ECON 110, Prof. Hogendorn

Problem Set 3

1. *Sugar.* Read the following beginning to an article:

   Michael Schroeder, "Sugar Growers Hold Up Push For Free Trade," *The Wall Street Journal,* February 3, 2004, pg. A13.

   WASHINGTON – The sugar industry – which accounts for less than 1% of all U.S. farm sales but 17% of agriculture's political contributions since 1990 – is proving to be an obstacle to Bush administration efforts to keep the free-trade ball rolling.

   The industry not only is the sticking point in the administration's plans to get congressional backing for a free-trade pact with Central America, but also is gumming up talks toward a free-trade pact with Australia.

   Australia, the world's fourth-largest sugar exporter, wants to sell more sugar to the U.S. in exchange for lowering the tariffs it levies on U.S.-made goods. Australia currently sells the U.S. 87,000 metric tons of sugar a year, less than 1% of the 10 million tons of sugar consumed in the U.S. Caps on sugar imports long have kept the U.S. price of refined sugar at twice the world market price.

   (a) Assume that all U.S. imports of sugar come from Australia for the purposes of this problem, and assume that sugar is subject to a *tariff.* Draw a supply and demand diagram of the U.S. market for sugar, showing the tariff and the amount of imports and sugar consumed. You don't have to draw the diagram perfectly to scale, but try to capture all of the information in the final paragraph above.

(b) Label the effects of the tariff in terms of changes in producer and consumer surplus, deadweight losses, etc. With reference to these effects, describe why the sugar industry works so hard to maintain the trade barrier and why the government, on behalf of the country in general, is working to end it.

2. *ChinaAutoPartsTariff.* The following excerpt is from John W. Miller, "China-Tariff Discord Escalates," *The Wall Street Journal,* September 13, 2006, A2:

"BRUSSELS -- The U.S., the European Union and Canada are set to file a joint complaint with the World Trade Organization against China's import tariffs on auto parts, said people familiar with the matter.

"In March the three governments filed a preliminary complaint against Chinese protection of its auto-parts manufacturers. In negotiations with the governments, China has refused to change its protectionist policy, which charges an average 25% levy on imported auto parts. That leaves formal complaint as a last recourse at the WTO for Washington, Brussels and Ottawa."

Total U.S. and EU exports of auto parts to China are valued at about $5 billion per year. Let the world price of auto parts be $1, and let China's domestic demand curve be $q(p) = 40.25 - 17p$.

(a) Draw the effect of the tariff on a graph of the Chinese auto parts market. Show what deadweight losses China causes itself. In words, how do you interpret the deadweight losses?

(b) Assume that current imports into China of auto parts are 5 billion units. What is the quantity supplied by Chinese producers?

(c) Suppose that Chinese auto parts suppliers have a supply elasticity of $\varepsilon = 1.2$. What is the change in Chinese producer surplus that results from the tariff?

3. *SiliconValley.* In Silicon Valley, there are many information technology (IT) firms clustered in one place. This is usually attributed to positive externalities in production: when firm produces a product, the skilled workers can exchange ideas with one another, with venture capitalists, and so on. Thus, firms in Silicon Valley are more productive than similar firms elsewhere.

   (a) Graph the supply and demand curves for one IT good (e.g. web servers) in Silicon Valley. Show the positive externality in production.

   (b) Label the graph to show the external benefits and the deadweight loss in both the free-market and the socially optimal situations.

   (c) If the California government were to intervene in this market, what should it do?

4. *Fatburgers.* There are 400 fatburger consumers and 100 fatburger producers. The price of a fatburger, p, is measured in cents. Each of the 400 consumers has demand curve

$$q_i(p) = 100 - \frac{p}{4}$$

Each producer has supply curve

$$s_i(p) = 4(p - 5)$$

   (a) Determine the market supply and demand, find the equilibrium price, and draw on a graph.

   (b) The government imposes a per-unit sales tax of t cents per fatburger. Find the new equilibrium price and quantity as a function of t.

   (c) Show that the government achieves the maximum possible tax revenue when it sets $t = 197.5$ cents. You will need to find and maximize the government's revenue as a function of t.

(d) How much does the tax in part (c) reduce consumer surplus and producer surplus, and how much deadweight loss does it cause? Show on a graph as well as giving numerical results.

