**ECON 136: Week 8, Monday**

**Solving Externality and Public Goods Problems**

1) (Building on the externality problem from Monday): Suppose the demand for oil is given by PD = 90 – 0.5Q in millions of barrels and that the marginal private cost of producing oil is PS = 10 + 0.3Q. A toxic byproduct of oil drilling causes a marginal external cost of 0.2Q. Draw an appropriate diagram to illustrate and use algebra to confirm that

a) the market equilibrium will yield 100 million barrels of oil at a price of $40/barrel;

b) the socially efficient (MSC = MSB) output is 80 million barrels

c) the deadweight loss associated with the market equilibrium is $200 million.

d) Suppose the government imposed a tax of $16.00 per barrel of oil sold. What would be the new market equilibrium and what would be the size of the deadweight loss?

e) Suppose the government required producers of oil to use a non-toxic drilling process, which would eliminate the externality but result in MPC = PS = 6 + 0.9Q . I claim that this would result in a deadweight loss of $50 million from underproduction of oil. Explain my reasoning.

2) (Building on the public goods problem from the Wednesday before Break) Suppose there are 3 consumers of a public good (e.g., pollution abatement)

 MB1 = 60 – Q

 MB2 = 100 – Q

 MB3 = 140 – Q

a) Carefully draw the diagram showing that

 MSB = 300 – 3Q, for Q < 60

 240 – 2Q, for 60 < Q < 100

 140 – Q, for 100 < Q < 140

b) If MC = 180, confirm that the socially optimal level of the public good is Q = 40.

c) Calculate each person’s total benefit from being able to consume 40 unit of the public good.

d) If each person were taxed equally to cover the cost of the public good, which consumers gain and which consumers lose from the provision of the public good?

e) Suppose the government provides a second public good at total cost of 1800 and that the total benefits to our three consumers are

 TB1 = 4200

 TB2 = 2400

 TB3 = 3600

If each person were taxed equally to cover the cost of the two public goods, which consumers gain and which consumers lose from the provision of the two public goods together?

3) I’ve described responding to the externality problem as a public good. Consider more generally strategies for abating pollution.

What’s the marginal benefit of pollution abatement?

What’s the marginal cost?

What strategies might the government use to approximate the economically efficient level of pollution abatement?