ECO 305 — FALL 2003 — November 11

MONOPOLY

CAUSES OF MONOPOLY

1. Legal grant – historically sold by kings
   Now – public utilities, “national champions”
2. Exclusive ownership – DeBeers, OPEC?
3. Large sunk costs or scale economies – Microsoft?
4. Predatory action to exclude others – Microsoft?
   Modern governments regulate 3, outlaw 4

MONOPOLIST’S BEHAVIOR

Even a monopolist competes for consumer’s $ with firms producing all other goods
But no strategic interaction (game theory)
Profit-maximization given demand curve
Direct $x = D(p)$, inverse $p = P(x)$

Two equivalent solutions
[1] Choose $x$ to max $xp − C(x)$
   FONC $[p + x dp/dx] = C’(x)$ ($MR = MC$)
   SOSC $(MR − MC)$ ↓; $MC$ cuts $MR$ from below
   Can have $MC$ itself falling; some incr. rets. OK
[2] Choose $p$ to max $px − C(x)$
   FONC $x + p dx/dp − C’(x) dx/dp = 0$
   Same since $dx/dp = 1/(dp/dx)$
Elasticity of direct demand

\[ \epsilon = -\frac{p}{x} \frac{dx}{dp} , \]  
so mark-up \( p = \frac{MC}{1 - 1/\epsilon} \)

Dead-weight loss because \( p > MC \)  
hence need for antitrust policy

KEY TRADEOFF – Price ↓ / quantity ↑ implies  
profit ↑ \( (P - MC) \ dx \) from marginal sales,  
↓ \( x \ dp \) on inframarginal sales

PRICE DISCRIMINATION – Attempt to escape tradeoff

[1] Perfect – separate price for each buyer, unit  
Efficient, but monopolist extracts all surplus  
Needs detailed info; must prevent resales
Separate, uniform price for members of each group
Less info needed; must prevent resale

Two-group case:
\[ \max x_1 P_1(x_1) + x_2 P_2(x_2) - C(x_1 + x_2) \]

FONCs
\[ p_1 + x_1 \frac{dp_1}{dx_1} \equiv MR_1 = MC \equiv C'(x_1 + x_2) \]
\[ p_2 + x_2 \frac{dp_2}{dx_2} \equiv MR_2 = MC \equiv C'(x_1 + x_2) \]
\[ p_1 = \frac{MC}{1 - 1/\epsilon_1}, \quad p_2 = \frac{MC}{1 - 1/\epsilon_2} \]
Group with less elastic demand pays higher price
  e.g. airfare discounts for senior citizens

[3] Versioning – individual demands unobservable
But distribution in population known
Offer multiple “packages”
Separate by self-selection (screening)
  e.g. Saturday night stay requirement in airfares
May be easier to prevent resales
Details later in information theory
OLIGOPOLY

GENERAL ISSUES

1. How to define “industry”
   Close substitutes (or complements), matter of degree

2. Why is number of firms in industry small?
   Large fixed costs or scale economies

3. Forms of strategic interactions
   a. Choice variables – quantities or prices
      Others – investment, R-and-D, advertising, ...
   b. Simultaneous vs. sequential actions
      Leadership and followership advantage
   c. One-time vs. repeated interaction
      Tacit collusion possible if repeated
   d. Explicit or implicit collusion or competition,
      Depends on information, time-span, law, ...

   No combination of these universally true
   Study some special models for insight, techniques

Key concept – Each firm’s price or quantity choice
shifts others’ demand curves, affects profits
Like an externality, negative if substitutes
   Conflict between joint and individual profit-max
Result – game-theoretic interaction, equilibrium
DEMAND FUNCTIONS

Result of maximizing quasilinear utility \( u(x_1, x_2, y) = y + a_1 x_1 + a_2 x_2 - \frac{1}{2} \left[ b_1 (x_1)^2 + 2 k x_1 x_2 + b_2 (x_2)^2 \right] \)

subject to budget constraint \( y + p_1 x_1 + p_2 x_2 = M \)

Inverse:

\[
p_1 = a_1 - b_1 x_1 - k x_2, \quad p_2 = a_2 - k x_1 - b_2 x_2
\]

\( a_i, b_i > 0, k^2 \leq b_1 b_2 \)

Substitutes: \( k > 0 \), complements: \( k < 0 \)

Perfect 1-for-1 substitutes: \( p_1 = p_2 = a - b (x_1 + x_2) \)

Direct:

\[
x_1 = \alpha_1 - \beta_1 p_1 + \kappa p_2, \quad x_2 = \alpha_2 + \kappa p_1 - \beta_2 p_2
\]

\( \alpha_i, \beta_i > 0. \quad \kappa^2 \leq \beta_1 \beta_2 \)

Substitutes: \( \kappa > 0 \), complements \( \kappa < 0 \)

Perfect 1-for-1 complements: \( x_1 = x_2 = \alpha - \beta (p_1 + p_2) \)

QUANTITY-SETTING (COURNOT) DUOPOLY

Constant marginal costs \( c_1, c_2 \); fixed costs “in background”

Firm 1’s profit

\[
\Pi_1(x_1, x_2) = (p_1 - c_1) x_1 = [(a_1 - c_1) - b_1 x_1 - k x_2] x_1
\]
3-D and contour graphs \((a_1 - c_1 = 1, \ b_1 = k = 1)\)