

Accurately Capturing Willingness to Pay (WTP) in Contingent Valuation Studies

EREA CVM Team

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What is CVM?

- Contingent Valuation Methodology is one of the Stated Preference Methods to value non-marketed benefits from project, policies, and programs.
- Stated Preference because value or WTP obtained through direct questioning (survey) and asked explicitly, i.e., lets respondents state their preferences or value
- Value is contingent on a hypothetical market
- This implies:
 - Need to design a survey questionnaire
 - Need to construct a hypothetical market (or scenario)



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Jury finds Exxon, Hazelwood reckless

Verdict means oil company could be liable for up to \$15 billion in punitive damages

By NATALIE PHILLIPS

A federal jury decided Monday that reckless by Exxon Corp. and Capt. Joe Hazelwood led to the 1989 tanker grounding that caused the nation's worst oil spill — which means the oil giant could be liable for \$15 billion in punitive damages.

A dozen fishermen and attorneys sprang leaped to their feet with applause and a cheer as Judge Russell Halliday read the verdict. He reprimanded them with a quick, "Knock it off."

Brian O'Neill, the Minneapolis attorney representing more than 10,000 fishermen, natives and others, wiped tears from his eyes.

The decision, which came after four weeks of testimony and four days of deliberations, centered on Hazelwood's drinking problem and what Exxon knew about it. But the verdict is only the first of Exxon's stock several that the federal jury will have to make. The non-hearing on trial will move on to issues: Was Exxon negligent? How much of damages — how much Exxon should pay — when testimony resumes again next week.

For the moment, though, the plaintiffs were elated. Standing in front of the federal court building with his 1-year-old son in his arms, Patrick Lynch



- State of Alaska vs. Exxon Valdez
- Damage assessment of \$2B (passive use values) from a Contingent Valuation of Carson et. al.

Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez Oil Spill

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Abstract. We report on the results of a large-scale contingent valuation (CV) study conducted after the Exxon Valdez oil spill to assess the harm caused by it. Among the issues considered are the design features of the CV survey, its administration to a national sample of U.S. households, estimation of household willingness to pay to prevent another Exxon Valdez type oil spill, and issues related to reliability and validity of the estimates obtained. Events influenced by the study's release are also briefly discussed.

contributions to economic
analysis

J.A. HAUSMAN
Editor

Contingent Valuation

A Critical Assessment

- Brought also controversy and debate
- Validity of the methodology was questioned
- NOAA Panel produced guidelines for acceptable CVM studies
- These guidelines/standards have evolved through time, but broadly related to the following areas:
 - CV Scenario/ Module design
 - Survey implementation
 - WTP Estimation

Report of the NOAA Panel on Contingent Valuation

January 11, 1993

Kenneth Arrow
Robert Solow
Paul R. Portney
Edward E. Leamer
Roy Radner
Howard Schuman



- Why the debate on the validity of CVM results?
- Associated biases main critique against the method
 - Hypothetical bias (most prominent)
 - There is a difference between hypothetical and actual statements of value
 - Strategic bias
 - Situation wherein respondents are strategizing to influence results with the intention to free ride when the project is implemented
 - Other biases: Payment vehicle bias, Information bias, interviewer bias, sampling bias
- Biases means non-truthful revelation of value or WTP in the survey
- CVM can generate relatively unbiased estimates, but only if certain practices are followed to make the exercise *incentive compatible*

- These guidelines/ recommendations also basis to evaluate reliability and acceptability of WTP estimates and results of CV Study
- Recommendations:
 - CV Scenario/ Module design
 - Survey implementation
 - WTP Estimation
 - WTP Post Estimation: Validity Checks

Bias and Critiques against CVM	Current Best Practices to Mitigate Bias in CVM
Hypothetical bias: difference between hypothetical and actual statements of value	<ul style="list-style-type: none"> • Conduct focus group discussion (FGD) and pretesting of questionnaire • Use of cheap talk scripts or oath scripts • Contingent valuation (CV) scenario must have a well-defined description of a reference level (status quo or baseline) compared with a target level (state of the world with the proposed policy change) of each attribute • Use of referendum approach • Use of debriefing questions to identify protest votes and correction for uncertainty • Assess validity of willingness-to-pay (WTP) estimates
Strategic bias: respondents strategizing to influence results with the intention to free ride when the project is implemented	<ul style="list-style-type: none"> • Well-designed survey questionnaire • Recommended use of single-bounded dichotomous choice (SBDC) elicitation format • Use of provision point mechanism in CV scenario

CV Scenario Design: Description of reference vs. improvements in levels of goods and services

CV scenario must have a well-defined description of a *reference level (status quo or baseline)* compared to a *target level (state of the world with the proposed changes in the good and services or any policy change)* of each attribute of interest.

