

Problem Set 4

Parts of this assignment are difficult though not all of the problems are difficult. Do not be discouraged if you cannot answer all of the questions and do not spend an inordinate amount of time answering the questions. Rather, view this as an opportunity to learn and to contemplate some of the issues raised by this class.

Conceptual Valuation Issues.

1. Losses and Gains

The government is considering removing the dams on the Elwha. For some the project will create gains. A number of Native American tribes argue that for them the restoration is not a gain but rather the restoration of a loss.

- a. Are both the gains and the losses restored benefits?
- b. If you accept the Native American point of view does it make any difference? That is, do gains and losses restored give the same measurement? Explain.

2. A wave of robberies of electronic supply stores has resulted in increased police surveillance of such stores. The increased surveillance costs the City \$700,000 per year. The retail value of the goods stolen is \$1,200,000 per year. The stolen goods would have been fenced for \$650,000 per year. What are the net social benefits from the surveillance program. Explain your answer in terms of standing ?

II. Boxes and Triangles

3. Assume that the demand curve for butter is:

$$P = 60 - 2Q_D$$

Where P is the price per pound (in cents) for butter and Q_D is the quantity demanded per year (in millions of pounds.)

Assume that the supply curve for butter is:

$$P = 2Q_S$$

where $P = 2Q_S$ is the quantity supplied per year (in millions of pounds).

- a. The government puts a price floor of 40 cents per pound on butter and buys the surplus. How big will be the resulting surplus of butter? Graph the results including the welfare loss indicating which is the consumer and which is the producer surplus.
- b. What will be the size of this loss arising from the government price floor? What is the present value of the loss if it is a perpetuity and the discount rate is 3%
- c. What will be the size of the loss if it will grow by the amount of inflation which is expected to be 4%, and if the nominal discount rate is 8%? .
- d. Assume instead the government does not have a floor but levies a tax of 10 cents a pound. Calculate the dead weight loss from the tax.
- e. Explain why the calculation of the loss in a and b implicitly makes the Kaldor-Hicks assumption. (Note you can answer this even if you can not calculate the size of the loss).
- f. What will be the amount of tax revenues? How is this treated in calculating welfare changes and under what assumption?
- g. Would the welfare loss be greater if those that receive the tax dollars have a smaller value than the butter consumers for the marginal utility of income. Why or why not? Explain.
- h. What are the assumptions about the margarine market that need to be made to support your calculation in (d.) above?

4. The City of Nitro, W. Va. is considering building a new bridge between Ortin and Nitro (these are real towns) . They can receive Federal money to build the bridge if they can show that the bridge is worthwhile. A review of the federal guidelines convinces the Nitro City council that what is required is a benefit cost analysis. They ask you to perform such an analysis.

You determine that the major value of the bridge would be to reduce travel costs for residents of Ortin and Nitro. You discover that there is no congestion with or without the bridge, but that the bridge travel costs will be reduced because residents of Nitro and Ortin will not have to drive so far.

Suppose the aggregate demand for car trips is $Q/\text{day} = 2000 - 400P$.

P is defined in terms of travel cost, and travel costs are defined solely in terms of the value of travel time in dollars per hour. You determine that travel time for the average commuter is 20 minutes without the bridge and 10 minutes with the bridge. The average value of time is equal to 60% of the wage rate and this wage rate is \$10.00/hr.

- a. Calculate the daily benefits of the bridge. Each car has only one passenger.
- ii. As a next step draw simple demand and supply curves and show on the diagram the savings shown by the bridge.
- b. Calculate the present value of the bridge benefits assuming that the bridge has an infinite lifetime and that the relevant rate of interest is 10% per year.
- c. Calculate the present value of the bridge benefits given that its life is 30 years and that benefits increase at a rate of 5% per year continuing to assume that the interest rate is 10%.

- d. The bridge is expected to cost \$6,000,000 in construction costs. The City already owns most of the land that would be needed for the bridge. This land cost the City \$20,000,000 and its current market value is only \$5,000,000 due to the deterioration of the area.

Using the information in b and d above what is the NPV of the bridge?

- e. There is a cheaper bridge that costs \$1,000,000 to build with land costs the same. This smaller bridge will only lower travel time by 9 minutes per trip. Which bridge has the better NPV from the point of view of society as a whole. Assume both bridges last forever.
- f. Suppose the Federal Government will pay 90% of the costs of the more expensive bridge. Which bridge is better from the City's point of view? Why?
- g. Reconsider problem b above. You discover that in addition to the information you have already, that the existence of the bridge will increase land value around the bridge 10% or a total of \$10,000,000. Some of this is land owned by the City and of the 10 million increase in land values 3 million will accrue to land owned by the City. What now is the present value of the benefits of the bridge from a national perspective?
- h. Now what is the NPV of the bridge from the City's perspective?
- i. The increase in land values will generate additional tax revenues of about \$700,000. In terms of society as a whole, how should these be valued in the benefit cost calculation? Would your treatment be different if the City owned all of the land and as a result there were no increase in tax revenues?

5.

a. Ms. Jones has \$2500 per year for “pocket money.” She buys 500 packs of cigarettes at \$1.80 per pack. Although she is a heavy smoker, cigarettes are not necessary for her survival. Show her budget line and equilibrium position in a diagram utilizing indifference curves. (Measure packages of cigarettes on the horizontal axis and “pocket money” on the vertical axis.)

b. The Anti-Tobacco Alliance threatens to win its fight to have smoking prohibited by law. Where would Jones' equilibrium lie if this legislation were passed?

c. Show on the diagram you have drawn the maximum amount Jones would be willing to pay annually to avoid the ban on smoking and explain briefly. (Assume that Jones would still pay \$1.80 a pack.) Show also the minimum amount the U.S. Smoker Compensation Commission (set up to compensate smokers for the loss of their right to smoke) would have to pay Jones to compensate her for the loss of her opportunity to smoke.