Problem Set 3

14.03, Fall 2010

1 Tariffs vs quotas [25 points]

Consider as a first approximation that cars are a homogeneous good (they are all exactly the same for consumers). The supply of Japanese cars on the international market is perfectly elastic at price $p^J = 5$. The US supply is $p = 4 + q$ where quantities are measured in millions of cars and prices in thousands of dollars. The US demand for cars is $Q^D = -\frac{1}{2}p + 8$.

1. What is the price for cars in the US if there are no imports, so the entire demand has to be met with internal production?

2. The price of Japanese cars on the international market is $\$5,000$ ($p^J = 5$). If imports are allowed at this price, what is the total demand for cars, how many cars would be produced internally, and many would be imported?

3. The government is concerned that imported cars will flood the American market, driving the U.S. automobile industry out of business. It decides to implement a program to guarantee that all the American cars produced for less than $\$7,000$ ($p = 7$) are sold. Find the appropriate quota on imported cars that would achieve that goal.

4. Find the appropriate import tariff on imported cars that would also achieve the same goal as in part 3. [A tariff is a tax on imports, payable to the US Government.]

5. Draw a graph that represents the equilibrium with no trade, the free trade equilibrium and the two equivalent restricted trade equilibria.

6. Assess the welfare under the three regimes. Calculate consumer surplus, producer surplus (for internal producers) and government rev-

enues under the three regimes and then compare the welfare loss due to the two types of trade restrictions.

7. Do the Japanese car manufacturers prefer the tariff or the quota system? How about the American car manufacturers? How about the US consumers?

8. The assumption that the supply of Japanese cars is infinitely elastic may not be a reasonable one. Assume instead that the supply of Japanese cars is given by $q^J = \left(p^J - 2\right)\frac{3}{2}$. Find the quota on imported cars that would achieve a price of $p = 7$. Find the appropriate tariff. Can you explain why the tariff differs from your answer in part 4 (notice that the Japanese car price at the free market equilibrium—that is, with no tariff—is the same in both cases)?

9. There is a sudden increase in the internal demand for cars. Without doing any math, describe the impact of this increase in demand on consumer surplus under the quota system and under tariffs.

2 Does Market Integration Increase Welfare? (based on Jensen 2007) [25 points]

Assume there are two towns along a coastline, each with $N_F = 10$ fishermen who leave in the morning and fish in the 'catchment zone' near their town. The total catch depends on the abundance of fish in the catchment zone on a particular day, where each zone an be in either a high (H) or a low (L) abundance state. Each zone has an equal probability of H and L each day, equal to one-half. On an abundant day each fisherman catches 10 pounds of fish. On a non-abundant day, they only catch 1 pound of fish each. Therefore, the total quantity of fish is either $q_H = 100$ with probability one-half or $q_L = 10$ with probability one-half in each town on any given day. The realizations of H and L are independent across the two towns (that is, the probability that Zone 1 is H or L on a given day does not depend upon the abundance of fish in Zone 2).

At the end of the fishing day, there is a competitive fish market in each town with sellers and buyers that are price-takers. The aggregate demand curve for fish in each town is equal to:

$$Q_F(P) = 160 - 10P$$

1. Assume each fisherman sells the catch in their local market. What is the consumer surplus in each town in each state of the world? What are the profits for each fisherman in each state of the world? [Note: Assume the marginal cost for producers is zero, so their profits are equal to revenues.]

2. Cell phones are introduced in both towns at the same time (assume all fisherman own a cell phone). Cell phones make the state of abundance in both zones observable. We want to analyze how the introduction of cell phones affects the market equilibrium in the two towns. Clearly, if both towns experience an $H - H$ state or a $L - L$ state, nothing changes in the market equilibrium. Assume the cost of transport from zone to zone is τ per pound of fish.

   (a) On a $H - L$ or $L - H$ day, should the price of fish be equated in both zones? Yes/No/Explain.

   (b) How many fishermen should optimally leave the H zone to sell in the L zone given transport costs $\tau = 3$ per pound of fish?

   (c) Now assume that fishermen in the H zone coordinate (by phone) to move the right quantity of fish to the L zone (as per your calculations above). What are prices, profits and consumer surplus on $H - L$ (and $L - H$) days? Compare to your answers above (for a $H - L$ and $L - H$ day).

3. Does market integration increase expected consumer surplus? How about expected producer profits? How about expected total welfare?

4. Draw two diagrams showing the supply and demand in each market in an $H - L$ state of the world. Show how the integration of the two

markets changes consumer and producer surplus when fish is transported from market H to market L. Label the changes in consumer and producer surplus carefully. Show what the total change in welfare is.

3 General Equilibrium in a Pure Exchange Economy [25 points]

Consider a pure exchange economy with two individuals, Ann and Bob, and two goods, x and y. Ann's preferences are given by:

$$U_A(x_A, y_A) = x_A^{1/5} y_A^{4/5}$$

Bob's preferences are given by:

$$U_B(x_B, y_B) = x_B^{4/5} y_B^{1/5}$$

Ann's initial endowment is 8 units of X and 12 units of Y, while Bob has 12 units of X and 8 units of Y.

1. What are Ann and Bob's uncompensated (Marshallian) demand functions for goods X and Y, $d_x^i(p_x, p_y, I)$ and $d_y^i(p_x, p_y, I)$, $i = A, B$?

2. What is the price ratio (p_x/p_y) in equilibrium? (Hint: Remember that the equilibrium price ratio clears the market.)

3. Find the equilibrium allocation.

4. Derive the equation of the contract curve.

5. Sketch an Edgeworth box showing endowments, competitive equilibrium prices and consumption choices, and indifference curves through the endowments and through the equilibrium consumption choices (these do not have to be to scale). Indicate the area of mutually beneficial alternative allocations.

4 Price Distortion and Welfare (based on Hsieh and Moretti, 2003) [25 points]

Consider two cities H and L with separate real estate markets. In city H there are $N^H = 2000$ houses for sale at price $p^H = 80$. In city L there are $N^L = 1000$ houses for sale at price $p^L = 10$. Brokers earn a commission on each sale equal to cp^i. Each house requires one broker to be sold, in the event there are excess brokers, not all brokers make a sale. The one that does make a sale is taken at random. The labor supply function for brokers is $L^S = E\left[commission\right] * 1000$, where

$$E\left[commission\right] = \frac{\text{(Number of homes for sale)}}{\text{(Number of brokers)}} cp^i$$

Therefore, if the there are an equal number of brokers and houses, the labour supply function would simply be $L^S = commission * 1000$.

1. First assume the commission rate $c = 10\%$. Compute the equilibrium wages for each market. What is the surplus of sellers, of brokers, and the number of brokers in each market state $\{H, L\}$? [You can assume that the surplus for a seller is equal to the sale price net of commission].

2. The Department of Justice has ruled that fixed commissions for real estate sales are an anticompetitive practice. The commissions will now be set competitively so that the number of brokers equals the number of houses in both the H and L markets. Therefore assume that the market for brokers' wages is competitive. What is the level of commission in each market. What is the surplus of sellers and of brokers? What is the deadweight loss?

3. How would your estimate of the total social waste be biased if lower skilled brokers entered the market during boom times? [Is the bias upward, downward, indeterminate, or zero AND why?]

4. Propose an experiment that would determine whether the quality dimension is important using data on markets with competitive versus fixed commission pricing. The key outcome for measuring quality

would be time houses spend on the market (imagine that sellers lose $1,000 per week while waiting for a buyer). Formally write down the causal framework you are proposing, the outcome(s) you would measure, and the interpretation you would give them.

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Fall 2010