Outline

1. Producer Surplus

2. Consumer Surplus

3. Trade

4. Market Equilibrium in The Long-Run
1 Welfare: Producer Surplus

- Nicholson, Ch. 11, pp. 371-374 (Ch. 9, pp. 261–263, 9th)

- Producer Surplus is easier to define:
  \[ \pi(p, y_0) = py_0 - c(y_0). \]

- Can give two graphical interpretations:

  - **Interpretation 1.** Rewrite as
    \[ \pi(p, y_0) = y_0 \left( p - \frac{c(y_0)}{y_0} \right). \]

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

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

• Rewrite profit as

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

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

• Nicholson, Ch. 5, pp. 165-169 (Ch. 5, pp. 145–149, 9th)

• Welfare effect of price change from \( p_0 \) to \( p_1 \)

• Proposed measure:

\[
e(p_0, u) - e(p_1, u)
\]

• Can rewrite expression above as

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

\[
= \int_{p_0}^{p_1} \frac{\partial e(p, u)}{\partial p} dp
\]

• What is \( \frac{\partial e(p, u)}{\partial p} \)?
• Remember envelope theorem...

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

• Welfare mesure is integral of area to the side of Hick-sian compensated demand

• Graphically,
• Example of welfare effects: Imposition of Tax

• Welfare before tax

• Welfare after tax
3 Trade

- Nicholson, Ch. 12, pp. 427-429 (Ch. 11, pp. 326–327, 9th)

- Assume that domestic industry opens to trade

- Is this a good or a bad thing?

- Consider graphically

- Equilibrium with no trade at quantity $X^*_D$ and price $p^*_D$
• Trade: Goods available at lower price \( p^*_T \)

• (Otherwise, openness to trade irrelevant)

• Shift in price to \( p^*_T < p^*_D \) and in quantity to \( X^*_T > X^*_D \)

• Label domestic production and imports
• What happens to profits of domestic firms?

• What happens to consumer surplus?

• More total surplus, but firms lost some profits and some employment → Difficult trade-off
4 Market Equilibrium in the Long-Run

- Nicholson, Ch. 12, pp. 406-417 (Ch. 10, pp. 295–306, 9th)

- So far, short-run analysis: no. 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 $t$:

$$Y^S_t(p, w, r) = Y^S_{t-1}(p, w, r) + y(p, w, r)$$

Supply function shifts to right and flattens:

$$Y^S_t(p, w, r) = Y^S_{t-1}(p, w, r) + y(p, w, r) > Y^S_{t-1}(p, w, r) \text{ for } p \text{ above } AC$$

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

Also:

$$Y^S_t(p, w, r) = Y^S_{t-1}(p, w, r) \text{ for } p \text{ below } AC$$

since for $p \text{ below } AC$ the firm does not produce ($y(p, w, r) = 0$).
- Flattening:

\[
\frac{\partial Y_t^S(p, w, r)}{\partial p} = \frac{\partial Y_{t-1}^S(p, w, r)}{\partial p} + \frac{\partial y(p, w, r)}{\partial p}
\]

\[
> \frac{\partial Y_{t-1}^S(p, w, r)}{\partial p}
\]

for \( p \) above AC since \( \frac{\partial y(p, w, r)}{\partial p} > 0 \).

- Also:

\[
\frac{\partial Y_t^S(p, w, r)}{\partial p} = \frac{\partial Y_{t-1}^S(p, w, r)}{\partial p}
\]

for \( p \) 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 $\pi = 0 \implies$ entry until $p = AC$

• Also:

$$\frac{C''(y) - \frac{C(y)}{y}}{y} = 0$$
• 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
5 Next Lecture

• Market Power

• Monopoly

• Price Discrimination

• Then... Game Theory