Benefits Valuation Method:

WILLINGNESS TO PAY

Overview

This method consists of asking a sample of respondents their likelihood to pay money for an environmental improvement (willingness to pay, WTP) or to receive money to avoid environmental harm (willingness to accept, WTA). This method seeks to estimate nonmarket values using stated preferences, with respondents stating their choices in a statistically designed survey. These valuation techniques use survey data to estimate the value of protecting or restoring a resource, such as a specific wetland or a barrier island. There have been countless studies over the past decade that have looked at quantifying environmental benefits provided by restoring coastal features using a stated preference approach.

Generally, there are four stated preference methods with significant overlap in their methodologies, strengths, and limitations. These include contingent valuation, choice modeling or choice experiments, contingent ranking, and deliberative monetary valuation. The four methods are similar in using surveys to ask respondents how much they value a resource directly. Respondents are first informed about the current state of the resource and one or more hypothetical states, for example, a degraded wetland and a restored wetland. Respondents then either rank the options or report the monetary amount they would be willing to pay to obtain the hypothetical state or prevent it from occurring.[1] Demographic information is often also collected to ensure that the survey is representative, and the sampled values are able to be extrapolated to a larger population.

Below is a quick explanation of these four methods and how they differ.[2]

- Contingent valuation (CV): Respondents report the monetary amount they would be willing to pay to obtain the hypothetical state or prevent it from occurring.

[1] Conversely, respondents may be asked to report their willingness to accept degradation or the elimination of a resource. Theoretically, willingness to pay and willingness to accept should provide similar values, but due to "loss aversion," among other reasons, these two values may differ substantially.

[2] A good overview of the first three methods can be found here: Daniel Lew. 2011. "Overview of Stated Preference Methods." NOAA Fisheries.

Case Study

Remoundou and others (2015) carried out a contingent valuation (CV) study on willingness to pay for mitigation measures against coastal impacts from climate change, including beach size as a means to mitigate storm run-up. While storm surge mitigation was more of an amenity value in the survey for beach recreation, one could interpret this attribute as the willingness to pay for reduced flooding from extreme wave events. The stated preference approach can be quite flexible. A researcher can design the approach to estimate the desired values.

- Choice modeling (CM): Same as CV, except respondents are given two or more alternative states with specific costs associated with each. This choice allows researchers to estimate the value for a specific characteristic or attribute. Unlike an open-ended CV, this does not capture total willingness to pay; instead, it presents a lower bound on the willingness to pay for an attribute. Depending on the design, this methodology may overlap with referendum CV or contingent ranking.[3]
- Contingent ranking: Like CM, respondents have several alternatives, except these alternatives are not associated with monetary values. Instead, respondents rank the choices. Notably, this process does not allow willingness to pay estimation but does provide information on the relative preference of different alternatives.

Strengths

For decades, stated preference approaches have been carried out and refined in the academic literature. While they do not rely on or use data from people making actual economic decisions in a marketplace, they can be used as the next-best alternative if implemented carefully. One benefit for stated preference is that a researcher has a considerable amount of flexibility in designing the survey for how they want to estimate the desired values for the project characteristics of interest.

Challenges

Stated preference approaches require setting aside substantive time, and resources, to vet, properly design, and implement. If carried out with a governmental partner, they must receive full-scale federal approval from the Office of Management and Budget. The validity of these methods' estimates is highly dependent on the quality of the survey. Well-designed surveys with larger sample sizes will generate better willingness to pay estimates. The survey should provide detailed information on the resource and ensure that respondents understand the values reported should reflect how much they would and could pay, rather than symbolic value of the resource's worth or what they would like to be able to pay. Therefore, stated preference approaches often require significant time and resources to implement. Pascual and Muradian (2010) lay out some of the limitations of stated preference approaches:

- A divergence between willingness to pay and willingness-to-accept
- An "insensitivity to scope" problem[4]
- Non-use values may not be adequately captured

[3] For more information on deliberative monetary valuation: J. Kenter, 2017, "Deliberative Monetary Valuation." Chapter 34 in *Routledge Handbook of Ecological Economics* (Editor: C. Spash), pages 351-62, New York, Routledge.

[4] People sometimes do not appropriately take into account the degree of the restoration (e.g., small versus large acreage) when estimating their willingness to pay.

Tips

- Seek expertise. Contract with an economist experienced in stated preference methods. An experienced economist will ensure that the results are defensible.
- It is essential to implement proper data collection protocols. These surveys attract attention from economists and the public because values are estimated in a hypothetical choice format. Therefore, this method requires a substantial amount of time to accurately implement because of the nature in which values are derived. Substantive time and resources are required when creating willingness to pay surveys. Vetting question design and wording, selecting hypothetical choice scenario characteristics, determining the sample size, designing aspects to minimize or avoid various biases within the survey, and other survey implementation aspects are critically important.

Additional Resources

Getting Help

- Reach out to our team (*econguidance@noaa.gov*) for specific questions on willingness to pay studies.
- Hire a private consultant or request support from academic partners. Researchers, graduate students, and academic scholars may be able to provide guidance or work directly on your willingness to pay analysis.

Other Resources

Blignaut, J., M. Mander, R. Inglesi-Lotz, J. Glavan, and S. Parr. 2016. The Amenity Value of Abu Dhabi's Coastal and Marine Resources to Its Beach Visitors. *Ecosystem Services*. Volume 19. Pages 32-41. *http://doi.org/10.1016/j.ecoser.2016.04.005*.

Environmental Protection Agency (EPA): Web-accessible materials on ecological valuation developed by or for the Science Advisory Board Committee [report excerpt, *Valuing the Protection of Ecological Systems and Services*].

Landry, C.E., P. Hindsley, O. Bin, J.B. Kruse, K. Wilson, and J.C. Whitehead. 2011. "Weathering the Storm: Measuring Household Willingness-to-Pay for Risk-Reduction in Post-Katrina New Orleans." *Southern Economic Journal*. Volume 77, Number 4. Pages 991-1013.

Petrolia, D.R., M.G. Interis, and J. Hwang. 2014. "America's Wetland? A National Survey of Willingness to Pay for Restoration of Louisiana's Coastal Wetlands." *Marine Resource Economics*. Volume 29, Number 1. Pages 17-37.

Pascual, Unai, and Roldan Muradian. 2010. "The Economics of Valuing Ecosystem Services and Biodiversity," Chapter 5 in *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*, Pushpam Kumar, ed., Earthscan.

Petrolia, D.R., and T.G. Kim. 2011. "Preventing Land Loss in Coastal Louisiana: Estimates of WTP and WTA." *Journal of Environmental Management*. Volume 92, Number 3. Pages 859-865. *http://doi.org/10.1016/j.jenvman.2010.10.040*.

Remoundou, K., P. Diaz-Simal, P. Koundouri, and B. Rulleau. 2015. "Valuing Climate Change Mitigation: A Choice Experiment on a Coastal and Marine Ecosystem." *Ecosystem Services*. Volume 11. Pages 87-94. *http://doi.org/10.1016/j.ecoser.2014.11.003*.