ECON 224, Prof. Hogendorn

Problem Set 3

1. *Cod.* Codfish in Newfoundland has been terribly overfished. This is a case where each fishing firm fails to take account of its marginal social cost in depleting the overall stock, leading to a negative externality in production. In real life, the Canadian government responded with a fishing moratorium, but in this problem we consider whether a Pigouvian tax would work.

   (a) Draw the supply and demand for cod (conventional ``x" diagram), show the marginal social cost, and label the deadweight loss from the externality.

   (b) Now show the Pigouvian tax. What price do consumers pay? What price do fishing firms receive? How much is the government tax revenue?

   It turns out that there are two types of cod fishing, and their private cost curves are shown in the following diagram:
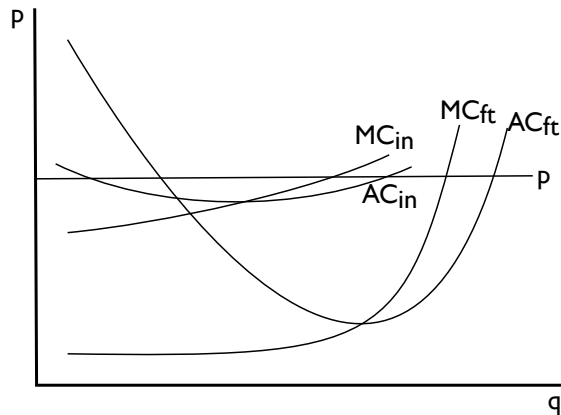
Inshore fishermen operate in a labor-intensive way, using small boats and many workers. To catch more fish requires more boats and labor hours on the margin. Freezer trawlers, on the other hand, use large ships with freezer equipment. They have huge economies of scale up to a point, but little ability to expand output beyond that point since the ship already operates 24/7.

(c) Assume the Pigouvian tax doesn't change prices in a way that puts either type of fishing firm out of business. How does each firm react to the tax? Which firms react more strongly?

(d) Suppose that the phrase ``Grand Banks cod'' is valuable and recognizable to consumers, although some cod is from outside Newfoundland's Grand Banks. What would be the costs and benefits of creating an official geographic indication for ``Grand Banks cod?''

(e) If the geographical indication were an EU-style *protected designation of origin* that specified small-boat fishing methods, how would this affect the industry and the overfishing externality?

(f) Suppose the Canadian government also became concerned about the dangers of fishing work and mandated that every boat have expensive GPS emergency gear. How would this affect the industry?

(g) The safety regulation would require cost-benefit analysis regarding the value of fishermen's lives. What methods could the government use to value the lives? Given that fishing is a low-paid, risky type of job, would these methods value fishermen's lives more or less than a typical Canadian worker?

2. *IMOpen.* Underlying Instant Messaging (IM) is a database called the Names and Presence Directory (NPD) which shows who is available and whether or not they are online (present). Several leading IM services, including AOL, Yahoo!, Microsoft, and Skype, use propretiary NPDs that are not open to to other systems. There may be positive externalities in produc-

tion of IM because the NPD, if open, could be used to produce other value-added products based on whether or not people are online.

Here is a diagram of the situation for AOL Instant Messenger (AIM)
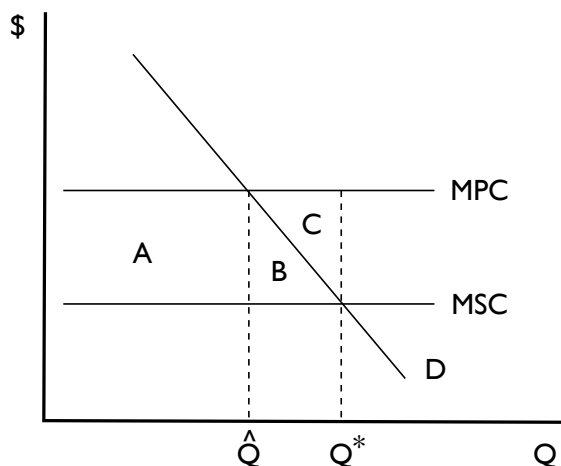
(a) Without any intervention in the market, AIM would produce quantity $\hat{Q}$. Which area (A, B, or C) would be deadweight loss? Explain in words who would suffer this loss?

(b) If the government employed a Pigouvian subsidy to get AOL to produce Q^*, the cost of the subsidy would be what?

3. *AC.* It's a hot day in summer, and there are three groups of people, the Sweaties, who desperately need to consume electricity for their air conditioning, the Woodchoppers, who don't want their trees killed by acid rain from power plants, and the Greedy Widows and Orphans (GWO) who want big dividends from their electricity stocks.

Currently there are no property rights to air quality whatsoever, so the GWO produce quantity $\hat{Q}$ in the diagram below. Note that the Woodchoppers suffer a total cost of $A + B + C$ in the form of acid rain.

3
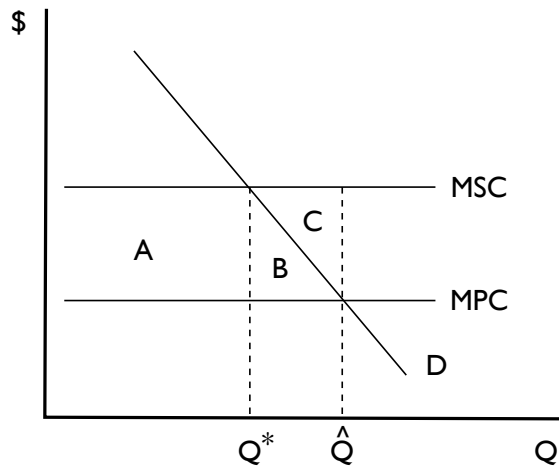
(a) The government decides to define a property right to clean air, so that the GWO have to pay the Woodchoppers if they want to generate any power. How much electricity is generated? How much do the GWO pay the Woodchoppers?

(b) The GWO decide to start a campaign to change the property rights, and it succeeds. Now the GWO can produce as much as they want, and the Woodchoppers have to pay them to stop. How much electricity is generated? How much do the Woodchoppers pay the GWO?

4. You should know how to do Chapter 12, problems 3, 6.

5. You should know how to do Chapter 18, problem 3.

6. You should know how to do Chapter 20, problems 5, 6.

7. You should know how to do Chapter 21, problem 3.

8. You should know how to do Chapter 22, problem 2.

Answers:

2. *IMOpen_a.*

(a) The deadweight loss is B. This is the area that has a lower social cost than it does social benefit. It is suffered by those who demand the NPD service, in this case both end-consumers and the hypothetical producers of the add-on products.

(b) A Pigouvian subsidy would push AOL to lower its price to the level given by the MSC curve. The problem for AOL is that it would be lowering the price on every unit, not just the units between $\hat{Q}$ and Q^*. Thus, it would incur a loss equal to the vertical distance between MSC and MPC on every unit. The subsidy would therefore cost A+B+C.

This shows how difficult Pigouvian subsidies can be. In order to produce benefit B, the government needs to spend a great deal more on subsidy. The subsidy is just a transfer within society, from the taxpayers to AOL, so it does not reduce social welfare, but it is not very plausible that Congress would approve such a large redistribution of resources for such a small social gain. In the real life case of the AOL / Time-Warner merger, a condition of merger approval was to open the NPD, which in this case is a simpler strategy, especially since the marginal cost in this example is close to zero.