$\max \ (\theta_1 - p)p \Rightarrow p_{2L} = \frac{\theta_1}{2} < \frac{1}{2}$$

Commitment problem still. For high types, want to:

$$\max \ (1 - \max(p, \theta_1))p \Rightarrow p_{2H} = \max\{\tfrac{1}{2}, \theta_1\} = \theta_1$$

at $t=1$: consumer will get $(\theta - p_1) + (\theta - p_{2H})$ if lease at $t=1$ or $(\theta - p_{2L})$ if lease at $t=2$

Will lease at $t=1$ if

$$\theta - p_1 + \theta - p_{2H} \geq \theta - p_{2L}$$

$$\Rightarrow p_1 = \frac{\theta_1}{2} = p_{2L}$$

Introduce probability of breakdown (planned obsolescence)

$$u = \begin{cases} \theta(2-x) - p_1 & \text{if buy at } t=1 \\ \theta - p_2 & t=2 \\ 0 & \text{not buy} \end{cases}$$

x is prob. of breaking.

at $t=2$, $$\max_{p_2} \ [\underbrace{x\underbrace{(1-\theta_1)}_{\text{* ppl bought at } t=1}}_{\text{* ppl who have to return to mkt}} + \theta_1 - p_2]p_2 \Rightarrow p_2 = \frac{x(1-\theta_1)+\theta_1}{2}$$

Indifferent consumer:

$$\hat{\theta}(2-x) - p_1 + x(\hat{\theta} - p_2) = \hat{\theta} - p_2 \Rightarrow \hat{\theta} = \frac{2+(1-x)^2}{4+(1-x)^2}$$

when $x=0$, $\hat{\theta}=\frac{3}{5}$, which is the special case from before.

when $x=1$, $\hat{\theta}=\frac{1}{2}$, which is the leasing solution with commitment

Depending on the cost structure, we can have an interior solution.

Bertrand - price

Cournot - quantity

- competition w/homogeneous products
  - those analyses date back to 19th century.

Bertrand Paradox

- 2 firms
- $MC = c$
- $\pi^i(p_i, p_j) = (p_i - c) D_i(p_i, p_j)$
- $D_i(p_i, p_j) = \begin{cases} D(p_i) & p_i < p_j \\ \frac{1}{2} D(p_i) & p_i = p_j \\ 0 & p_i > p_j \end{cases}$

- Only solution is $p_i^* = p_j^* = c$

How to resolve this paradox?

- increasing MC (incl. capacity constraints)
- product differentiation
- repeated games

- timing

Cournot competition

- $Q = \sum_{i=1}^{N} q_i$
- Firm i: $\max q_i (P(Q) - c)$

$$(q_i): P(Q) - c + q_i \frac{\partial P}{\partial Q} \underbrace{\frac{\partial Q}{\partial q_i}}_{=1} = 0$$

$$\Rightarrow q_i = \frac{P(Q) - c}{-\frac{\partial P}{\partial Q}}$$

compare this to FOC for monopolist:

$$(Q): P(Q) - c + Q \frac{\partial P}{\partial Q} = 0$$

If $\frac{q_i^*}{Q} \to 0$, we approach competition

If $\frac{q_i^*}{Q} \to 1$, we approach monopolist outcome

Here, the quantities are strategic substitutes. (ie i produces more $\Rightarrow$ j wants to produce less.)

In corresponding pricing game, prices are strategic complements.