Economics 101A
(Lecture 17)

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Outline

1. Response to Taxes
2. Market Equilibrium in The Long-Run
3. Producer Surplus
4. Consumer Surplus

1 Response to taxes

- Nicholson, Ch. 11, pp. 322–323 [OLD: Ch. 15, pp. 407–408]

- Per-unit tax t

- Write price p_i as price including tax

- Supply: $Y_i^S(p_i - t, w, r)$

- Demand: $X_i^D(\mathbf{p}, \mathbf{M})$

$$Y_i^S(p_i - t, w, r) - X_i^D(\mathbf{p}, \mathbf{M}) = 0$$

- What is dp^*/dt?

- Comparative statics:

$$
\begin{aligned}
\frac{\partial p^*}{\partial t} &= -\frac{\frac{\partial Y^S}{\partial t}}{\frac{\partial Y^S}{\partial p} - \frac{\partial X^D}{\partial p}} = \\
&= -\frac{-\frac{\partial Y^S}{\partial p}\frac{p}{X}}{\left(\frac{\partial Y^S}{\partial p} - \frac{\partial X^D}{\partial p}\right)\frac{p}{X}} = \\
&= \frac{\varepsilon_{S,p}}{\varepsilon_{S,p} - \varepsilon_{D,p}}
\end{aligned}
$$

- How about price received by suppliers $p^* - t$?

$$
\begin{aligned}
\frac{\partial \left(p^* - t\right)}{\partial t} &= \frac{\frac{\partial Y^S}{\partial p}}{\frac{\partial Y^S}{\partial p} - \frac{\partial X^D}{\partial p}} - 1 = \\
&= \frac{\varepsilon_{D,p}}{\varepsilon_{S,p} - \varepsilon_{D,p}}
\end{aligned}
$$

- *Inflexible Supply.* (Capacity is fixed) Supply curve vertical ($\varepsilon_{S,p} = 0$)

- Producers bear burden of tax

- *Flexible Supply.* (Constant Returns to Scale) Supply curve horizontal ($\varepsilon_{S,p} \to \infty$)

- Consumers bear burden of tax

- *Inflexible demand.* Demand curve vertical ($\varepsilon_{D,p} = 0$)?

- Consumers bear burden

- General lesson: Least elastic side bears larger part of burden

- What happens with a subsidy ($t < 0$)?

- What happens to quantity sold?

- Use demand curve:
$$\frac{\partial X^{D*}}{\partial t} = \frac{\partial X^{D*}}{\partial p^*}\frac{\partial p^*}{\partial t}$$
and use expression for $\partial p^*/\partial t$ above.

2 Market Equilibrium in the Long-Run

- Nicholson, Ch. 10, pp. 295–306 [OLD: Ch. 14, pp. 382–394]

- 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 :

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

- 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

3 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 - 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)

4 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

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

- 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,

5 Next Lecture

- Market Power
- Monopoly
- Price Discrimination