- Credible and consequential
- Field contextualized/ designed and not generic desk work designs

Comparison of acceptable and poor good/ service description

Project CV Scenario	Gunatilake and Tachirii (2012)
With respect to water supply sector, the project will finance investments in improved water treatment and distribution, including expansion of the distributions system, where required, to improve the quality, quantity, and reliability of the piped water supply	The proposed project will involve sourcing raw water from the river to meet the water demand of households and business enterprises. Water will be treated to make it safe for human consumption . This means sufficient water will be made available to the household, water will be safe to drink from the tap , and therefore will not need boiling, filtering, or treating . Water will be available 24 hours a day with sufficient water pressure, so there would be no need to store water .

CV Scenario Design: Institutional Actors

Institutional actors and those who will deliver the changes in the goods should be clear

How the changes will be delivered, i.e., project components should also be stated clearly

A. Current Context and Problems

The ABC Water Authority (AWA) is mandated to develop and regulate water supply and wastewater. In particular, 70% of households in City A and City B pay water tariffs for their metered connections, thereby, contributing to the bulk of AWA's revenues. However, in recent years, its level of service has been deteriorating with intermittent and inequitable water supply and areas with low water pressure due to lack of maintenance and improvement, i.e., rehabilitation of assets. Leakages in the water distribution pipelines are 10 times the accepted norm, with approximately half of them needing replacement. Nonrevenue water (NRW) from technical losses has steadily increased up to more than 50%.

The leakages in the pipelines are putting an increasing maintenance burden on AWA, particularly in fixing the leaks. As a result of the large NRW in the water distribution networks, all water treatment plants (WTPs) servicing both cities are challenged by the demand for higher volume of water. Most WTPs are currently operating above their design capacity including most of their pump stations. The latter has been operating inefficiently and unreliably because of the steady and increasing backlog in capital maintenance, which needs urgent intervention. The WTPs are also using techniques and processes that do not meet the national drinking water quality standards introduced in 2012. Consequently, the deteriorating quality of tap water in households has been increasing risk to public health.

B. The ABC Urban Water Services Improvement Project and its Benefits

To address these problems, the Government of ABC (GOA) through the AWA Division of City A is planning to implement the ABC Urban Water Services Improvement Project (AUWSIP). The proposed ABC Urban Water Services Improvement Project (AUWSIP) will support water supply improvement in City A through (i) improvement in the efficiency of water distribution network in City A, (ii) repair and upgrading of water treatment plants to meet the national drinking water standards, (iii) rehabilitation of water pumping stations in City A and City B to improve efficiency, and (iv) upgrading of institutional capacity to support the proposed interventions and to ensure sustainable benefits.

Let me now discuss the notable benefits and changes the project will achieve [enumerator shows slide 11 and reads through]

Once the program is implemented, households connected to the new water distribution network will experience an improvement in the quality of piped water. In particular, the tap water will no longer taste and smell bad, and households can now drink directly from the tap. This would save time and costs because tap water will no longer need to be boiled for drinking. There will be adequate water pressure, which would allow households like you to use several faucets simultaneously. Currently, using several faucets at the same time results in low water pressure, causing only a trickle of water out of the faucet. Other household members usually need to wait while one member uses the faucet.

