

Application of CV Method into Japan

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1. Contingent Valuation Method

Awareness on environmental issues has worldwide increased in recent years, and numbers of discussions have been made on the method for evaluating environmental damage such as an influence of oil spill caused by tanker accidents. Contingent valuation method (CVM), one of the non-market valuation methods used to assess the value of environmental conditions and assets not directly marketable, like water quality and the ecosystem has been taken note.

In CVM, researchers conduct public questionnaires and ask citizens how much they would willingly pay for environmental improvement and environmental conservation if they could be bought with money. The researchers then statistically process the questionnaire survey data, estimate maximum willingness to pay (WTP) per household, and multiply the WTP by total households to obtain total assessed value for the environment. People are usually asked about their WTP for environmental improvement and conservation. The assessed value of environmental damage (environmental degradation) is thought to essentially correspond to the WTP for prevention against the damage. This is because the maximum amount people are willing to pay to prevent against environmental degradation can be considered the same amount as the loss they would pay if the degradation actually occurred.

2. The case of the Exxon Valdez Incident

As an example, I will introduce the case of the Exxon Valdez incident in Prince William Sound in 1989, which resulted in an environmental damage assessed up to \$2,800,000,000. The state of Alaska conducted an interview survey covering 1,043 households all over U.S. At the first, investigators explained to the respondents about the extent of damages incurred due to the spill. Secondly, they suggested a program that the government would provide escort vessels for oil tankers passing through Prince William Sound for the next 10 years to prevent damage from repeated incidents in the area. Then they asked the respondents how much amount each household willing to pay as the Special Federal Tax to cover the indicated program scheme at once to all basis, using the following questionnaire.

"At present, government officials estimate the program will cost your household a total of \$_____ This money would only be used for the program to prevent damage from another oil spill in Prince William Sound. "

In the actual questionnaire, one of four dollar amounts, \$10, \$30, \$60 or \$120, was randomly selected and placed into the blank space. The investigators asked the respondents if they would pay the indicated amount or not. When the respondents answered "Yes," the investigators raised the amount to \$30, \$60, \$120 and \$250, and then repeated the same question... When the respondents answered "No," at the first question investigators reduced the amount \$5, \$10, \$30 and \$60 and then asked them whether the respondents would pay the reduced amount.

As the result of the survey, the average WTP per household was \$94. And the median of WTP was \$31. Since the yes-no answer formality in this survey was so-called referendum formality, it was determined that median WTP should be used as the reasonable base followed by the past experience. By multiplying the above median WTP by the total number of households in the U.S., the environmental damage from the Exxon Valdez spill was assessed at \$2,800,000,000.

However, during discussion on the result of survey, some structural problem that CVM survey assessed for "Existence Value" but no "Use Value" of the environment, was brought up. In this context, a member of the committee insisted to reduce the original figure by 50%.

Further, the following discussion that CVM contains potential uncertainty, i.e., 1) strategic bias, a tendency of overestimation / under estimation of the respondent, 2) information bias, 3) range bias, a feeling reflected to the figure itself, etc. Eventually, the state of Alaska and Exxon agreed to set the environmental damage at \$1,000,000,000.

3. A damage assessment example on an oil spill in Tokyo Bay

Though there is few example case on AVM assessment in Japan, the following is a case conducted by Takeuchi, Kuriyama and Washida in 1999.* They made a simulation assuming a 15,000-kiloliter oil spill at the same point that the Diamond Grace run aground in Tokyo Bay in 1997. In this case, they defined that 100% damage as the damage that the coast of Tokyo Bay would have incurred if no measures had been taken. The researchers asked the questionnaire to the respondents how much amount they would paid for the response costs if the damage could have been reduced by

* 竹内・栗山・鷺田 (1999) 「油流出事故の沿岸生態系への影響 - コンジョイント分析による評価 - 」『環境評価ワークショップ - 評価手法の現状 - 』筑地書館

certain percentages when some oil spill response (OSR) measures were taken place, including providing escort vessels and deploying oil containment booms.

Conjoint analysis method was applied for the survey. In this particular example, the respondents are presented the following four patterns of oil spill response, and be requested to indicate their first-choice and second-choice responses.

