Outline

1. Welfare: Producer Surplus

2. Welfare: Consumer Surplus

3. Profit Maximization: Monopoly
1 Welfare: Producer Surplus

- Nicholson, Ch. 9, pp. 261–263 [OLD: Ch. 13, pp. 350–351]

- Producer Surplus is easier to define:

\[ \pi(p, y_0) = py_0 - c(y_0). \]

- Can give two graphical interpretations:

  1. Rewrite as

\[ \pi(p, y_0) = y_0 \left[ p - \frac{c(y_0)}{y_0} \right]. \]

  Profit equals rectangle of quantity times \( p - \text{Av. Cost} \)
2. Remember:

\[ f(x) = f(0) + \int_0^x f_x'(s) \, ds. \]

Rewrite profit as

\[
\left[ p \ast 0 + p \int_0^{y_0} 1 \, dy \right] - \left[ c(0) + \int_0^{y_0} c'_y(y) \, dy \right] = \\
= \int_0^{y_0} (p - c'_y(y)) \, dy - c(0).
\]

Producer surplus is area between price and marginal cost (minus fixed cost)
2 Welfare: Consumer Surplus

- Nicholson, Ch. 5, pp. 145–149 [OLD: Ch. 5, pp. 139–143]

- Evaluate welfare effects of price change from $p_0$ to $p_1$

- Proposed measure:

$$e(p_0, u) - e(p_1, u)$$

- Can rewrite expression above as

$$e(p_0, u) - e(p_1, u) = \left( e(0, u) + \int_0^{p_0} \frac{\partial e(p, u)}{\partial p} dp \right) - \left( e(0, u) + \int_0^{p_1} \frac{\partial e(p, u)}{\partial p} dp \right)$$

$$= \int_{p_1}^{p_0} \frac{\partial e(p, u)}{\partial p} dp$$
• What is \( \frac{\partial e(p,u)}{\partial p} \)?
• Remember envelope theorem...

• Result:
\[ \frac{\partial e(p, u)}{\partial p} = h(p, u) \]

• Welfare measure is integral of area to the side of Hicksian compensated demand

• Graphically,
3 Profit Maximization: Monopoly

- Nicholson, Ch. 13, pp. 385–393 [OLD: Ch. 18, pp. 496–504]

- Nicholson, Ch. 9, pp. 248–255 [OLD: Ch. 13, pp. 335–342]

- **Perfect competition.** Firms small relative to market

- **Monopoly.** One, large firm. Firm sets price $p$ to maximize profits.

- What does it mean to set prices?
• Firm chooses $p$, demand given by $y = D(p)$

• (OR: firm sets quantity $y$. Price $p(y) = D^{-1}(y)$)
• Write maximization with respect to $y$

• Firm maximizes profits, that is, revenue minus costs:

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

• Notice $p(y) = D^{-1}(y)$

• First order condition:

$$p'(y) y + p(y) - c'_y(y) = 0$$

or

$$\frac{p(y) - c'_y(y)}{p} = -p'(y) \frac{y}{p} = -\frac{1}{\varepsilon_{y,p}}$$

• Compare with f.o.c. in perfect competition

• Check s.o.c.
• Elasticity of demand determines markup:
  
  – very elastic demand → low mark-up
  
  – relatively inelastic demand → higher mark-up

• Graphically, $y^*$ is where marginal revenue $(p'(y)y + p(y))$ equals marginal cost $(c'_y(y))$

• Find $p$ on demand function
• Example.

• Linear inverse demand function $p = a - by$

• Linear costs: $C'(y) = cy$, with $c > 0$

• Maximization:

$$\max_y (a - by) y - cy$$

• Solution:

$$y^*(a, b, c) = \frac{a - c}{2b}$$

and

$$p^*(a, b, c) = a - b \frac{a - c}{2b} = \frac{a + c}{2}$$
• S.O.C.

• Figure

• Comparative statics:
  – Change in marginal cost $c$
  – Shift in demand curve $a$
• Monopoly profits

• Case 1. High profits

• Case 2. No profits
• Welfare consequences of monopoly
  – Too little production
  – Too high prices

• Graphical analysis
4 Next Lecture

• Market Power

• Price Discrimination