Environmental Economics 8545

Sixth Quiz

NonMarket Valuation and Travel- Cost Models

1. Consider the designation of a new wilderness area in Colorado. Assume that the economics consulting firm of Snerd, Snerd, and Gomer has accurately determined the CV each hiker and back packer would associate with designation and that the sum of all these individual CV's is $5 million. Snerd, Snerd, and Gomer included all the aspects of the change in their CV calculation for the hikers and backpackers. However, designation of this Wilderness Area will decrease the availability of water to grow soy beans on the plains of Colorado. This reduction will cause the price of tofu to rise by $1 a pound. Assume that before the change, four million pounds of tofu was produced and sold. This price increase obviously makes tofu consumers worse off. Note that hikers and backpackers are not in this group; that is, they never consume tofu. Convince me whether designating the Wilderness Area is a potential pareto improvement. What if the price increased by $1.50 rather than by $1?

The designation of the new wilderness area will be a PPI if the gains to the gainers, in $, are greater than the loss to the losers. The gains are $5 million.

The losses to the tofu eaters are

no more than $4 million if the price of tofu rises by $1. How do we know this? Assume the demand curve for tofu is not upward sloping. Before the price increase, 4 million pounds were sold. If all tofu eaters were constrained to consume the same amount after the price increase, the amount they would pay for tofu would increase by $4 million, and the negative of $4 million would be the sum of their Cvs if they were so constrained, which they are not. Given that their demand curves are not upward sloping, they will likely choose to reduce their losses by consuming less tofu, thus causing the sum of the Cvs to be equal to or less than $4 million.

Remember that when something bad happens we minimize its impact. The CV is the $ measure of their loss, given that they have optimized (minimized the impact of the price increase).

So, in the case, where the price has increased by only $1, the designation is a PPI.

If the price increase were $1.50, given the information that we have we don’t know whether the designation is or is not a PI. It could be, but we don’t know.

Remember the distinction between a PI and a potential PI.

2. Compare discrete-choice models of recreation demand, where the year is divided into a number of periods, with more traditional recreation demand models that assume utility, for the year, is a function of the number of trips to each site during the year. As part of your answer, briefly describe both types of models. What are their differences? What are their similarities? What are the advantages and disadvantages of each?

The repeated discrete-choice models:

The year is divided into a number of periods, in each period the individual must choose one of a discrete number of alternatives (residual budget is spent on a numeraire), and each period is a separate choice occasion. That is, the individual maximizes utility for each period, and what he or she chooses is independent of what he or she chose in other periods.

Per-period income is difficult to define, so models often assume no income effects. Income effects can also make the derivation of Cvs and Evs more difficult.

Model takes account of the integer nature of trips.

Model does not admit diminishing marginal utility from either trips to sites or to groups of sites. This is a negative. Related is the fact that such models don't admit compliments.

Models define a conditional indirect utility function for each alternative, which typically is only a function of the costs and characteristics of that alternative.

Individual deterministically chooses that site in each period that maximizes utility.

Even if costs and characteristics remain constant from period to period the individual will not always choose the same alternative. This is because there is a component of utility for each alternative that varies from period to period.

From the researcher's perspective, one can only determine the probability that a specific alternative will be chosen. This is because each conditional indirect utility function has a random component from the researcher's perspective.

Models are utility-theoretic from both a deterministic and random perspective.

If one uses such a model to just model where one recreates when one recreates, any derived consumer's surplus measures will be "per trip"

Classic consumer theory applied to recreation demand:

The individual maximizes utility over the year or season subject to their budget constraint. The period can encompass many trips. This is standard neoclassical demand theory, as you learned in micro theory, except characteristics are incorporated..

Utility is a function of the number of trips to each site, plus the amounts consumed of other commodities.

So, these models can admit both increasing and decreasing marginal utility. A big plus. Related is the fact that such models can admit compliments.

Income for the year is a well-defined concept.

Assumes trips are perfectly divisible.

Utility-theoretic from a deterministic perspective.

No utility-theoretic reason for why demand function have a random component.

One could divide the year into a number of periods, assuming one can take only so many trips per period, but each period is not a choice occasion as in the repeated discrete-choice models. Utility is maximized over the entire year.

Utility for the year does not depend on when commodities are consumed within the year.

Often one proceeds by assuming the recreational activities and their characteristics are separable from other commodities and estimate partial demand functions for trips to the recreational sites. If one does this, they must be aware that any derived consumer's surplus measure will be a "partial" measure.

For an example of a "classical" model of recreational participation and site choice see Morey, Breffle and Greene, Two Nested CES Models of Recreation Participation and Site Choice: An "Alternatives" Models and an "Expenditures Model: July 29, 1999 -its on the web page.

Characteristics of the alternatives can be included in the utility function.

If one includes the participation decision in the model, there are interesting issues wrt how other commodities and their prices will be aggregated into indices.

Remember that one can specify a neoclassical (Hicks-Allen) model of recreational demand that is not a partial model; that is, one can model both the demand for recreational activities and the demand for other commodities. It just requires more data to estimate a full demand system rather than a partial demand system. Our example in class was a partial demand system (ski areas) but that is not required by the theory.

How would I choose between the two approaches? It would depend on a lot of factors. One

would always like to estimate a complete demand system (include both participation and site choice), so there will be important aggregation assumptions that need to be made with either approach. One needs to figure out the aggregation assumptions that you are willing to make with each approach, and then decide how comfortable you are with each set of assumption. The choice will also depend on how important it is to allow for complementarities between sites, diminishing or increasing marginal utility, indivisibilities, etc.

In the past 20 years or so, the majority of recreational demand models have been discrete-choice random utility models, not neoclassical type models. The move towards discrete-choice RUM models was pioneered in part by Daniel McFadden.