(e) You have just learned that when people eat fatburgers, it causes significant long-term health problems. Much of the cost of these health problems is paid for by the government rather than the individuals. In fact, careful analysis suggests that the government ends up paying $1.975 in health costs for every fatburger eaten. Show how this information changes the graphical analysis of part (d). (Numerical results are not necessary.)

Review Problems only, not to turn in:

5. *Tariff.* Let domestic demand be $q(p) = 60 - 2p$ and supply is $s(p) = p$. Let the world price be 10.

    (a) Under free trade, what is the quantity imported and what is domestic consumer and producer surplus?

    (b) If the government imposes a tariff of $5 per unit imported, how much revenue is generated, and what are the new domestic consumer and producer surpluses? How big is the deadweight loss?

6. *MexicanFarmers.* Mexico's farmers are about as productive as U.S. farmers, but "local farmers are still going out of business because their costs – from diesel to electricity to credit – are about a third higher than those north of the border." "While the country's farmers are being exposed to the full force of world competition, they are saddled with artificially high costs because much of the rest of the economy consists of public or private monopolies sheltering behind legal and constitutional barriers to competition." (*The Economist,* Nov. 30, 2002, pg. 32.)

(a) Suppose that U.S. farmers are willing to supply any amount of corn at \$2 per bushel. (This is akin to the "world price" of corn.) Suppose that Mexican farmers have supply curve $s(p) = -10 + 10p$. Let Mexican demand for corn be $q(p) = 50 - 5p$. How many bushels do Mexican farmers produce? How many do Mexican consumers buy? How large are imports from the U.S.?

(b) Draw a graph of (a).

(c) Actually, the North American Free Trade Agreement (NAFTA) allows Mexico to impose a tariff of about 70% on corn imports from the U.S. With the tariff, how much corn do Mexican farmers produce, and how much is imported?

(d) Draw the tariff on your graph, and label the changes in producer and consumer surplus, the tariff revenue, and the deadweight losses.

(e) If the goal is to help Mexican farmers, would the tariff work better if their supply were more elastic? Would the tariff then be better or worse for Mexicans as a whole? (Hint, use your graph and change the slope of the supply curve so that the same tariff causes a larger % increase in supply.)

Answers to Review Problems:

5. *Tariff_a.*

   (a) $q(10) = 60 - 2 \cdot 10 = 40$ and $s(10) = 10$, so imports are 30. The choke price is 30, so consumer surplus is $\frac{1}{2}(30 - 10)40 = 400$. Domestic producer surplus is $\frac{1}{2}10 \cdot 10 = 50$. Total surplus is 450.

   (b) The price with the tariff is 15, so $q(15) = 60 - 2 \cdot 15 = 30$ and $s(15) = 15$. Imports fall to 15 units, and government revenue is $15 \cdot 5 = 75$. The new consumer surplus is $\frac{1}{2}(30 - 15)30 =$

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225 and the new domestic producer surplus is $\frac{1}{2}15 \cdot 15 =$ 112.5. The total surplus is 412.5, so the deadweight loss is 37.5.
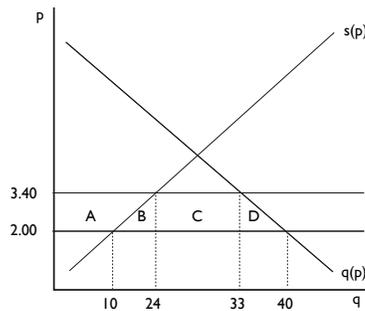
6. *MexicanFarmers_a.*

   (a) Mexican supply is $s(2) = -10+10\cdot2 = 10$. Mexican demand is $q(2) = 50 - 5 \cdot 2 = 40$. Imports are the difference between demand and supply: $40 - 10 = 30$.
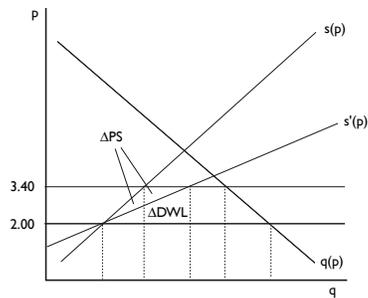
   (b)
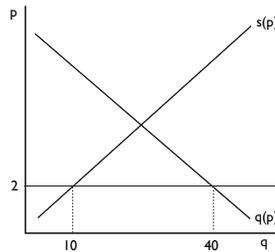
   (c) If imports cost $170\% \cdot 2 = 3.40$, then $s(3.40) = 24$ and $q(3.40) = 33$. Imports fall to $33 - 24 = 9$.

   (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:

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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.