Patterns of Measure	1	2	3	4
Extra Burden (Tax Increase)	¥5,000	¥90,000	¥10,000	¥0
Recreation area including bathing beaches and fishing spots	Protect 93% of the area	Protect 24% of the area	Protect 69% of the area	Protect 7% of the area
Number of person who feel offensive smell or dizziness	Suppress to 0	Suppress to 0	Suppress to 10,000	Suppress to 10,000
Tidal flat	Protect 87% of tidal flat	Protect 40% of tidal flat	Protect 60% of tidal flat	Protect 13% of tidal flat
Fishery harbors	Protect 100% of fishery harbors	Protect 100% of fishery harbors	Protect 66% of fishery harbors	Protect 66% of fishery harbors

The measures were to be taken in the next 10 years, and each household was to bear the cost by paying once for all tax. In the table for one above the tax amount and environmental protection rate were presented to each respondent in different combinations.

The researchers statistically processed these data and calculated the amount of tax increase that each household would accept in return for a 1% increase in protection of bathing beaches and fishing spots, or in return for a decrease of one person troubled by offensive odor or feeling of dizziness. The sums of money calculated, known as the marginal WTPs, are shown below:

	Marginal WTP
Recreation area including bathing beaches and fishing spots (increase of protection by 1%)	¥26
Number of person who feel offensive smell or dizziness (decrease by one person)	¥146
Tidal flat (increase of protection by 1%)	¥182

Fishery harbors (increase of protection by 1%)	¥363
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4. Reliability of environmental damage assessment by CVM

Among the non-market assessment methods, several are based on revealed preference data reflecting on the actual behaviors of citizens. In CVM surveys, the assessment is based on a set of hypothetical WTP (stated preference) data associated with a hypothetical environmental protection indicated in a questionnaire. However, there has been some concern about the reliability of the hypothetical WTP, and manner or attitude for the interview, which will resulted so called a bias problem.

Firstly, we need to classify the nature of environmental damage like a tanker oil spill. The damage to recreational facilities such as contamination of bathing beaches and fishing spots causes "loss of use value," the damage of not being able to use the contaminated environment. On the other hand, for about the issues concerning to destruction of ecosystem, desertification, ozone-hole, some people impute value to a protected environment that they never see or use. This type of value is called "existence value."

Loss of use value can be estimated from behavioral data on actual users. Loss of existence value, on the other hand, can only be assessed through CVM with person-to-person inquiry. When we need to include existence value in environmental damage assessment, we need to use CVM

Secondly, for the reliability of CVM, it has been the subject of many arguments in the U.S. over the years. As a final conclusion to their arguments, environmental economists frequently cite the final report issued by a blue-ribbon panel organized by National Oceanic and Atmospheric Administration.[†] A group of distinguished economists sitting on this panel reached the following conclusion:

"Thus, the Panel concludes that CV studies can produce estimates reliable enough to be the starting point of a judicial process of damage assessment, including passive-use values."

In the above statement, CV means CVM and passive-use value means existence value. According to the statement, CVM is sufficiently reliable to provide a starting value for damage

[†] 'Natural Resource Damage Assessment under the Oil Pollution Act of 1990,' Federal Register, pp. 4601-4614, Vol. 58, No. 10, January 15, 1993.

assessment in judicial proceedings. Of course, the panel listed various points to be noted for conducting CVM surveys and suggested a guideline for reliable CVM surveys.

Today, everyone understands the importance of environmental issues. In Japan, however, it seems to me that comprehensive discussions on the amount of damage from environmental degradation has been confined. In many judicial cases, the existing methods may not provide sufficient grounds for calculating compensation. While CVM may not be 100% accurate, it does provide grounds for calculation in the judicial process, affording both the defendant and plaintiff opportunities to discuss the estimated value of damage and agree on a reasonable settlement. In recent years, there has been an especially strong need to incorporate the opinions of citizens in the policymaking process at national and local administration levels. CVM incorporates only the value assessed by the citizens.

5. CVM applications in Japan

CVM assessment has been developed mainly in the U.S. Several points or difficulties are pointed out while we can expect to encounter when this method is applied in Japan. In doing so, I am not denying the validity of CVM surveys in Japan. Now that CVM is becoming a global standard commonly adopted in Europe, the U.S., and other places in the world, it is difficult for us to remain indifferent to this method. In this sense, we need to think about how to cope with the issues.

5. a. Differences in the environmental regulations and judicial processes between the U.S. and Japan

Impelled by the fact of the "Love Canal case" in New York in 1978, the U.S. government enacted Comprehensive Environmental Response, Compensation, and Liability Act in 1980. Under the act, the government establishes what it calls "Superfunds" to clean up areas polluted by hazardous waste, and then uses the funds to implement the cleanups. The government also identifies the persons responsible for waste pollution, and orders them to pay the cleanup expenses and environmental damage as compensation. The act is usually called the Superfund Act, after the name of the fund.

