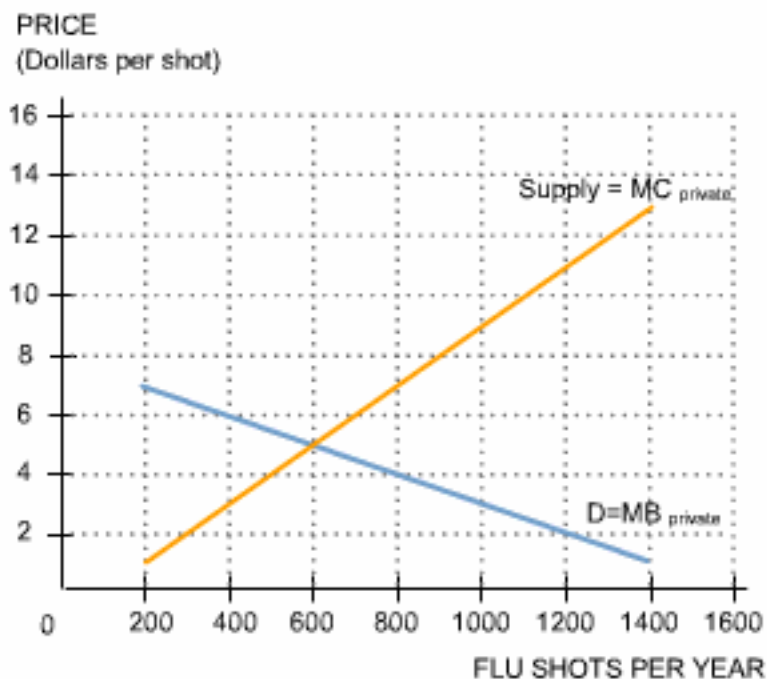


Whitman College  
 Econ 107  
 Exam 3  
 April 10, 2003

Write all answers on your exam. Show all of your work. The exam ends at 10:55.

1. Suppose that you are an economist working for a public health agency and have been assigned the task of examining the market for flu shots in a local community. The graph below shows the market supply and demand curves for flu shots in this community. The supply curve reflects the private marginal costs of providing flu shots, while the demand curve represents the direct marginal benefit to consumers of obtaining a flu shot.



(a) (2pts) What is the competitive equilibrium price and quantity of flu shots?

A recent public health study indicates that the benefits of flu shots extend beyond those enjoyed by the direct recipients of the shots. In particular, those who do not get flu shots will likely benefit because their chance of exposure to the flu virus will be reduced when others do get the flu shots. The health study estimates that the external benefits amount to \$6 per flu shot.

(b) (5pts) On the graph above, draw the marginal social benefit curve, and label your curve MSB.

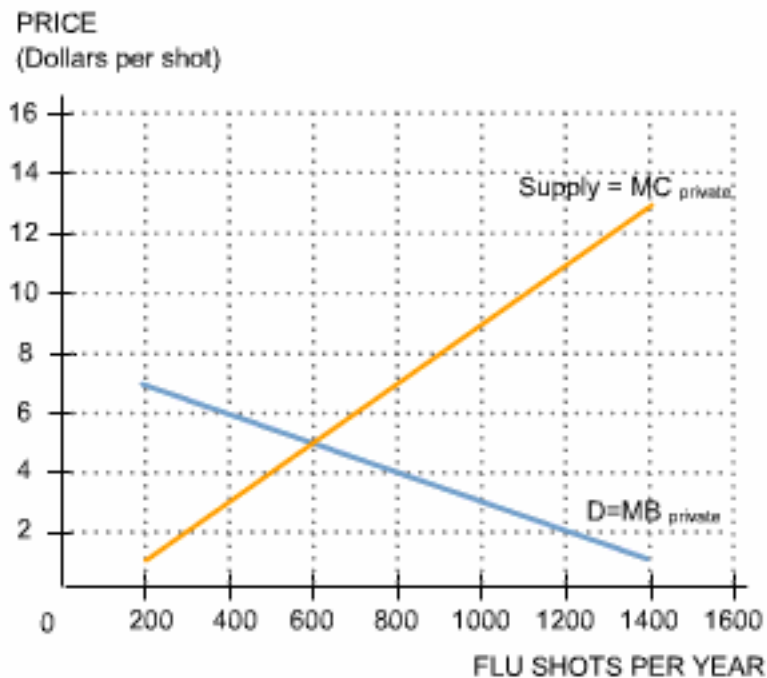
(c) (3pts) What is the socially efficient number of flu shots?

