Economics 101A
(Lecture 20, Revised)

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Outline

1. Market Equilibrium in the Long-Run
2. Welfare: Consumer Surplus
3. Welfare: Producer Surplus

1 Market Equilibrium in the Long-Run

- Nicholson, Ch. 14, pp. 382–394.

- So far, short-run analysis: number of firms fixed to J

- How about firm entry?

- Long-run: free entry of firms

- When do firms enter? When positive profits!

- This drives profits to zero.

- Entry of one firm on industry supply function $Y^S(p, w, r)$ from period $t-1$ to period t :

$$Y_t^S(p, w, r) = Y_{t-1}^S(p, w, r) + y(p, w, r)$$

- Supply function shifts to right and flattens:

$$\begin{aligned} Y_t^S(p,w,r) &= Y_{t-1}^S(p,w,r) + y(p,w,r) \\ &> Y_{t-1}^S(p,w,r) \text{ for } p \text{ above } AC \end{aligned}$$

since $y(p,w,r) > 0$ on the increasing part of the supply function.

- Also:

$$Y_t^S(p,w,r) = Y_{t-1}^S(p,w,r) \text{ for } p \text{ below } AC$$

since for p below AC the firm does not produce ($y(p,w,r) = 0$).

- Flattening:

$$\begin{aligned}\frac{\partial Y_t^S(p,w,r)}{\partial p} &= \frac{\partial Y_{t-1}^S(p,w,r)}{\partial p} + \frac{\partial y(p,w,r)}{\partial p} \\ &> \frac{\partial Y_{t-1}^S(p,w,r)}{\partial p} \text{ for } p \text{ above } AC\end{aligned}$$

since $\partial y(p,w,r)/\partial p > 0$.

- Also:

$$\frac{\partial Y_t^S(p,w,r)}{\partial p} = \frac{\partial Y_{t-1}^S(p,w,r)}{\partial p} \text{ for } p \text{ below } AC$$

- Profits go down since demand curve downward-sloping

- In the long-run, price equals minimum of average cost

- Why? Entry of new firms as long as $\pi > 0$

- ($\pi > 0$ as long as $p > AC$)

- Entry of new firm until $\pi = 0 \Longrightarrow$ entry until $p = AC$

- Also:

$$\text{If } C'(y) = \frac{C(y)}{y}, \text{ then } \frac{\partial}{\partial} \frac{C(y)}{y} = 0$$

- Graphically,

- Special cases:

- **Constant cost industry**

- Cost function of each company does not depend on number of firms

- **Increasing cost industry**

- Cost function of each company increasing in no. of firms

- Ex.: congestion in labor markets

- **Decreasing cost industry**

- Cost function of each company decreasing in no. of firms

- Ex.: set up office to promote exports

2 Welfare: Producer Surplus

- Nicholson, Ch. 13, pp. 350–351

- Producer Surplus is easier to define:

$$\pi\left(p, y_0\right) = p y_0 - c\left(y_0\right).$$

- Can give two graphical interpretations:

  1. Rewrite as

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

  Profit equals rectangle of quantity times (p - Av. Cost)

2. Remember:

$$f(x) = f(0) + \int_0^x f'_x(s)\,ds.$$

Rewrite profit as

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

$$= \int_0^{y_0} \left(p - c'_y(y)\right) dy - c(0).$$

Producer surplus is area between price and marginal cost (minus fixed cost)

3 Welfare: Consumer Surplus

- Nicholson, 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

$$\begin{aligned} e(p_0, u) - e(p_1, u) &= \left(e\left(0, u\right) + \int_0^{p_0} \frac{\partial e(p, u)}{\partial p} dp \right) - \\ &\quad - \left(e\left(0, u\right) + \int_0^{p_1} \frac{\partial e(p, u)}{\partial p} dp \right) \\ &= \int_{p_1}^{p_0} \frac{\partial e(p, u)}{\partial p} dp \end{aligned}$$

- What is $\frac{\partial e(p,u)}{\partial p}$?

- Remember envelope theorem...

- Result:

$$\frac{\partial e(p,u)}{\partial p} = h\left(p,u\right)$$

- Welfare mesure is integral of area to the side of Hicksian compensated demand

- Graphically,