ECN 445 FALL 2014

PROBLEM SET 3

Due by end of class on Oct 30th.

1. [Lecture: Welfare evaluation #2] Missioni sweaters are greatly admired by their aficionados. The demand for these sweaters is given by Q = 13 - 0.02 P, where Q is the quantity of sweaters purchased per person per year, and P is the price of a sweater. These sweaters typically sell at the Missioni store for $500 per sweater. However, in a special promotion, Target decides to offer Missioni sweaters at a price of $50, while limiting purchases to 2 sweaters per person. What is the gain in consumer's surplus for a Missioni fan who can get these sweaters at Target instead of at the Missioni? Draw the appropriate diagram to illustrate this gain, and also do the numerical calculation.

For the following questions see the Lectures on Externality: Pigou & Coase.

2. The production of gasoline causes air pollution but the damage from this pollution is not priced and is not factored into the price of gasoline. Markets are interconnected, and the price of gasoline affects the cost of transportation; the cost of transportation affects how easy it is to get people and goods, including food, from one place to another and thus affects the value of land for housing and the cost of food; the cost of transportation also affects the market for cars and public transportation; and all of these affect people's budgets. Given this interconnection of markets, what are the consequences of an unpriced (and unregulated) externality in the market for gasoline? If there are competitive markets in all these other markets, are they likely to produce an efficient allocation of these other goods? Explain the reasons for your answer.

3. (a) What is the difference between a pecuniary externality and a real (physical) externality? (b) What does the First Theorem of Welfare Economics state about the outcome of an economy with perfectly competitive markets? (c) Which type of externality, according to Pigou, leads to a violation of the First Theorem of Welfare Economics, and why: explain why that type of externality leads the outcome of a perfectly competitive economy not to maximize the public interest? (d) What alternative remedies did Pigou prescribe? (e) Did Coase believe that either of Pigou's remedies was needed? If not, how did Coase see the situation being resolved? (f) Are there circumstances in which you would find Coase's criticism of Pigou unpersuasive? What circumstances?

4. A builder proposes a skyscraper that would block sunlight to the neighboring houses. The building would have net benefits to the builder of $100,000. The neighbors, who use some solar heating, would face reduced property values and increased heating costs totaling $80,000.
   (a) The law clearly stipulates that the neighbors have the right to solar access. Is a Pareto-improving exchange possible? What do you expect the outcome to be?

(b) How, if at all, would the outcome be different if the builder had the right to construct the skyscraper, even if it blocked solar access?

(c) Suppose again that the neighbors have the rights. Because there is a large number of neighbors, hiring an attorney to negotiate with all of them will be expensive, perhaps as much as $25,000. Is a Pareto-improving exchange possible? What do you expect the outcome to be?

(d) Now suppose that the builder has the rights, and the costs of the lawyer (still $25,000) belong to the neighbors. Is a Pareto-improving exchange possible? What do you expect the outcome to be? Compare this scenario with those of the other parts of this problem. What has led to these different outcomes?

5.[See also Review lectures on Theory of production and cost, and profit maximization] Acme Charcoal is a charcoal producing company in Cleveland. Its total cost function is $C(Q_A) = 25 + 10Q_A + 4Q_A^2$, where Q_A is charcoal production per week in thousands of tons.

a) What is the formula for the average variable cost of production?

b) What is the formula for Acme's marginal cost function? What portion of this marginal cost curve lies above Acme's minimum average variable cost?

c) If charcoal sells in Cleveland for $810 per thousand tons, how much charcoal will Acme produce?

6. Acme Charcoal (continued) [Lectures on Externality: Pigou & Coase]

Clearview is an eyeglass company located near Acme Charcoal in Cleveland. Clearview's production of eyeglasses is negatively affected by the smoke from Acme's production of charcoal.

a) As in the previous question, charcoal sells in Cleveland for $810 per thousand tons. This is the nineteenth century, and no pollution control laws have yet been passed in the US. Does the fact that Acme's charcoal harms Clearview change your answer to part (c) of the previous question? Explain the reason for your answer.

b) Clearview's total cost function to produce eyeglasses is

$C(Q_E) = 40Q_E + 2Q_E^2 + 2Q_A$ where Q_E is Clearview's weekly production of eyeglasses and Q_A is Acme's weekly production of charcoal in thousands of tons. What is the extra cost to Clearview from an additional thousand tons of charcoal production by Acme?

c) Eyeglasses sell for $140 per eyeglass. How many eyeglasses would you predict that Clearview produces per week?

d) How much profit do Acme and Clearview each earn in this situation?

e) How much higher would Clearview's profit be if Acme went out of business or at least did not operate in the vicinity of Clearview's premises?

f) If a municipal ordinance were passed in Cleveland making a polluter in Cleveland liable for damages caused by his pollution, what do you predict would be the outcome in terms of Acme and Clearview? How much would each firm produce? Explain the reasoning behind your answer.

7. [Lecture on Pollution control policy] It is 2025 and Globus Electricity company has to manage its carbon emissions from burning coal to generate electricity. For this it must employ a carbon capture and storage (CCS) plant to abate carbon emissions. In the absence of any abatement, Globus would generate 50 tons of carbon. It has a CCS plant on the Westside with the following cost function for carbon abatement: Abatement cost = 50QW + 5QW2 , where QW is the tons of carbon abated at that plant; the marginal cost of abatement is MC = 50 + 10QW.

(a) For each ton of carbon emissions that Globus does not abate it must pay a federal emissions tax of $300 per ton emitted. How much carbon will Globus choose to abate? Explain the reasoning underlying your calculation.

(b) Why doesn't Globus decide to abate all its emissions in case (a)?

Globus now decides that it will abate *all* of its emissions, rather than paying any tax on emissions. It acquires a second CCS plant on the Eastside. This plant has as cost function for carbon abatement given by: Abatement cost = 30QE + QE2 , where QE is the tons of carbon abated at the east plant; the marginal cost of abatement at this plant is MC = 30 + 2QE.

(c) Given Globus's decision to abate all of the 50 tons of carbon, how much abatement Globus will choose to conduct at each plant? Explain your reasoning.

8. [Lecture on public goods] (a) What is the definition of a public good? How does it differ from a conventional market good? (b) Explain why one might see a lighthouse as a public good. Are there other transportation related facilities that could be seen as a public good – which facility, and how does it fit the criteria for a public good? (c) Is it possible that there could be private provision of lighthouses? (d) Would private provision be expected to generate a socially optimal level of provision of a public good? Explain the reasons for your answer.