3 Book Notes

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Applications and Extensions of optimal production and pricing

Simple (3rd degree) Price Discrimination

Charge different prices to different groups
↳ senior discount

groups must:
↳ be identifiable
↳ have specific willingness to pay
↳ resale should be impossible

Market w/ less elastic demand

$P_1 = \frac{\varepsilon_1}{1+\varepsilon_1} MC \qquad P_2 = \frac{\varepsilon_2}{1+\varepsilon_2} MC$

Example: Two groups. Max profit w/ discrimination
$P_1 = 20 - q_1 \quad P_2 = 30 - q_2 \quad C(Q) = .5(q_1+q_2)^2$

Two prices: $\pi = (20-q_1)q_1 + (30-q_2)q_2 - .5(q_1+q_2)^2$

$MR_1 = MR_2 = MC$

$MR_1 = MC$: $20 - 2q_1 = q_1 + q_2$
$MR_2 = MC$: $30 - 2q_2 = q_1 + q_2$

$20 - 2q_1 = 30 - 2q_2$
$2q_2 = 10 + 2q_1$
$q_2 = 5 + q_1$

$20 - 2q_1 = q_1 + 5 + q_1$
$15 = 4q_1$
$q_1 = 3.75 \rightarrow q_2 = 5 + q_1 = 8.75$
$P_1 = 20 - 3.75 = 16.25 \qquad P_2 = 30 - 8.75 = 21.25$

$\pi = 16.25(3.75) + 21.25(8.75) - .5(3.75+8.75)^2 = 168.75$

one price?

$P_1 = 20 - q_1 \rightarrow q_1 = 20 - P_1 \qquad P_2 = 30 - q_2 \rightarrow q_2 = 30 - P_2$

$P_1 = P_2 = P \rightarrow q = 50 - 2P \rightarrow P = 25 - .5q$

$\pi = (25 - .5q)q - .5q^2$
$MR = MC$
$25 - q = q$
$q = 12.5$
$P = 25 - .5(12.5) = 18.75$
$\pi = 18.75(12.5) - .5(12.5)^2 = 156.25$

Extra profit → $168.75 - 156.25 = 12.5$

Profit maximization when purchases per capita don't depend on market size

$q_s/N = f(P, P_s, P_c, M, z)$ → Purchases per capita

N = city size

Maximizing profit with a pre-determined capacity constraint

Theaters, stadiums, etc

Profit maximization with Uncertainty

Expected profit

Value of information with continuous decisions

Peak load Pricing - determining capacity when demand varies

Chapter 16 in Game Theory

To max π, $MR_L = MC_L = C$ and $MR_H = MC_H = C + K$

$\pi = P_H(q_H)q_H + P_L(q_L)q_L - C_L - (C+K)q_H \rightarrow q_H = q_L$

↳ if $q_H < q_L$ then $q_H = q_L$

$MR_H + MR_L = 2C + K$