Outline

1. Producer Surplus

2. Consumer Surplus

3. Trade

4. Rent Control

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

- Nicholson, Ch. 11, pp. 386-389

- 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:

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

• Rewrite profit as

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

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

• Nicholson, Ch. 5, pp. 169-173

• 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

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

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

• 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 Hick-sian compensated demand

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

• Welfare before tax

• Welfare after tax
3 Trade

- 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 Rent Control

• Rent control: Restrict increase of rent that can be charged
  – San Francisco + Berkeley: only 1-2% increase per year
  – Covers all rental units built before 1979

• Intent: Keep area affordable

• Consider graphically effect of Rent control
• Two costs of rent control:
  
  – Cost 1. Some units will not be rented
  
  – Cost 2. Existing units may be misallocated
5 Market Equilibrium in the Long-Run

- Nicholson, Ch. 12, pp. 425-435

- 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:

\[
\frac{\partial Y_t^S (p, w, r)}{\partial p} = \frac{\partial Y_{t-1}^S (p, w, r)}{\partial p} + \frac{\partial y (p, w, r)}{\partial p} > \frac{\partial Y_{t-1}^S (p, w, r)}{\partial p} \quad \text{for } p \text{ above } AC
\]

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

- Also:

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

- 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 $\pi = 0 \implies$ entry until $p = AC$

• Also:

If $C''(y) = \frac{C(y)}{y}$, then $\frac{\partial C(y)}{\partial y} = 0$
• 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
6  Next Lecture

- Market Power

- Monopoly

- Price Discrimination

- Then... Game Theory