Peter J. Wilcoxen   Department of Public Administration
Economics for Public Decisions   The Maxwell School, Syracuse University

Exam 1
Fall 2020

Instructions

1. The exam is **closed-notes, closed-book** and **no collaboration** is allowed.

2. It will **end at 9:15** to allow everyone 5 minutes for scanning and submitting answers.

3. There are **60 points** possible on the exam and you'll have 75 minutes to complete it.

4. **Show all your work**. Answers without supporting work will receive little or no credit.

5. Write your answer on paper and then **scan it and submit it** at the end of the exam.

6. Please **number the pages** as you go so you can scan them in the right order.

7. If you have a **tablet**, you can use that instead of paper as long as you can produce a PDF.

$$\text{Area of a triangle: } \frac{1}{2}bh \qquad \text{Area of a trapezoid: } \left(\frac{b_1 + b_2}{2}\right)h$$

Question 1 (30 points)

A good is purchased by households of types A and B and produced sellers of type C. Key information about each group is shown below.

Type	Number	Curve	Income
Individual type A buyer	10	$WTP_{Ai} = 1000 - 2Q^D_{Ai}$	50,000
Individual type B buyer	5	$WTP_{Bi} = 500 - 0.25Q^D_{Bi}$	150,000
Individual type C seller	200	$WTA_{Ci} = 10 + 2Q^S_{CI}$	n/a

(a)   *15 points.* Please compute: □ the market equilibrium price and quantity; □ the quantity purchased by an individual A household; □ the quantity sold by an individual C seller; and □ illustrate the market equilibrium with an appropriate graph.

Question 1, continued

Now suppose the government is considering a $20 subsidy on the good and would like to know how it would impact the market, and whether it would be progressive or regressive. A subsidy is regressive if high income households receive a larger amount of the subsidy as a percent of their income than low income households.

(b)   *15 points.* Please compute the following when the subsidy is in place: ☐ the new buyer and seller prices; ☐ the new market quantity; ☐ the new quantity purchased by an individual household of each buyer type (A and B); ☐ the amount of spending on the subsidy received by an individual household of each buyer type (A and B); ☐ indicate whether the subsidy is progressive or regressive, including any necessary calculations; and finally ☐ calculate the fraction of subsidy spending that goes to sellers and the fraction that goes to buyers (analogous to the tax burden percentages).

Question 2 (15 points)

Although pollution and other negative externalities can be managed by taxes, governments sometimes prefer a more direct approach and require firms to purchase equipment to eliminate the externalities (e.g., requiring pollution controls on smokestacks). Such an approach is a bit like a tax except that the firm has to buy equipment instead of sending cash to the government.

Suppose an area is served by two electricity sources: W, a wind farm, and C, a coal power plant. The price of electricity is currently $40. W is producing 1000 units and has a supply elasticity $\eta_W = 2$. C is producing 2000 units and has a perfectly elastic supply curve with a $WTA_C = \$40$. Total consumption is initially 3000 units and the demand elasticity is $\eta = -0.2$.

Production from C contributes to climate change and the government is considering requiring it to use an emissions-control technology. The technology would cost C an additional $20 on each unit it produces; that is, it would be similar to a $20 tax on C except that the money would be spent on equipment rather than being given to the government. Since W does not produce emissions it would not need to purchase the equipment.

(a) Suppose the technology requirement is put in place. Please compute the following: □ the new market price; □ the new total quantity consumed; □ the new quantity produced by W; □ the new quantity produced by C; □ the change in CS; □ the change in PS for each producer; and □ the total amount spent by C on new equipment. (Additional space is available on the next page.)

Additional space for Question 2.

Question 3 (15 points)

The government would like to intervene in the market for a good that creates a positive externality. The market WTP and WTA curves for the good are given below, as is the MB curve for the externality. Initially there is no tax or subsidy.

$$WTP = 2000 - 7 * Q_M^D$$
$$WTA = 3 * Q_M^S$$
$$MB_e = 2 * Q_M^D$$

(a)   Please determine: □ the initial market equilibrium price and quantity in the absence of a policy; □ the efficient quantity; □ the efficient buyer and seller prices; □ the subsidy rate that would move the market to the efficient equilibrium; □ the resulting change in CS; □ the change in PS; □ the change in government revenue; □ the change in the benefits created by the externality; and □ the change in SS resulting from the policy. (Additional space is available on the next page.)

Additional space for Question 3