

ECON 110, Prof. Hogendorn

Problem Set 2

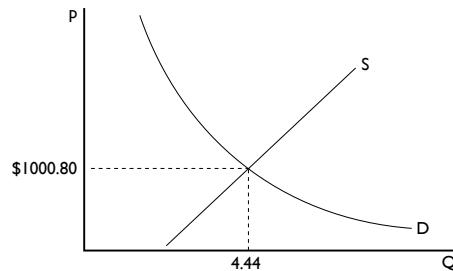
1. *Juvenor*. You take a job at a pharmaceutical market research firm. On your first day, the woman in the cubicle next to you says, “You'd better watch yourself – there was some guy from Amherst here before you, and he only lasted a week.” On your desk you find some handwritten notes:

Assignment: find market equilibrium for *Juvenor* (drug that makes people feel younger) and find consumer surplus.

Data: demand from men:  $p = 100 - .02q$ , demand from women:  $p = 4000q^{-1}$ , supply: perfectly inelastic,  $q = 1000$ .

Solution:

- (a) Find market demand: men+women =  $100 - .02q + 4000q^{-1}$ .  
(b) set equal to supply:  $1000 = 100 - 0.02q + 4000q^{-1} \Rightarrow q = 4.44$   
(c) Draw graph:



- (d) Find consumer surplus:  $CS = \int_0^{4.44} 100 - 0.02q + 4000q^{-1} dq$

At this point, there is some scratch work on the integral, and then a line trailing off to the lower right corner of the page. Your boss tells you that the data are correct, but you should redo each step of the solution, and explain what mistakes your predecessor made.

2. *Five-Households*. Suppose there are 5 households, each with demand curve  $q(p) = 10p^{-2}$ . Derive and graph the market demand curve. What is the total consumer surplus when  $p = 2$ ?
3. *Fluff*. Fluff toys are very popular. Originally they sold for \$35 each, but the manufacturer has run out. So now, the only way to get one is on eBay, where the equilibrium price is \$100 and the quantity is 5000.
  - (a) Draw a graph of the supply and demand curves in the eBay market. Assume a linear demand curve and an inelastic (but not perfectly inelastic) supply curve. Label the consumer and producer surpluses.
  - (b) Suppose that at equilibrium, the price elasticity of demand on eBay is  $\varepsilon = -1.2$ . How many would people want to buy at the official retail price of \$35?
  - (c) Show what would happen if a government law prohibited sales at prices above the official retail price. Label the changes in producer and consumer surplus under the law. Label the deadweight loss.
4. *Dollar-sales-tax*. Demand is  $q(p) = 40 - 3p$  and supply is  $s(p) = 2p$ .
  - (a) What is the equilibrium price and quantity? What is the consumer and producer surplus?
  - (b) If a \$1 per unit sales tax is imposed on  $q$ , what is the new equilibrium price and quantity? What is the new consumer and producer surplus? What is the deadweight loss of the tax? How much revenue does the tax generate?

## Review Problems only, not to turn in:

5. Wesley. In Muller's *The Mind and the Market*, he quotes 18th century religious leader John Wesley as follows:

“Wherever riches have increased, the essence of religion has decreased in the same proportion. Therefore I do not see how it is possible in the nature of things for any revival of religion to continue long. For religion must necessarily produce both industry and frugality, and these cannot but produce riches. But as riches increase, so will pride, anger, and love of the world in all its branches.”

Consider the market for “grain,” which we will take to be the major good produced by a typical agricultural economy of Wesley's time period. Let grain have conventional, upward-sloping supply and downward-sloping demand.

- (a) How will demand and/or supply shift if a religious revival produces “industry,” that is, a desire to work harder?
- (b) How will demand and/or supply shift if a religious revival produces “frugality,” that is, a greater desire to save?
- (c) How will demand and/or supply shift if “love of the world” increases, that is, if people become more interested in consumption?
- (d) Based on your answer to (c), what will happen to the equilibrium price, quantity, consumer surplus, and producer surplus?
- (e) Do you think that Wesley would view consumer surplus as a good measure of welfare? Why or why not?
- (f) In what way has John Wesley affected each student in this class? (No points for this question, but you should know the answer!)

6. *JFK*. You take a job with a cargo company at JFK Airport in New York City. JFK's air cargo business has been suffering in recent years because new aircraft are able to fly directly from Europe to interior U.S. airports such as Memphis and Kansas City. Some of the other cargo firms serving JFK decide to petition the Port Authority of New York and New Jersey to intervene in the market. Based on your economics training, you believe that demand is quite elastic (because there are many substitute airports) and supply is inelastic (because it is hard to leave or enter the industry).
- Draw a supply and demand diagram with linear curves (be careful about the elasticities). Label the equilibrium price and quantity.
  - Some firms are lobbying for a price floor  $p_f$  above the market equilibrium price. Show the resulting quantity  $q_f$  and show the effect on consumer and producer surplus and deadweight loss.
  - Do you recommend that your firm lobby for this policy. Remember that you are only considering the costs and benefits for your firm, but these may differ in the short and long run. The answer is ambiguous, so state your reasoning.
7. *Veerman*. Former Dutch agriculture minister Cees Veerman owns farms in Holland and France. Let's suppose that he grows turnips, and that his supply curve for turnips is

$$s(p) = 1000 + 6.44p$$

Because he is a small producer, the demand curve for Veerman's turnips is perfectly elastic; that is, he has to accept the market price. Currently that price is €250 per tonne.