CV Scenario Design: Elicitation Formats

- Elicitation Formats is how the WTP question is asked. This question is asked after describing the goods and services
- Current preference: Single Bound Dichotomous Choice (SBDC) in a referendum format (i.e., Yes-No answers in a voting context) for a randomized bid amount has best understood properties
- However, may not be applicable in many contexts
- Avoid open ended
 - e.g., How much are you willing to pay for the water improvement?
- Whitehead (2000): contingent valuation question as a behavioral intention question, not as a willingness to pay question

*Suppose that the Local government will decide whether to push through with the Water Services Improvement Project through a referendum . **Would you vote** for the Water Services Improvement Plan if it means that you and your family will have to pay an additional amount of ____Rs/hh/mo to be added to your monthly water bill for improved water services?*

YES

NO

CV Scenario Design: Payment Vehicle

- Payment Vehicle (method of payment or mechanism used to collect money from households to finance the hypothetical provision of the good):
 - Inclusive – everybody will be made to pay
 - Credible – legally binding
 - Relevant - likely to be employed in the real-world decision
 - Acceptable/ Neutral – there is no strong aversion to the payment mechanism
- Prefer to use surcharges than changes in total expenditure
 - i.e., would you vote for the program if you would pay an additional \$ 0.50/month
- Duration or frequency should also be clear (e.g., per month, one time payment etc.)

CV Scenario Design: Cheap Talk

- Cheap talk are statements that:
 - Reminding respondents that some people do not truthfully reveal their WTP because of the hypothetical nature of the CV scenario (i.e., effect of hypothetical bias)
 - Reminding respondents of their budget constraint
 - Reminding respondents of substitute goods or services

Example of Cheap talk script

This survey is only meant to get your opinion on whether you would decide to vote for the ABC Water Services Improvement Project (AUWSIP) if it is implemented in your area. **Past studies show that people say YES when asked of their opinion in a survey, but they would vote NO in a real situation. Researchers are not sure why they do this. It could be because it feels good to say yes in a survey when you do not actually have to pay. Or it could be to please the person doing the interview.** However, please try to tell us how you would answer in an actual situation. Please say yes only if you are willing to support the plan to improve the water quality services in your city.

Also please consider your household's capacity to pay. Payment for these improvements means forgoing other household expenditures.

CV Scenario Design: Provision Point

- Provision point rule identifies the decision rule wherein the goods will be delivered
- Addresses issue of free riding behavior (strategic behavior)
- Idea is to make question feel *binding* to respondents

Example of Provision Point

Suppose that the AWA Division of City B decides to push through with the ABC Urban Water Services Improvement Project through a referendum. ***The project will only be implemented if 60% of households will vote for it.*** But with the completion and implementation of the project, people would have to pay higher water bills. If you vote against the plan, your water bills would not increase, but the water service and quality will not improve either.

CV Scenario Design: Debriefing Questions

- Debriefing Questions are Post CV questions that are meant to filter:
 - Uncertainty
 - Protest Votes

Example of Debriefing for Uncertainty

How sure are you that you would pay?

- Very unsure
- Unsure
- Sure
- Very sure

Example of Debriefing for Protest Votes

What is the main reason why you did not vote to support the plan? (choose one option)

- I cannot afford the additional monthly fee
- I am not sure about the sustainability of the plan
- I don't like the additional charges to be added to my water bill
- I don't see the need for rehabilitation of pipelines and water treatment plants
- It is the government's responsibility, not mine, to pay for the project

CV Scenario Design: Debriefing Questions (....continued)

- Debriefing Questions are Post CV questions that are meant to filter:
 - Perception on scenario consequentiality (Price and Policy)

Example of Debriefing for Consequentiality

Do you think the city government would *use the results of this study to set new tariffs and implement the new plan?*

- No
- Yes

How sure are you of your answer in the previous question?

