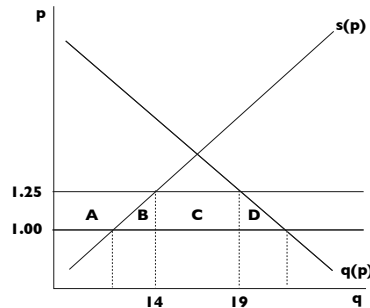


ECON 110, Prof. Hogendorn

Problem Set 4 Answers

1. *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 markets, these resources could be put to work in other industries within China.

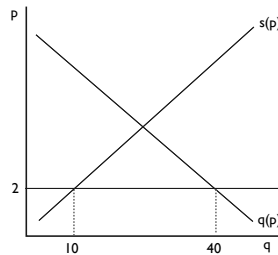
- (b) The tariff is 25%, so the price in China is \$1.25. Chinese demand is  $q(1.25) = 40.25 - 17 \cdot 1.25 = 19$ . Since imports are 5, Chinese supply must be 14.
- (c) The current price/quantity point for supply is (1.25,14). If China dropped the tariff, the price would fall to \$1, a 20%

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:  $10.64 * 0.25 + 0.5 * 0.25 * (14 - 10.64) = 3.08$ .

2. *MexicanFarmers\_a.*

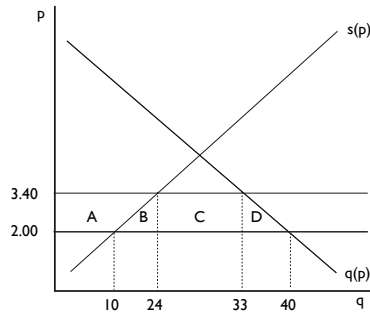
(a) Mexican supply is  $s(2) = -10 + 10 \cdot 2 = 10$ . Mexican demand is  $q(2) = 50 - 5 \cdot 2 = 40$ . Imports are the difference between demand and supply:  $40 - 10 = 30$ .

(b)

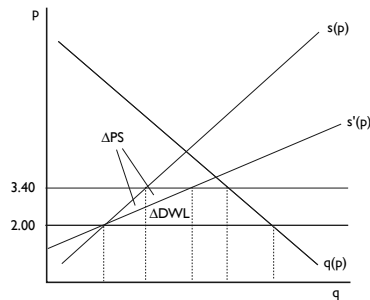


(c) If imports cost  $170\% \cdot 2 = 3.40$ , then  $s(3.40) = 24$  and  $q(3.40) = 33$ . Imports fall to  $33 - 24 = 9$ .

(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, part of which would come from a reduction in deadweight loss and part of which would come out of government tariff revenue. The downside is that Mexicans as a whole would now suffer a larger deadweight loss which would come out of government tariff revenue.

### 3. Lawns.

(a) Writing the formula for elasticity on a linear demand curve and working backwards gives:

$$|\epsilon| = 1.5 = b \frac{p}{q} = b \frac{1.2}{0.33} \Rightarrow b = 0.4125$$

Now that we know the slope, the intercept can be found by making sure the line goes through the point we identified:

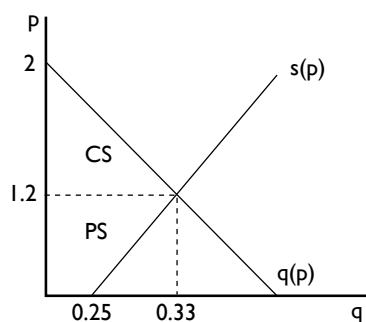
$$q = a - bp \Rightarrow 0.33 = a - 0.4125 \times 1.2 = 0.33 \Rightarrow a = 0.825$$

Thus, the demand curve is  $q(p) = 0.825 - 0.4125p$ .

(b) Setting demand equal to supply gives

$$0.825 - 0.4125p = 0.25 + 0.067p \Rightarrow 0.575 = 0.4795p \Rightarrow p = 1.20$$

The corresponding quantity, using the demand curve, is  $q(1.2) = 0.33$ . (Not surprisingly, we picked this point as the equilibrium on purpose.) To find consumer and producer surplus, it's probably easiest to draw the graph, finding the choke price and the supply intercept:



Then the area of CS is  $\frac{1}{2}(2 - 1.2)0.33 = 0.132$ . The area of PS involves a rectangle and a triangle added together:

$$.25 \times 1.2 + \frac{1}{2} \times 1.2 \times (0.33 - 0.25) = 0.348.$$

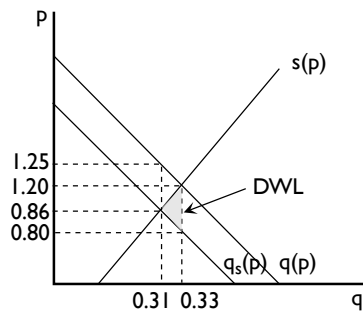
(c) The private demand curve is  $q(p) = 0.825 - 0.4125p$ . If we invert it, we get the private benefits of a quantity  $q$  of lawn:  $p(q) = 2 - 2.42q$ . But now it turns out that there is a \$400 social cost that needs to be subtracted off, so we subtract 0.4 from the above:  $p_s(q) = 1.6 - 2.42q$ . Now to get back to a regular demand curve, we need to invert again:

$$q_s(p) = 0.66 - 0.4125p.$$

(d) Essentially, we need to repeat part (b) with the new demand curve. Setting demand equal to supply gives

$$0.66 - 0.4125p = 0.25 + 0.067p \Rightarrow 0.41 = 0.4795p \Rightarrow p = 0.86$$

The corresponding quantity, using the social demand curve, is  $q_s(0.86) = 0.31$ . Again, to find deadweight loss it's probably easiest to draw the graph. That shows that one important point to know is the price that makes social demand equal to 0.33, which is  $p_s(0.33) = 0.80$ .



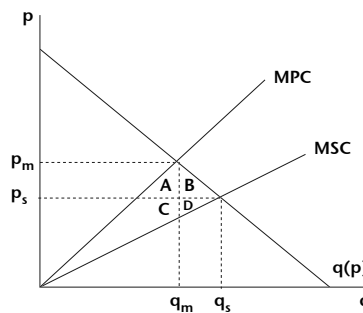
The area of the deadweight loss is

$\frac{1}{2}(1.2 - 0.80)(0.33 - 0.31) = 0.004$ , or about \$4 per household.

- (e) Since the tax would be levied directly on the household, it would shift the private demand curve exactly to the social demand curve. The private demand curve at  $q = 0.31$  gives a price of 1.25, so the tax revenue would be  $(1.25 - 0.86)0.31 =$  or \$0.1209 thousands, i.e. \$120.90 for the average household.

#### 4. SiliconValley\_a.

- (a)



- (b) Free market: External benefits =  $A + C$ , Deadweight loss =  $B + D$   
Social optimum: External benefits =  $A + B + C + D$
- (c) It could provide a subsidy so that the price of web servers fell to  $p_s$  in the graph. This would increase quantity demanded to  $q_s$  and correct for the externality.