Peak Load Pricing

Market segmentation
2° P. discrm +

with a twist: capacity constraints
or at least MC that prices is much higher at peak demand.

seats in station electricity demand
"Not Undersold" policy = NUP

"We'll match any advertised price"

Good deal for consumers?

Aero laptop sold by 2 firms:
  Circus Sellers: \( MC = 800 \)
  Freds: \( P_C = P_F = 900 \)

\( Q_C = Q_F = 1000 \). \( P_{SC} = 1000 \cdot (900 - 800) = 100000 \)

**Scenario 1**

Suppose Fred cuts price to $860, doubles \( Q_F \).

\( P_{SF} \uparrow \$120 \). A real temptation!

eventually CS also cuts price,.....

"Bertrand hell"

**Scenario 2** NUP. (Both firms)

A price cut to $860 now will not double \( Q_F \) ! It's not a tempting proposition.

So both firms keep prices high & equal.

\( \Rightarrow \) KDC model (sweezy)

"Sticky" prices etc.

NUP dulls price competition.
Transfer Price

The internal price at which upstream division sells to downstream division.

- For multinationals, use it to reduce taxes
- Incentives for managers

Double marginalization problem

Historical example:

- China $\rightarrow$ Afghanistan $\rightarrow$ Italy
- Silk $\rightarrow$ Gold

Simple contemporary example:

Demand for final product

\[ P = 10 - 2Q \]
\[ MC_{Total} = 2 \text{, all upstream.} \]
\[ MC_U + MC_D = 2 \]
\[ M R = 10 - 4Q, \quad MC = 2 \]
\[ 4Q = 10 - 2 = 8 \]
\[ Q = 2 \]
\[ P = 10 - 2 \cdot 2 = 6 \]

\[ \pi = (P - MC)Q = 4 \cdot 2 = 8 \]
Upstream firm maximizes own profit: it will price at 6 and hopes to sell 2 units.

But if downstream firm takes this price as its own MC and max's profit:

\[ \text{max } \pi_D = (p_D - 6)Q = (10 - 2Q - 6)Q = (4 - 2Q)Q. \]

For C: \[ 0 = 4 - 4Q \Rightarrow Q = 1 \]

\[ \Rightarrow p = 10 - 2 \cdot 1 = 8 \]

They get $2 in profit.

\[ \pi = 8 \text{ no d.m. problem.} \]

\[ \text{CS} = 4. \]
In general, when \( MC_T = MC_U + MC_D \), then firm as a whole sets

\[ MR = MC_T = MC_U + MC_D \]

So motivate upstream firm by setting

\[ NMR = MR - MC_D = MC_U = P_{\text{transfer}} \]

\( \rightarrow \) transfer price.
Basics of Risky Choice.

$$X_i$$  |  $$P_i$$
---|---
$1000 | 0.10
$100  | 0.40
0     | 0.50

$$E(X) = \mu = (1000)(1.1) + (100)(.4) + 0(.5) = \$140$$

$$Var = \sigma^2 = (1000-140)^2(.1) + (100-140)^2(.4) + (0-140)^2(.5) = \$84,400$$

$$\sigma = \sqrt{\sigma^2} = \$290.$$  Standard deviation.

$$(x_i, p_i), i = 1,..., n \quad \sum p i = 1, p_i \geq 0.$$  

$$E(X) = \mu_x = \sum_{i=1}^{n} x_i p_i, \quad \sigma_x^2 = \sum_{i=1}^{n} (x_i-\mu)^2 p_i = Var X.$$  

$$\sigma_x = \sqrt{\sigma_x^2}.$$  

$$X_1 = \$10, X_2 = \$0 \quad \mu_x = \$5$$

$$P_1 = .5, P_2 = .5 \quad \sigma_x = \$5$$

$$CE =$$ valuation of the gamble  

$$\geq \$5$$ for about $$\frac{1}{4}$$ of class  

$$\geq \$$ for about $$\frac{1}{2}$$ of class. $$\geq 3$$ for most.

$$RP = \mu - CE. > 0$$ if risk averse.
Utility function

\[ u_j(x) = CE_j = \mu_x - RP_j = \mu_x - \frac{1}{2} \sigma^2_j \]

\[ CE_j = \mu_x - \frac{1}{2} \sigma^2_j \]

e.g. if \( RP_j = 4 \) and \( CE_j = 2 \),

then risk tolerance \( \sigma_j \) satisfies

\[ 4 = 5 - \sigma_j^2 \]

\[ 5 - 4 = 1 = \sigma_j^2 \]

\[ \sigma_j^2 = \frac{1}{2} \]

\[ \Rightarrow \sigma_j = \frac{1}{\sqrt{2}} = 0.04 \]

If \( CE_j = 3 \),

then

\[ 3 = 5 - \sigma_j \cdot 25 \]

\[ \Rightarrow \sigma_j \cdot 25 = 5 - 3 = 2 \]

\[ \Rightarrow \sigma_j = \frac{2}{25} = \frac{0.08}{25} \]

Discussion