- Very unsure
- Unsure
- Sure
- Very sure

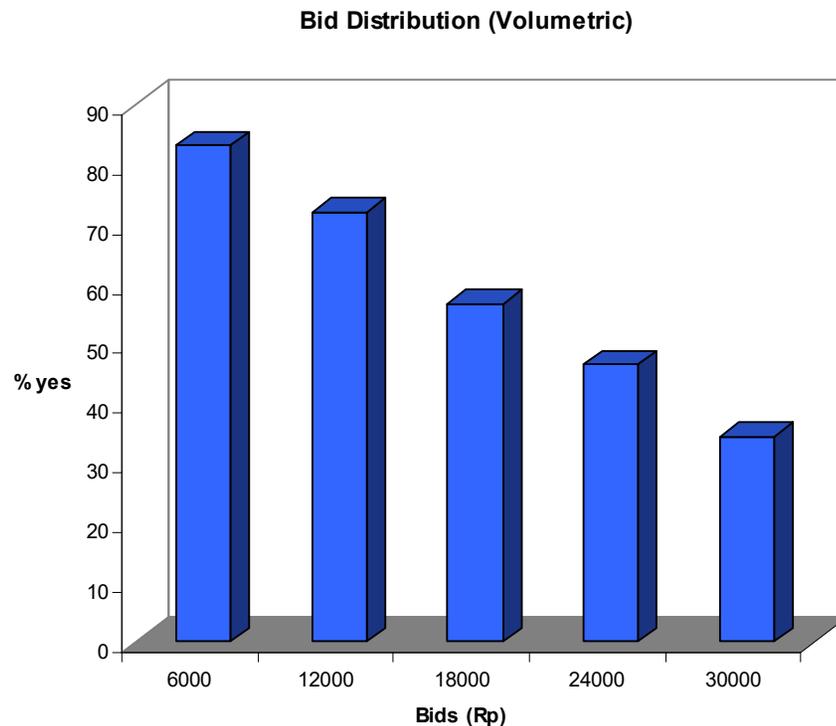


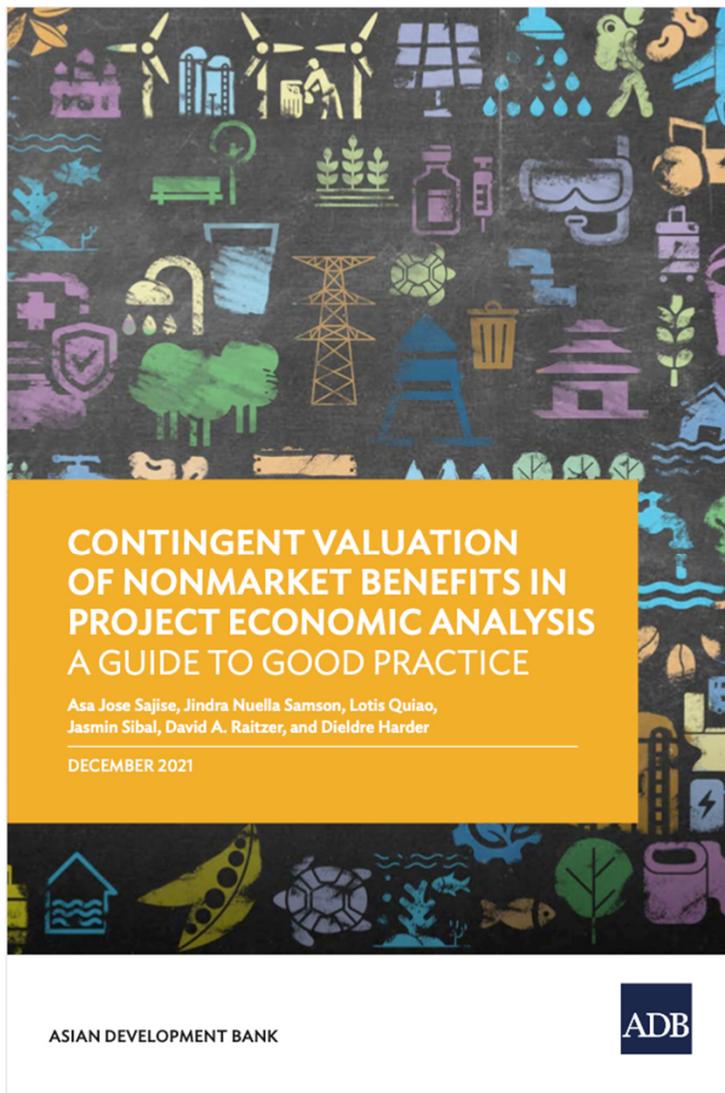
WTP Estimation: Regression

- Choice of regression models should match data generated by the elicitation format choice
 - e.g., Single bound dichotomous choice data should be estimated using logit or probit regression models
- Observation of standard econometric practices
 - Specification tests and model selection should be clear and discussed thoroughly
 - Check signs of regression coefficient are plausible and corresponded with expectations
 - Ensure sufficient sample power to estimate effects of regressors
 - Also, important to report all steps taken leading to the final regression equation

