Economics 326: Partial Equilibrium and Market Clearing

Ethan Kaplan

November 26, 2012

Outline

1. Consumer and Producer Surplus

2. Simple Equilibria Comparative Statics

1 Equilibrium Comparative Statics

- What happens when there are demand shifts?
  - Quantities will change a lot when Supply is elastic (not prices)
  - Prices will change a lot when Supply is inelastic (not quantities)

- What happens when there are supply shifts?

- Quantities will change a lot when Demand is elastic (not prices)
- Prices will change a lot when Demand is inelastic (not quantities)

2 Per Unit Taxes

- What happens if we put on a tax? Then the prices that producers get are not the same as what consumers pay:

$$P_S + \tau = P_D$$

  where P_D is the price consumers pay (or the demand-side price), P_S is the price that producers receive (or the supply-side price), and τ is the tax.

- This is a per unit tax where the amount of the tax does not depend upon the price of the good. There are also ad valorem taxes (think of Chancelor Valorem from the Phantom Menace who was fighting over interstellar tariff rates) where the tax is a percentage of the price:

$$P_S(1+\tau) = P_D$$

- What happens to prices as the size of the tax changes? Who pays for the tax?

- We can look at this by coming up with an expression for $\frac{\partial P_S}{\partial \tau}$ and $\frac{\partial P_D}{\partial \tau}$. We have two equations:

$$\begin{aligned} Q_S(P_S) &= Q_D(P_D) \\ P_S + \tau &= P_D \end{aligned}$$

- First we substitute the price equation into the market clearing equation:

$$Q_S(P_D - \tau) = Q_D(P_D)$$

- Then we totally differentiate:

$$\begin{aligned}
\frac{\partial Q_S}{\partial P}\frac{dP}{d\tau} - \frac{\partial Q_S}{\partial P} &= \frac{\partial Q_D}{\partial P}\frac{dP}{d\tau} \\
&\Longrightarrow \frac{\partial Q_S}{\partial P}\frac{dP_D}{d\tau} - \frac{\partial Q_D}{\partial P}\frac{dP_D}{d\tau} = \frac{\partial Q_S}{\partial P} \\
&\Longrightarrow \frac{dP_D}{d\tau}\left[\frac{\partial Q_S}{\partial P} - \frac{\partial Q_D}{\partial P}\right] = \frac{\partial Q_S}{\partial P} \\
&\Longrightarrow \frac{dP_D}{d\tau} = \frac{\frac{\partial Q_S}{\partial P}}{\frac{\partial Q_S}{\partial P} - \frac{\partial Q_D}{\partial P}}
\end{aligned}$$

- We can then convert the right hand side to elasticities by multiplying by $\frac{P}{Q_S}$:

$$\frac{dP_D}{d\tau} = \frac{\frac{\partial Q_S}{\partial P}\frac{P}{Q_S}}{\frac{\partial Q_S}{\partial P}\frac{P}{Q_S} - \frac{\partial Q_D}{\partial P}\frac{P}{Q_S}}$$

but remembering that $Q_S = Q_D$, we get:

$$\begin{aligned}
\frac{dP_D}{d\tau} &= \frac{\frac{\partial Q_S}{\partial P}\frac{P}{Q_S}}{\frac{\partial Q_S}{\partial P}\frac{P}{Q_S} - \frac{\partial Q_D}{\partial P}\frac{P}{Q_D}} \\
&= \frac{\epsilon_S}{\epsilon_S - \epsilon_D}
\end{aligned}$$

which says that that demand price reacts more when supply is elastic!

- Similarly, we can derive:

$$\frac{dP_S}{d\tau} = \frac{\epsilon_D}{\epsilon_S - \epsilon_D}$$

- Note that $\epsilon_S > 0$ and $\epsilon_D < 0$ so that P_S will decrease and P_D will decrease.

- Show graphs!