AAE 343 Discussion Section 7

March 8th, 2019

I. Pitfalls of BCA

- Double counting / failing to properly account for opportunity costs
- Sunk costs: previous costs are irrelevant in BCA
- Jobs are a cost! Employed workers are paid the opportunity cost of their labor. Jobs are not created/lost by a project, but rather pull or release workers from other productive activity.
- Gov't revenue: tax or permit revenue is considered a transfer, and therefore not relevant to a BCA.
- Hot topic in policy circles (and recently at my office) currently: co-benefits. Count them? (*Hint: form an informed opinion!)*

II. Valuation Methods

We won't dive deeply into the practice of these methods as they depend heavily on econometrics – not a pre-req for this course. But the idea is to make you familiar with the different approaches to valuing environmental goods and their strengths and weaknesses, so that you can assess the quality of evidence that people cite when arguing for or against environmental policy.

For those interested in learning more about these kind of valuation methods, AAE offers several graduate level courses on the topic, which lead to a couple different 1-year master's degrees… (end of sales pitch).

a. Hedonic pricing

i. Main idea: Environmental goods/bads that do not have prices themselves are often "bundled" into the prices of other market goods. Examples: housing price is a function of local non-market-priced characteristics like school quality, road noise, air quality. A person's wage is a function of non-market-priced characteristics like environmental hazard on the job. We can "back out" the environmental/risk value from wages or prices by controlling for all other characteristics that are bundled into the market good.

ii. When to use: (1) for valuation of local environmental amenities. (2) for measuring risk-based values of statistical life/injury.

iii. Process: (1) Collect data on housing prices/wages, structural characteristics of house/employee (i.e. bedrooms, baths, square footage for housing; or education, experience, etc. for wages), and environmental/risk variables. (2) Use regression to estimate the share of housing price/wage income that is attributable to the environmental/risk variable of interest, *conditional on all other control/structural characteristics*.

$$StatisticalLife = \frac{\Delta Income}{\Delta Risk}$$

$$Value = \frac{\Delta HouseValue}{\Delta Env.Factors}$$

iv. Major issues: (1) Need sufficient variation in the environmental good/risk to measure it's effect on wage income or housing prices. (2) Omitted variable bias: need to properly control for all relevant characteristics, else we risk inappropriately attributing value to environmental good when it should go elsewhere. This is an especially big problem since environmental quality tends to be correlated with other attractive local amenities… (3) The use of this method requires that people be generally aware of local environmental goods/bads or risk on the job. (4) If people sort into neighborhoods or jobs based on environmental or risk preferences, our average estimates may well be biased downwards.

b. Travel Cost

i. Main idea: The cost of admission to a recreation site is more than its sticker price (i.e. a park pass, requisite fishing/hunting permits, etc.). It's also the time and monetary cost of *travelling to* the recreation site. Since people live different distances from these sites, we can use this variation in travel cost as a proxy for price variation, and trace out a demand curve for the recreation site.

ii. When to use: mostly used for the valuation of public recreational amenities like parks, lakes, preserves, etc. Note these are public goods, so the private market value of land will *understate* its value because it doesn't account for the public's recreational values.

iii. Process: (1) Collect data about population of recreational users, number of trips, cost of travel, frequency of trips. This data can be collected on site, or is sometimes collected afterwards by survey. (2) Using this data, derive demand curves (WTP) for site-specific activities from travel behavior. (3) Calculate aggregate net benefit using consumer surplus and the size of the user population:

$$Agg.NetBenefit = CS \times Pop.$$

iv. Major issues: (1) This is really only useful when your valuing people's WTP to a destination. So mostly recreational value. (2) A long-recognized problem when using this method is that people recreate at multiple destinations on the same trip. How to calculate travel costs in this context? A fair bit of more recent work is attempting to deal with this. (3) Sometimes rely on survey responses asking people to recall how many times they visited various destinations of interest in the past year… how reliable is this data?

c. Contingent Valuation

i. Main idea: The straightforward approach: just ask people how much they are willing to pay or willing to accept for an environmental change. Note here, however, that we are eliciting people's stated preferences, rather than their revealed preference. At face value, we're just taking people at their word when they saying they are willing to pay $X.

ii. When to use: This is especially useful when revealed preference data to answer our question of interest doesn't exist. Can construct price and amenity attribute scenarios that don't exist in the real world, and ask people to respond as if it were real.[1] Also, for all notions of non-use values (i.e. *existence value, option value, bequest value, altruistic value)*, this may be the only way to find out people's valuation.

iii. Process: (1) Spend a lot of time writing a survey, wording questions *just right,* so that you can claim to be following the best practices of the surveying science. (2) Spend time and money to collect data using your surveys. (3) Calculate WTP/WTA for your environmental good of interest, and aggregate up over your population. (4) Undertake some statistical analyses to see how your measures vary with covariates of interest (income, demographics, etc.). Ensure your numbers from this analysis pass the smell test.

iv. Major Issues: (1) You're almost always going to start off with skeptics if you're using this kind of valuation – many economists don't believe stated preference work because people don't do what they say they will. This broad trend is called *hypothetical bias*. (2) Many other bias can exist when using CVM. *Framing bias* and the WTP/WTA gap was mentioned on HW#2. *Operational bias* can exist when the person you're surveying has no idea what the environmental good you're asking about is.

[1] Example: How much would you pay to live in a world where the temperature in Madison never went below 32 degrees from March to November? ☺

Problem 1 *Hedonic Valuation.*

1. Madison Water Utility recently found that water from Well 15 have "elevated" levels of perfluorinated compounds – toxic chemicals that are damaging to health[2]. Using recent property sales data only from homes that receive their drinking water from Well 15, could we estimate how much people value drinking water free from PFAs?

2. We are interested in measuring the damages that result from airplane emissions near airports. Using the hedonic property sales approach here in Madison, we argue that properties very close to Truax Field suffer more damages than those further away.

   If we include "distance to airport" as our measure of environmental exposure to emissions, is our damages estimate likely to be a good one? Why or why not? If not- how might we improve our measure?

3. A job with a 1/1000 chance of dying each year pays $20,000/year and a job with a 3/1000 chance of dying each year pays $34,000/year. What is the value of statistical life?

Problem 2 *Travel Cost* - Suppose we want to assess the recreational value of Devil's Lake by the travel cost method. The demand equation is $\text{TripCost} = 30 - 10 * (\#\text{trips})$. The information from our data is shown below.

Origin	Population	#Trips	Trips per person	Trip Cost
Madison	200,000	400,000	2	10
Milwaukee	600,000	600,000	1	20

1. Fill the table below

Origin	Individual Net Benefit	Aggregate Net Benefit
Madison		
Milwaukee		

2. Does the total cost of all trips by WI residents equal the state's annual WTP for Devil's Lake?

TopHat Question 1 Which method would be most appropriate to value a community's WTP for lowered health risks from a local nuclear power plant? (answer graded)

TopHat Question 2 What method would you likely use to evaluate the benefits of Grand Canyon National Park? (answer graded)

[2]Read more here: http://www.cityofmadison.com/water/water-quality/water-quality-testing/perfluorinated-compounds. Potential activists: please keep in mind that MWU is WAYYY proactive about environmental stuff.