WTP Post Estimation: Validity Checks

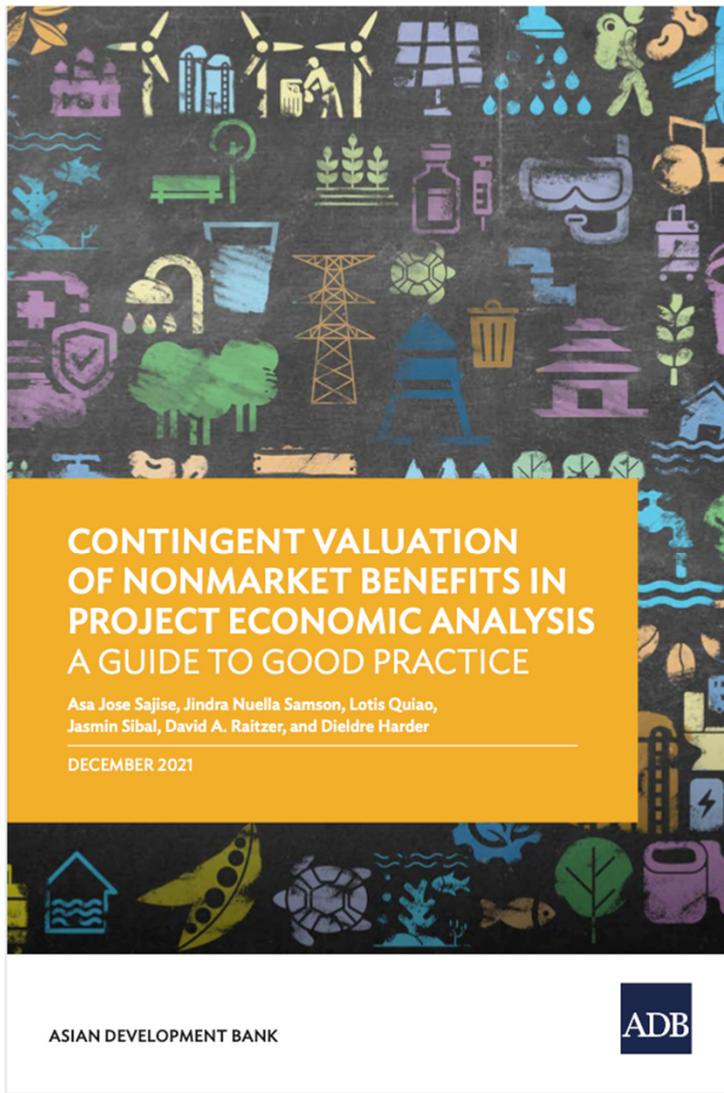
- Check whether results conform to economic theory:
 - Income and WTP have a positive relationship
 - Bid and WTP relationship (Bid Distribution) should be downward sloping, i.e., % yes decreasing as bid increases
- Account for effects of protest votes
- Verify relationship of other variables with WTP (i.e., knowledge of the good, attitudes, etc.)
 - Cross tabulations
- Demonstrate external validity (i.e., comparison of WTP estimates from other methods and studies)





Why follow the guidelines?

- High quality estimates of nonmarket benefits can help inform the design of policies and projects can:
 - Help to determine optimal user charges and tariffs
 - Provide estimates of demand to help determine optimal levels of supply
 - Help in understanding tradeoffs between different project options
 - Serve as a tool in policy dialogue to increase attention to nonmarket goods and services (such as those that arise from natural capital)



Why follow the guidelines?

- ADB conducts numerous thematic CVM studies in different regions, which provides unique opportunities
 - Cross country comparability of studies across similar thematic areas that can inform policy and the even the direction of the methodology
 - A high-quality evidence base of studies could facilitate lower cost use of benefit transfer methods later

Thank you very
much!

