

Valuation in Environmental Economics

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Objectives of the Presentation:

- Describe the basic principles of the major non-market valuation methods.
- Illustrate these principles with some relevant applications

Non-market Valuation:

- The objective of the methods described here is to estimate the Willingness to pay (WTP) for the benefits of the policy by the people affected by the policy. This simple statement sidesteps three issues that I will return to at the end of this presentation.

Categories of Methods for Non-market Valuation

- Revealed preference methods - based on observed choices of affected people.
- Stated preference methods - based on responses to hypothetical questions.

Revealed Preference Methods

- Based on identifying the implicit prices faced by people making choices.
- Rational choice implies:
$$\text{marginal WTP} = \text{Marginal implicit price (MIP)}$$
- If the MIP can be estimated, MWTP can be inferred.

Revealed Preference Methods: Examples

- Averting or avoidance behaviors
- Hedonic wage models
- Hedonic housing price models
- Household production models

Cost of Illness as a Proxy?

- If an environmental improvement prevents an illness, the monetary cost that the illness would have imposed on the victim is sometimes used as a proxy measure for the willingness to pay to avoid the illness.
- Costs can include: medicines, doctor's fees, lost wages.
- Leaves out WTP to avoid pain, suffering, etc.

Stated Preference Methods

- Various question formats:
- “How much would you be willing to pay for X?”
- “Would you pay \$Y for X – Yes or No?”
- “Rank or rate the following alternatives”

Issues with Stated Preference Methods

- Controversial
- Are responses reliable?
- Do people have incentives to misrepresent their values?
- Do they have full information about alternatives?
- Are responses affected by the way questions are framed?

Another Issue

- Do respondents have well-defined preferences or do they have to “construct” preferences and values?

An Example - Lead

- What is the value of reducing childhood exposure to Pb?
- EPA has been studying this question since 1985:

EPA, Costs and Benefits of Reducing Lead in Gasoline, Final Regulatory Impact Analysis, 1985.

EPA, The Benefits and Costs of the Clean Air Act – 1970 to 1990, 1997.

The Benefits of Reducing Exposure to Pb

- 1985 Analysis:
 - Effects on Children: avoided treatment costs (chelation); avoided compensatory education costs. Basically a Cost of Illness approach
 - Effects on Adults: avoided medical costs associated with hypertension; willingness to pay to reduce risk of heart attack.

The Benefits of Reducing Exposure to Pb – cont.

- 1997 Analysis: Added effects of elevated blood lead on IQ.
- Monetized by estimating a relationship between IQ and lifetime earnings.

The Benefits of Reducing Exposure to Pb – cont.

- Another study based - on cost of illness:
 - Agee, Mark D., and Crocker, Thomas D. “Parental Altruism and Child Lead Exposure: Inferences from the Demand for Chelation Therapy,” Journal of Human Resources, Summer 1996, v. 31, iss. 3, pp. 677-691

Another Example - Mercury

- What is the value of reducing childhood exposure to Hg?
- See: Gayer, Ted, and Robert W. Hahn. “Designing Environmental Policy: Lessons from the Regulation of Mercury Emissions,” Journal of Regulatory Economics, 2006, v. 30, pp. 291-315.

Another Example – Mercury – cont.

- Based on Hg ingestion by pregnant women and young children leading to reduced IQ and the IQ/wage relationship.

Three Issues

- What Normative Perspective?
- How to Capture Third Party Effects?
- Societal Benefits or Benefits to Parties Other Than Those Affected by the Program

What Normative Perspective?

- Children's Sovereignty? What is the Child Willing to Pay?
- Unattractive:
 - cognitive limits on child's ability to choose
 - whose budget constraint controls choices?

What Normative Perspective? Cont.

- Parental sovereignty – parents' WTP for changes affecting their children.
- Assert guardianship or stewardship responsibilities?
- Parental Altruism?

What Normative Perspective?

Cont.

- Child as adult (what would the child's WTP be if the child was well informed and had the cognitive capacity to make such choices)?
- Difficult to implement. Use benefits transfer based on adults' WTP to avoid similar effects?

Third Party Effects?

For example, if high blood Pb levels lead to violence, crime, or other anti-social behavior, how do we estimate the WTP of those affected adversely by these behaviors?

Societal Benefits?

- Do people have a WTP for ECIs affecting other than themselves or their own children?
- This is similar to the concept of non-use values in environmental economics (e.g.. people's WTP to prevent the loss of an endangered species that they never expect to see).

Societal Benefits? – cont.

- Generally must use stated preferences because there is no behavior (use) to observe.
- An example: see Cawley, John. “Contingent Valuation Analysis of Willingness to Pay to Reduce Childhood Obesity,” Economics and Human Biology, July 2008, v. 6, iss. 2, pp. 281-292.

A Reference

- A useful reference would be:

Organization for Economic Co-operation and Development. 2006. Economic Valuation of Environmental Health Risks to Children.