Peter J. Wilcoxen   The Maxwell School
Economics 437   Syracuse University

Exam 2
Spring 2016

<div style="border:1px solid black">

VERSION R

</div>

Instructions

1. Write your **SUID NUMBER** on your bluebook and DO NOT write your name.

2. Write the **EXAM VERSION** from the box above on your bluebook.

3. Do not open the exam until you are told to do so.

4. Please turn off the ringer on your phone right now – before the exam begins.

5. If you are wearing a baseball cap, please remove it or turn it backward.

6. **SHOW ALL YOUR WORK**. Numerical answers without supporting work will receive little or no credit and may be presumed to be copied from another exam.

7. You have 80 minutes to work on the exam. There are 80 points possible; please budget your time accordingly. Also note that many of the questions have (a), (b), etc., inserted into the text to help you avoid overlooking part of the answer.

8. Collaboration of any kind on the exam is not allowed. *Use of phones or other wireless devices at any time during the exam will be presumed to be collaboration – so don't do it.* Cheating of any kind will result in an F on the exam and referral of the case to the Dean's office for further sanctions.

9. Calculators *may not* be shared.

10. Some handy formulas:

$$PV = \frac{B}{(1+r)^t} \qquad\qquad PV = \frac{B}{r}$$

Present Value:

Areas: $\text{Triangle} = \frac{bh}{2} \qquad \text{Trapezoid} = \left(\frac{b_1 + b_2}{2}\right)h$

Question 1 (20 points)

Production of a good creates a positive externality. The market willingness to pay for the good is $WTP = 600 - 4*Q$ and the market supply curve is given by $MC = 4*Q$. The external marginal benefits on Q units of the good are given by $Mbext = 2*Q$.

Please compute: (a), (b) the price and quantity at the market equilibrium, (c), (d) the efficient quantity and subsidized price, (e) the efficient subsidy per unit; (f) the total cost of the subsidy to the government; and (g) the net welfare gain from moving from the market equilibrium to efficiency.

Question 2 (20 points)

A pollutant is emitted by 20 type-A firms and 10 type-B firms. Type-A firms each initially emit 300 tons of pollution and type-B firms each emit 200 tons. The MCA curve for an individual firm of each type is shown below, as is the overall MBA curve, where Qt is total abatement:

Individual type-A firm: $MCA_{ai} = (1/2)*Q_{ai}$
Individual type-B firm: $MCA_{bj} = (1/4)*Q_{bj}$
Overall MBA curve: $MBA = 100 - (1/80)*Q_t$

The government wishes to use a tax to control the externality. Please calculate: (a) the efficient total amount of abatement, (b) the efficient tax rate on emissions, (c), (d) the amount of abatement done by an *individual* firm of each type, (e), (f) the abatement cost for a firm of each type, and (g), (h) the tax payment by a firm of each type.

Question 3 (20 points)

Three sources emit a pollutant. Source 1 emits 400 tons, source 2 emits 600 tons, and source 3 emits 800 tons. Their marginal abatement costs and the marginal benefit of abatement are given by the following, where Qt is total abatement:

Source 1: $MCA1 = (1/2)*Q1$
Source 2: $MCA2 = (1/2)*Q2$
Source 3: $MCA3 = (1/4)*Q3$
MBA: $MBA = 900 - Q_t$

Design a tradable permit system that will achieve the efficient amount of abatement while shifting the total compliance cost so that sources 1 and 2 each pay half and source 3 has a net cost of zero. Please determine: (a) the equilibrium price of a permit, and (b), (c) and (d) the number of permits that should be distributed to each source.

Exam continues on the next page…

Question 4 (20 points)

The marginal benefits of abating a pollutant are given by MBA=2000–2*Q. Two sources of the pollutant were recently regulated. Just before regulation, each source was emitting 1000 tons (2000 tons total). At the time of regulation, the sources were believed to have abatement costs given by: MCA1=2*Q1 and MCA2=4*Q2. Using this information, the regulator set up a tradable permit system and gave each source exactly the number of permits it would need for its abatement to be efficient. After the system was put in place, however, the MCA curve for source 1 was discovered to be wrong. The true curve is MCA1=4*Q1.

Please calculate: (a) the efficient total quantity of abatement and the MCA if the original MCA1 curve had been correct; (b) the number of permits the regulator gave each firm; (c) the efficient total quantity of abatement given the true MCA1; (d) the deadweight loss, if any, under the permit system; (e) the equilibrium price of a permit under the true MCAs; and (f) the value of any permit sales from one firm to the other.