Environmental Economics 4545: Midterm Fall 2014

This midterm is either 20 or 30 percent of your course grade, depending on whether your grade on it is worse or better than your grade on the first midterm.

Please answer all 5 questions to the best of your ability. The exam consists of 50 points.

Each question that has ten points graded as follows: 9 or 10 is an A grade, 8 a B, 7 a C, 6 a D, and 5 or less an F

Carefully read the whole exam, before you start answering any of the questions.

Some of the questions can be with a few sentences, so don't go overboard.

I am willing to sell points for answers, but remember that each point on a 10 point question corresponds to one letter grade for that question.

If you are in the class or classes when we go over the midterm, 3 points will be added to your score. If it takes us more than one class to go over the exam, you must be at all of these classes to get the 3 points: partial bonus points will not be given.

Note that most of these questions appear, and are answered, on the review sheets.

1. (10 points) Describe, in words, the relationship between Edward's EV for the introduction of Obamacare and Edward's wtp and wta for the introduction of Obamacare.

   answer: If his $EV > 0$, Edward likes Obamacare, and it is how much Edward would have to be paid to voluntarily forego Obamacare, so his wta the absence of Obamacare. If his $EV < 0$, Edward does not like Obamacare, and it is how much he would pay to not have Obamacare introduced, so, in absolute terms it is his wtp to avoid Obamacare.

2. (10 points) If we knew everyone's EV for the introduction of Obamacare, could we determine whether the introduction of Obamacare was a Pareto Improvement? Yes or No, and explain.

   answer: Yes. If none are negative, and at least one is positive, it is a Pareto Improvement. If some are negative it is not a Pareto Improvement.

   comments on some of the answers: EV is positive for improvements and negative for deteriorations. It is incorrect say the following, "If the sum of the EVs is positive, the policy is necesarily a PPI." This is not a correct statement. Is is also incorrect to say the following, "If the sum of the CVs is positive, the policy is a PPI but **not** a PI." It is incorrect to say this because if the policy is a PI, the sum of the CVs (and the sum of

the EVs) will be positive. Some of you said that it is a PI if everyone's EV is positive. This is a true statement but everyone's EV positive is not necessary for OC to be a PI.

A PI does no not require that everyone is better off.

some of you made this question way too hard, and made your answer way too long.

The question and its answer have nothing to do with the sum of the the EVs, or the average value of the EVs. That would be relevant if I asked about PPI, but I did not.

3. (10 points) Your job it to put a lower-bound on the sum, over all Colorado residents, of their compensating variations $\left(CV = \sum_{i=1}^{1000} cv_i\right)$ for introducing wolves back into Colorado. Assume the population of the state is 1000 residents. Not surprisingly, the cv_i's vary across the residents. You know the highest is $100 and the lowest is $-$20$. You have done a well-designed referendum-type CVM study. Each individual in a random sample of CO residents is asked whether they would vote yes to reintroduce wolves at a cost to them of $5. 50% of those individuals answer yes. Each individual in a different random sample of CO residents is asked whether they would vote yes to reintroduce wolves at a cost to them of $25. 25% of those individuals answer yes.

What is the highest lower-bound estimate of the aggregate compensating variation (CV)? Report a number and explain how you got it. Tell the reader exactly what your number means.

answer: There are four ranges, $-$20$ to $5, $5 to $25, and $25 to $100. 50% of Colorado residents are estimated to be in the bottom range. 25% in the range $5 to $25, and 25% between $25 to $100. Multiplying these probabilities by the low end of each range, one gets $-20 * .50 + 5 * .25 + 25 * .25 = -\$2.50$. This says that the highest lower-bound on the average of the residents' cv's is $-$2.50. A negative cv is a wta. Multipying $-$2.50 by the thousand residents, the answer is $-$2500. So, the lowest possible value of the program is $-$2500, or, said another way, if $2500 of other benefits were added to the program, the program would, for sure, pass the Benefit-cost test (gain to gainers greater than loss to losers).

It is incorrect to say that this $-$2.50 is an estimate of the average cv. It is, rather, the lowest value the average can take given the data.

