

Econ 325: Environmental and Natural Resource Economics
Fall 2007
Problem Set 1

Due in class: Tuesday September 18, 2007

13 total points

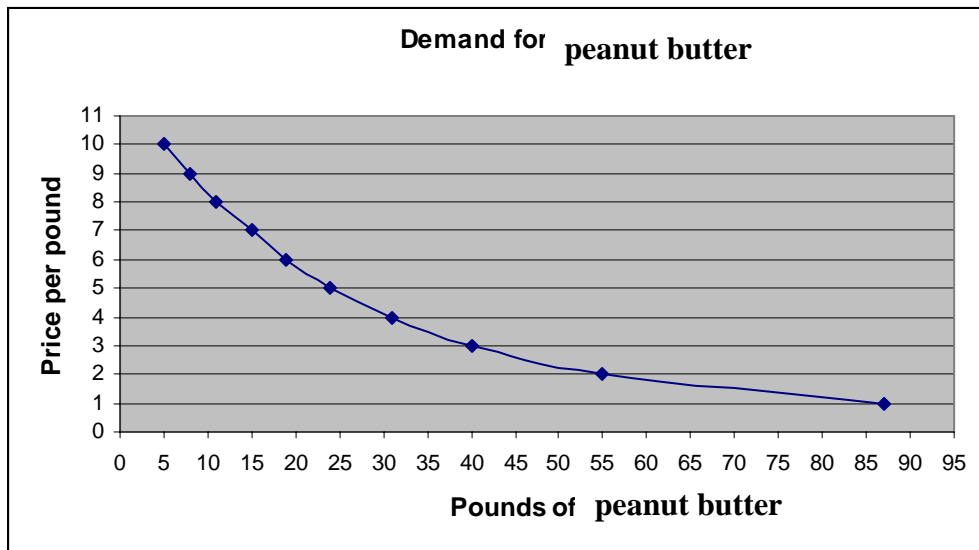
Instructions: Answer all 6 questions. Feel free to use Microsoft Excel wherever necessary. Please show your work, and be sure to label all graphs accordingly.

- Below are the marginal willingness to pay (demand) functions for peanut butter for three individuals: A, B, and C.

Price (\$)	Quantities demanded (pounds)		
	A	B	C
10	4	1	0
9	6	2	0
8	8	3	0
7	10	4	1
6	12	5	2
5	14	7	3
4	17	10	4
3	20	15	5
2	24	25	6
1	30	50	7

- Graph the aggregate (market) demand function.

1 point



- b. Suppose the marginal cost of producing peanut butter is constant at \$5 per pound. What is the socially efficient rate of peanut butter production? $MC = MSC = MB = MSB$

Price = MC = MSC

10

9

8

7

6

5

4

3

2

1

Market demand = MB = MSB

5

8

11

15

19

24

31

40

55

87

$q^* = 24$

1 point

2. As an environmental economist, you are hired to evaluate whether or not the following project is sensible. The Washington Department of Natural Resources is considering conducting a massive eradication effort for the invasive weed yellow star thistle. The initial cost of the effort will be \$50 million the first year, \$40 in the second and \$25 million in the third. No benefits are expected to accrue until the fourth period. Benefits from removing the weed (increased wildlife grazing, improved land access, increased soil moisture, water conservation, and the preservation of biodiversity) are estimated to be \$3 million dollars a year, although annual maintenance and control costs will be \$0.5 million. These costs and benefits are expected to continue for 50 years following the three years of initial investment.

A. If the discount rate is equal to 3%, what is the benefit cost ratio of the eradication effort? *1 point*

0.58 – see spreadsheet ps1 #2a.

B. If the discount rate is 7%, what is the benefit cost ratio of the eradication effort?
1 point

0.31 – see spreadsheet ps1 #2b.

C. Should we as a society undertake a project simply because the benefit-cost ratio is greater than 1? Or should there be more stringent conditions? *1 point*

No. The more stringent condition is that a project should make the best use of the resources as well; in other words, from the range of possible choices, the choice implemented should have the highest net benefit.

3. Under what circumstances would a hedonic pricing technique be the most appropriate approach to determining the value of a good? 1 point

When the characteristics of the good are easily defined, and there are price changes related to changes in the levels of these characteristics, lots of observations for analysis. Also, people should be aware of the consequences related to the characteristics for prices to adjust accordingly (home owner moves away from air polluted neighborhood because of the health risks – so price falls).

What are the positive and negative aspects of this revealed preference approach? 1 point

Positive – doesn't have the biases associated with hypothetical questions/informational issues associated with CV, may be less costly than conducting a formal survey. Negative – assumes people understand consequences associated with environmental problems and they react to them by changing houses or jobs. Hedonic wage assumes highly mobile society, that people can easily switch jobs or homes.

4. Contingent valuation is one form of direct techniques to solicit value. How does a contingent valuation study attempt to determine willingness to pay for an environmental asset? **By directly asking respondents their WTP.** 1 point

What are some of the benefits and drawbacks associated with this method? 1 point

**Benefits – only way to get at particular types of values (existence, bequest, nonuse values).
Drawbacks – lots of biases: people don't have practice valuing nonmarket goods – so may be giving a value that reflects altruism or a strong belief in the issue – something besides their actual WTP. Because hypothetical, can state values that are too high, throwing off the true value. Respondents may also make associations between environmental goods that the research had not intended (WTP for better visibility is the question, and respondent includes in their answer improved health – this may result in double counting.)**

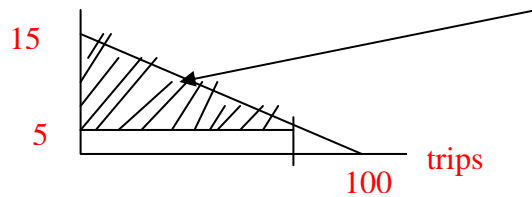
5. Assume you have data that suggest that if:

- i. Travel cost is greater than or equal to \$15, no trips are taken.
- ii. Travel costs are zero, 100 trips are taken.

a. Draw a travel cost demand curve based on these data. 1 point

The information provides the end points of a straight line. $P = 15 - (15/100) * q$
Plug in \$5 for price and solve for quantity. $q = 66.67$

b. Calculate ordinary consumer surplus for the individual whose travel costs are equal to \$5. 1 point



Then calculate consumer surplus,
which is area below demand curve
and above price at \$5.

$$\Rightarrow \frac{1}{2} * (15-5) * 66.67 = \$333.33$$

6. Assume construction workers are willing to accept a 1/2000 annual risk of death if their income increases by \$3000 per year.

A. Using hedonic wage theory, what is the collective willingness to be compensated to accept the loss of one life? 1 point

3,000 * 2000 = 6,000,000. Two thousand people have a collective willingness to accept \$6 million to be exposed to this risk that would be expected to lead to the death of 1 additional individual. Therefore, the collective willingness to be compensated to accept a loss of 1 life is \$6 million.

B. Would you expect this amount to be the same if this analysis was performed for a specific construction worker, rather than a statistical construction worker? Explain. 1 point

No, the value of a specific worker would likely be higher than that of a statistical worker.