10 Competitive market vs Monopoly

COMPETITIVE FIRM — takes prices as given.

or, while being able to set prices, faces perfectly elastic demand —

$$d(p^i) = \begin{cases} 0, \text{ if } p^i > p^*; \\ \text{any } q \in \mathbb{R}, \text{ if } p^i = p^*; \\ \infty, \text{ if } p^i < p^*. \end{cases}$$

MONOPOLY — free to set any price.

Implicitly assumed: Supply side (consumers) are competitive — take prices as given.

10.1 Profit maximization

COMPETITIVE FIRM:

$$py - c(y) \to \max_y .$$

$$\begin{aligned} FOC &: p = c'(y^*), \\ SOC &: c''(y^*) \geq 0. \end{aligned}$$

MONOPOLY:

$$\begin{aligned} py - c(y) &\to \max_{p,y}, \\ \text{s.t. } D(p) &= y. \end{aligned}$$

Alternatively

$$p(y)y - c(y) \to \max_y .$$

$$\begin{aligned} FOC &: p(y) + p'(y)y = c'(y), \\ SOC &: 2p'(y) + p''(y)y - c''(y^*) \leq 0. \end{aligned}$$

10.2 Marginal Revenue vs Marginal Cost

$$\begin{aligned} MR_C &= p, \\ MR_M &= p(y) + p'(y)y. \end{aligned}$$

Optimal production:

$$MR = MC.$$

Other conditions??

Monopoly:

$$MR_M = p(y)\left[1 + \frac{dp}{dy}\frac{y}{p}\right] = p(y)\left[1 + \frac{1}{\epsilon(y)}\right] = c'(y).$$

Here, $\epsilon(y)$ is the price *elasticity of demand.*

Example: $p(y) = a - by$, $y = Ap^{-b}$ $(\epsilon(y) = -b)$.

10.3 Competitive equilibrium

Suppose single good is for sale.

Firm's supply: $y_i^*(p)$.

Aggregate supply: $Y^*(p) = \sum_{i=1}^m y_i^*(p)$.

Aggregate demand: $X^*(p) = \sum_{i=1}^n x_i^*(p)$

In market equilibrium: $Y^*(p) = X^*(p)$. (why?)

Comparative statics: effects of Δm and Δn?

What happens if Entry and Exits are not restricted?

10.4 Welfare Economics

Representative consumer, representative firm(?).

Utility: $u(x) + y$.

Market Equilibrium: $u'(x) = p = c'(x)$.

Welfare problem:

$$\max_{x,y} u(x) + y$$
$$\text{s.t. } y = w - c(x)$$

FOC?

$TS(x) = CS(x) + PS(x) = [u(x) - px] + [px - c(x)] = u(x) - c(x)$

Several consumers, firms.

Consumer: $u_i(x_i) + y_i$; Firm: $c_j(x_j)$.

Welfare problem:

$$\sum_{i=1}^{n} u_i(x_i) + \sum_{i=1}^{n} y_i \to \max$$
$$\text{s.t. } \sum_{i=1}^{n} y_i = \sum_{i=1}^{n} w_i - \sum_{j=1}^{m} c_j(z_j).$$

Substitute:

$$\sum_{i=1}^{n} u_i(x_i) + \sum_{i=1}^{n} w_i - \sum_{j=1}^{m} c_j(z_j) \to \max$$
$$\text{s.t. } \sum_{i=1}^{n} x_i = \sum_{j=1}^{m} z_j.$$

FOC?