An aside, the upper bound estimate is $5 * .50 + 25 * .25 + 100 * .25 = \$33.75$. So the upper bound estimate of CV is $33, 750. So the range on the value of the program is $-$2,500 to $33, 750$

What if you answered the question assuming that lowest CV was zero rather than $-$20. This is incorrect but the answer would be

$0*.50 + 5*.25 + 25*.25 = \$7.50$. If you did this flawlessly, I will call it an 8/10.

4. (10 points) Here is what you know. Ralph likes Coke Zero. His demand curve for CZ (dollars on the vertical axis) is downward sloping (demand decreases as price increases). The price is currently \$1 a can and, at this price, he consumes 10 cans a day. Ralph has some per-day willingness to pay, wtp, to not have the price rise to \$2 a can. While you do not know Ralph's exact wtp to not face this price increase, what can you tell the reader about his wtp given the information that you have? You might want to include in your answer a a graph.

(answer) Ralph's wtp is bounded from above by \$10 (it cannot be greater than this amount). Ralph's wtp will be \$10 if the he chooses to continue to consume 10 cans at a price of \$2, which is what would happen if his demand function was vertical at 10 cans (if he purchases and consumes 10 cans a day no matter the price). If that is what he does, his loss would be \$10 (how much more he would have to pay for the same 10 cans). But if he he chooses to consume less than 10 cans when the price is \$2, he must prefer that to continuing to buy 10 cans at the higher price (he minimizes the negative impact of the price increase by reducing his consumption. So, we know is wtp to avoid the price increase is less than \$10.

Have them draw the graph. His wtp to have the price reduced is the area under his demand function (\$ on the vertical) between \$1 and \$0.5 to the left of 10. Picturing the graph one can see that this area is it largest if the demand function is vertical, and if its vertical the area is \$10.

Not that the question asks the same question as one of the review questions, one of the questions about Snerd Valley ski area. I am perplexed why anyone would get this question wrong–I thought is was a give away.

What if I had asked a different question. You are currently paying a dollar a can and choosing to consume 10 cans. What is the minimum you would pay to have the price on all can reduced from \$1 to 50 cents. It is \$5 which is the area under the demand curve between \$1 and \$0.5 to the left of 10, your saving on the 10 cans you are already buying (you would not buy fewer). It is what you would pay for the price decrease if you demand curve were vertical (you always consume 10 cans no matter the price). However, if your demand curve is downward sloping, you will choose to consume more, So, to the \$5 rectangle we have to add the area under the demand function bewteen \$1 and \$0.5 to the right of 10, meaning your wtp to have the price reduced by fifty cents is at least \$5.

5. (10 points) Read the Mobil Ad on the next page. It appeared in Time Magazine a number of years ago. Describe, as an economist would describe it, what they are saying in paragraphs 4-6. Also, critique both their conclusion in paragraphs 4 and 5, and critique the example they use to reach that conclusion. Separately critique the contents of paragraph 6.

answer: The ad discusses damages from an oil spill. It concludes that damages consist of only use damages; that is, it concludes that there is no such thing as non-use damages. Said another way, it does not recognize the possibility that an individual can be damaged (made worse off) by an event, even if that event does not cause the individual to change his behavior, or cause the individual to experience a material loss. It want the reader to conclude that there is no such thing as non-use damages, without quite explicitly saying that there is not such thing.

Their example is an example of a distant injury. Most oil spills are distant injuries for most people. Their example is also one where the amount of non-use damages is likely to be trivial–why would someone in Chicago– who never goes to NYC–care about an accident that put out of service **one** NYC taxi? They want the reader to generalize from their example (a distant, and small, injury with no non-use damages) to all distant injuries no matter their form or magnitude. The simplest way to show the flaw in the argument is to provide the reader with an example where the injury is distant and almost everyone would agree that the injury made them personally worse off, even though they have no intention of visiting the site.

For example, consider 9/11 and the the collapse of the twin towers. Many people in the U.S. would tell you that this event made them worse off, and many of these people would be people who do not typically get anywhere near NYC. An environmental example would be the BP spill in the Gulf. Many people who never visit the Gulf would say they would preferred that the spill had not happened, implying the spill made them worse off.

On a more subtle level, Mobil is saying that certain types of preference cannot exist, that you cannot care about things you do not use, consume or visit.