

ECON 110, Professor Hogendorn

Problem Set 3 Answers

1. *Dollar-sales-tax_a.*

(a) Setting demand equal to supply gives us:

$$40 - 3p = 2p \Rightarrow 40 = 5p \Rightarrow p = 8 \quad Q = 16$$

The choke price is $0=40-3p$, or $p=13.3$. The supply curve runs through the origin. Then consumer and producer surplus are:

$$CS = \frac{1}{2}(13.3 - 8)16 = 42.7 \quad PS = \frac{1}{2}(8 - 0)16 = 64$$

(b) Assuming the sales tax is collected from the suppliers, the tax effectively shifts the supply curve to $S(p-1)=2(p-1)=-2+2p$. The new equilibrium is

$$40 - 3p = -2 + 2p \Rightarrow 42 = 5p \Rightarrow p = 8.4 \quad Q = 14.8$$

The choke price is unchanged, and the PS is the area between the net price of 7.4 and the true supply curve:

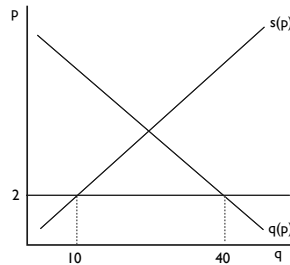
$$CS = \frac{1}{2}(13.3 - 8.4)14.8 = 36.3 \quad PS = \frac{1}{2}(7.4 - 0)14.8 = 54.8$$

The tax revenue is $1 \times 14.8 = 14.8$. The difference between the total surplus of $42.7 + 64 = 106.7$ before the tax and $36.3 + 54.8 + 14.8 = 105.9$ with the tax is the deadweight loss, equal to 0.8.

2. *MexicanFarmers_a.*

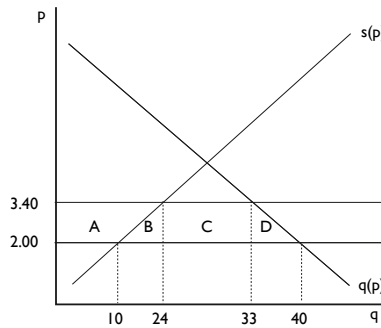
(a) Mexican supply is $Q_s(2) = -10 + 10 \cdot 2 = 10$. Mexican demand is $Q_d(2) = 50 - 5 \cdot 2 = 40$. Imports are the difference between demand and supply: $40 - 10 = 30$.

(b)

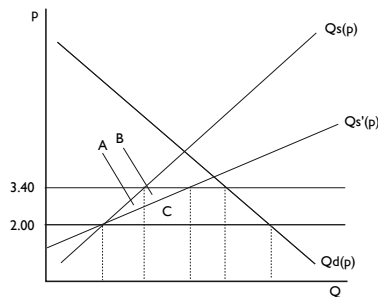


(c) If imports cost $170\% \cdot 2 = 3.40$, then $Q_s(3.40) = 24$ and $Q_d(3.40) = 33$. Imports fall to $33 - 24 = 9$.

(d) Mexican consumers lose $A + B + C + D$. Mexican producers gain A . The Mexican government earns tariff revenue C . B and D are deadweight loss.



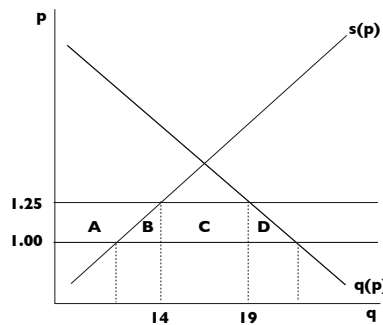
(e) Suppose supply were more elastic:



There would indeed be an increase in PS equal to $A + B$: A is a reduction in deadweight loss and B is a reduction in government tariff revenue. The downside is that Mexicans as a whole would now suffer additional deadweight loss C which also would come out of former government tariff revenue.

3. *ChinaAutoPartsTariff_a.*

(a) The Chinese auto parts market looks like:



Areas B and D are deadweight losses from the tariff. Area D is straightforward – it is the lost consumer surplus from Chinese firms and consumers having to pay extra for auto parts. Area B is part of the extra costs that Chinese firms incur when producing an extra amount of auto parts domestically. It is the portion of those costs that are greater than the costs in the rest of the world. Therefore, these costs are a waste of China's resources. With perfectly competitive mar-

kets, these resources could be put to work in other industries within China.

- (b) The tariff is 25%, so the price in China is \$1.25. Chinese demand is $q(1.25) = 40.25 - 17 \cdot 1.25 = 19$. Since imports are 5, Chinese supply must be 14.
- (c) The current price/quantity point for supply is (1.25,14). If China dropped the tariff, the price would fall to \$1, a 20% decrease. This would cause a 24% decrease in Chinese supply according to the elasticity estimate. Thus, the new Chinese supply would be 10.64. The change in Chinese producer surplus would be area A , which is composed of a rectangle showing the fall in price on the 10.64 units that are produced no matter and a triangle that represents the lost producer surplus on the units that were produced above the world price: $10.64 \times 0.25 + 0.5 \times 0.25 \times (14 - 10.64) = 3.08$.

4. *GermansBuyCars_a*. During the 2008 financial crisis, Germany was in recession. One tool the German government used to combat the recession was to offer German car buyers a €2,500 subsidy to buy a car.

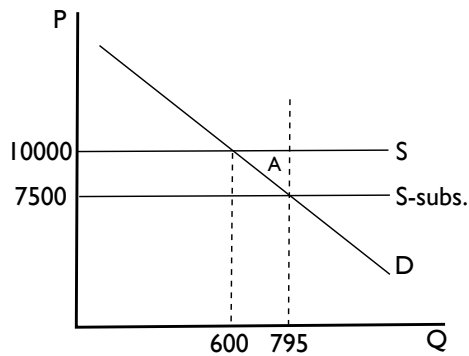
- (a) If $Q_d = a - bp$, then we can write the definition of price elasticity of demand at the given points as

$$E_d = \frac{dQ_d}{dp} \frac{p}{Q_d} = -b \frac{10000}{600000} = -1.3$$

Solving the above for b gives 78. Then we can find a by making sure that the given point lies on the demand curve

$$Q_d = a - 78p \Rightarrow 600000 = a - 78 \times 10000 \Rightarrow a = 1380000$$

- (b) The old supply was horizontal at $p = 10000$. Now suppliers behave as if their costs were 2500 lower, or $p^{sub} = 7500$. Setting demand equal to this subsidy curve gives $Q_d = 1380000 - 78 \times 7500 = 795000$. This is shown in the following diagram



The extra cars sold have a marginal cost shown by the original supply curve, but their marginal benefit is the segment along the demand curve. Thus, the area A is excess costs over and above the benefits, and indicates that these cars were not actually worth producing.

- (c) In this case, the consumption of the extra cars has conferred an additional benefit over and above what is shown by the demand curve. We can now think of the demand curve as showing the marginal private benefit, and there is a higher curve that shows the marginal social benefit inclusive of the pollution reduction.

Depending on how big this shift of the demand curve is, the area of deadweight loss may be reduced (as shown below) or it may even be eliminated entirely.