(d) (2pts) To achieve the socially efficient number of flu shots, what price would suppliers have to receive?

(e) (5pts) On the graph above, indicate the dead-weight loss generated in this competitive market.

Suppose now that the government pays \$6 to clinics for each flu shot that they administer, and that supply and demand are free to operate in the market for flu shots.

(f) (4pts) Show the effect of the subsidy on the graph below.



(g) (4pts) Now, what price do consumers pay for the shots and what quantity do they buy? Does the subsidy program achieve the socially efficient number of flu shots?

(h) (2pts) How much does this subsidy program cost the government?

2 (a) (5pts) Define Gross Domestic Product (GDP).

(b) (5pts) Which of the following would the Commerce Department include in its calculation of GDP? Circle all that would be included.

- A The value of the time you spent painting your house last summer.
- B The amount of money someone spent gambling at a casino in Atlantic City.
- C The value of the vegetables grown in your family garden.
- D The amount of money you saved by cleaning your own house instead of hiring it done.
- E The cost of clean-up after a hurricane hits Florida.
- F The market value of burglar alarms purchased to reduce crime.
- G The health care expenses associated with smoking.
- H The government's purchase of weapons.
- I The amount paid to an accountant to prepare tax returns.
- J The amount spent to construct a new house.

3(a) (5pts) Define the natural rate of unemployment.

(b) (5pts) Explain how you could estimate the natural rate of unemployment for a particular economy.

4. Consider a hypothetical economy. Last year, the price of heating oil was \$1 per gallon, and the price of electricity was \$0.10 per kilowatt-hour (kWh). This year, the price of heating oil has increased to \$2 per gallon but the price of electricity is still \$0.10 per kWh. Suppose that a statistical agency defines a home-heating basket that consists of 1000 kWh of electricity and 100 gallon of oil. The agency uses this basket to calculate a Consumer Price Index (CPI).

(a) (8pts) What would the CPI be for this year and for last year, if last year is the base year?.

(b) (5pts) Use the CPI to calculate the inflation rate between last year and this year.

Fred is the kind of guy who likes to have a backup. He heats his house with an oil-fired furnace and with electrical baseboard heaters. In his house, 1 gallon of oil produces the same amount of heat as 10 kilowatt-hours (kWh) of electricity. (These numbers are chosen to be easy to work with, not necessarily to be realistic.) To heat his house last year, Fred purchased 2,000 gallons of heating oil and 20,000 kWh of electricity. Assume that electricity and heating oil are the only goods that Fred buys. Last year, he spent his entire nominal income of \$4,000 on these two goods. This year, his nominal income is still \$4,000.

(c) (3pts) Did Fred's real income change between last year and this year? If so, in what direction did it change?

Question 4 continued

Suppose that this year, instead of buying both oil and electricity, Fred uses only electricity to heat his house. That is, he substitutes electricity for oil. Suppose that we judge Fred's standard of living by how warm his house is.

(d) (3pts) If Fred spends all of his \$4,000 in income on electricity this year, which of the following statements would be true? Show your work.

Fred's house will be:

- A. As warm as it was last year, so his standard of living stays the same.
- B. Less warm than it was last year, so his standard of living falls.
- C. Warmer than it was last year, so his standard of living increases.

(e) (2pts) True or False: Fred demonstrates that even if someone's real income falls, his standard of living can remain the same. (You do not need to explain your answer.)

Suppose that the following year, the price of heating oil will be \$2 per gallon but the price of electricity will rise to \$0.20 per kWh. Fred's nominal income will remain \$4000.

(f) (5pts) True or False: Fred's real income will fall between this year and the following year, but his standard of living will remain the same. Explain your answer.

(g) (12pts) Suppose Fred is your typical consumer in this economy, and you are an intern working for the statistical agency that produces the CPI for this country. Your boss has heard the term "substitution bias" mentioned with respect to his CPI. However, he doesn't understand what the term means. He has asked you to define the term, and to explain whether there is a substitution bias in this CPI. Write a memo to your boss providing the information he has requested. (You can use the notebook paper at the end of the exam for this memo.)

5. (a) (6pts) Draw an aggregate demand curve. Be sure to thoroughly label your axes.

(b) (8pts) Describe the wealth and substitution effects that give the aggregate demand curve its shape.