- Draw and label the supply and demand curves, including the quantity produced by Veerman.

- (b) Suppose the European Union offers Veerman a per-unit subsidy of €63 per tonne. The subsidy is paid directly to Veerman. Show the effects of the subsidy in your diagram, including Veerman's new quantity produced.
- (c) How much money does Veerman get in subsidy from the EU? How large is the deadweight loss?
- (d) What do you think, is the turnip subsidy progressive in the sense that lower income farmers receive a larger subsidy per euro of income? (given the information in this problem, there is no one correct answer, but you must justify your reasoning.)

## Answers to Review Problems:

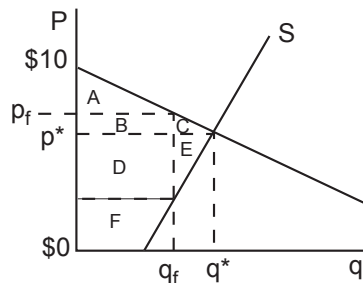
### 5. *Wesley\_a.*

- (a) If workers have an increased *intrinsic* motivation to work (as opposed to just getting higher wages, better working conditions, more training, etc.), then firms' costs will fall, shifting the supply curve down. These hard workers may either need more grain to sustain them or they may earn higher incomes if they are working longer hours, in which case demand might also shift right.
- (b) Frugality means consuming less and saving more, so this clearly causes demand to shift left. But the savings of an individual must be turned into productive capital if society as a whole is to save. Therefore, there will be more investment in capital, and probably a resulting downward shift in supply as firms' costs fall.
- (c) If people just like consumption more, it is an increased taste for consuming, and demand shifts right.

- (d) The equilibrium price will rise, since demand shifts left. Producer surplus will definitely rise, since the supply curve is unchanged and price is higher. The change in consumer surplus is ambiguous. On the one hand, demand is higher, so there is more area under the demand curve. On the other hand, price has risen.
- (e) Consumer surplus measures welfare “willingness to pay,” that is, it compares the amount a consumer would be willing to spend on a good versus the amount he or she actually must spend. Thus, welfare is equated with the consumption of material goods and the hypothetical high price a consumer would pay for them. Wesley views consumption of goods as problematic to people’s characters, so he probably would not like consumer surplus.

6. *JFK\_a.*

- (a) The equilibrium point must be on the upper half of the demand curve, and the supply curve must intercept the horizontal axis.



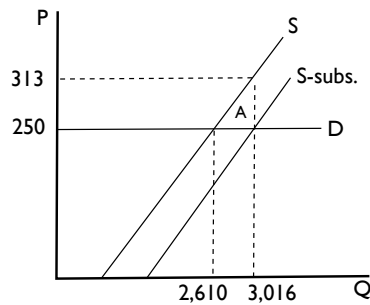
- (b) Demand must be the governing curve because it is not possible to sell more than people are willing to buy. CS is reduced by  $B + C$  and PS is reduced by  $E$  but increased by  $B$ .  $C + E$  is the deadweight loss.

- (c) First, note that we are talking about just your firm, while the curves represent all firms. *Some* firm(s) will lose customers under the price floor, since the quantity sold falls. If you are concerned that your firm will suffer a disproportionate share of this reduction, you might not favor the price control.

Also, these curves are probably short-run curves. In the long run, elasticity of demand is likely to rise, as consumers find new airports and new alternatives for shipping air freight. Thus the gains today may be smaller or even turn to losses in the future.

7. *Veerman*.

- (a) Veerman takes the €250 price as given:



- (b) In the graph above, Veerman's supply curve is effectively shifted down by €63 because this represents a decrease in costs to him. As a result, his quantity increases.
- (c) The total subsidy to Veerman is €63 times the quantity 3,016, a total of €190,008. The area marked A in the diagram is deadweight loss. In that area, the costs to Veerman, represented by line S, are greater than the value of 250 that consumers place on turnips. The area of A, one-half the base times the height, is  $\frac{1}{2}(3016 - 2610) \times 63 = 12,789$ .

(d) We know the turnip subsidy is a flat in the sense that it is the same regardless of the quantity of turnips produced. So the answer to the question depends on whether small turnip producers have *proportionately* larger or smaller incomes than large turnip producers. I think there are several reasons to support the regressive story: (1) large turnip producers have large amounts of land, which is probably associated with large income from other sources; (2) there are probably fixed costs associated with turnip production (tractors and equipment, farm buildings, etc.), and large turnip producers can spread this overhead across their output, thus lowering their average cost. But other stories could be told to justify a progressive argument.