Ever since the Superfund Act was enacted, polluters have been strictly held accountable, and many lawsuits have been filed to claim compensation for environmental damages. Since then, the term "natural resource damage assessment" has been commonly used for the process.

The Exxon Valdez spill, the worst environmental disaster in the U.S. history, brought

discussions of environmental damage to their peak, and the media took up the matter as a major public concern. Since marine pollution fell under the purview of the Superfund Act, the officials demanded that Exxon pay compensation based on cleanup and natural resource damage assessment. Later, in 1990, the Oil Pollution Act was enacted to cover marine pollution caused by maritime incidents, including oil tanker accidents. This act also uses the notion of natural resource damage assessment to define compensation.

In 1981, President Reagan issued Executive Order 12291. Under the order, a Regulatory Impact Analysis must be conducted in any case where new regulations or amendments of ongoing regulations generate a burden to the national economy of more than \$100 million a year. In effect, this analysis is a cost-benefit analysis. That is, when environmental regulations and other laws and policies cost generate considerable expenses in the economy, the benefit from the environmental improvement achieved through such regulations must be assessed in monetary terms.

In Japan, the Environmental Impact Assessment Law does not require the value assessment of environmental impact in monetary terms. We have no law governing strict business liability or requiring natural resource damage assessment. Moreover, the government has no policy operations equivalent to Executive Order 12291, a legislation based on the value of environment in dollar and cost-benefit analysis.

Given that Japan's legal controls differ from those in the U.S., there may be little room for acceptance of natural resource damage assessment at the judicial level. Such cases may follow the pattern seen in compensation suits involving divorces and sexual discrimination in the workplace, namely, the wide gap between the amounts awarded by Japanese and American judges. Moreover, regarding the assessment of the value of environmental damage, there may be differences between the two countries in the types of judicial processes.

In addition, U.S. society generally adheres to the notion that, based on the principle of public trust, environmental resources are national assets, the citizens are trustees of the assets, and the government, as a trustee of the assets, preserves and manages the resources. Can we say that such a notion exists in Japan?

5. b. Participation of resident for questionnaire survey

In the U.S., referendums are frequently held and people are actively involved in policies at federal and local levels. By comparison, Japan lags behind. If we were to conduct a CVM questionnaire in Japan, I have apprehensions that people would not actively respond. Many Japanese

think of environmental issues as matters to be handled exclusively by central and local governments. If presented with a CVM scenario where "residents purchase a specific environmental improvement," the Japanese might feel it odd. And since the Japanese tend to have a follow-the-crowd mentality, many may feel awkward thinking up an amount to write down without consulting someone else.

Those who have been involved in ordinary commercial research probably can understand the difficulty of conducting mail-in, telephone, or field questionnaires in Japan. For instance, if you conduct a survey with telephone, at what hours should you call the respondent? You can get the household WTP only when the respondent is in with all of his family members. Interview surveys are also much more difficult to perform in Japan than in the U.S.

5. c. The range of existence value

As shown in the example of the damage assessment from the Exxon Valdez spill, concerning existence value, the damage amount is highly dependent on the number of total households multiplied by the average or median WTP per household. There is no denying that some people find value in the existence of something they never use. In Japan, however, it would be very difficult to assess the existence value that the public assigns to an oil-damaged beach...

5. d. Instability of assessed value by time

When assessing environmental damage, the amount assessed immediately after the incident will differ from the amount assessed one year later or three years later. As can be seen in the Europe and the U.S., the final assessed value tends to be influenced by the scale and emotional slant of the media coverage. While the temper of Japanese widely known as "easily warmed up but just as easily cooled down," it is more important to know at what point we should assess the damage and how the assessed value changes over time.

5. e. Lack of fundamental information on the environmental problems

After an oil tanker accident off the coast of California, a suit was filed for compensation for the closure of a beach. The most critical question in this suit was not the reliability of the CVM survey or estimated existence value, but the estimation of the number of people who used the beach per day. The U.S. compiles more environmental data than Japan, including data from surveys of national park visitors, numbers of persons that participate in outdoor recreations, their expenses, the amounts of discharged pollutants, and so on. However, even the U.S. sometimes lacks the basic information mentioned above...

When an incident occurs, we cannot estimate the environmental damage without correctly

understanding the number of people who regularly use the area and the environmental status before the incident. As baseline information in Japan, we need to record the actual usage of each beach and recreation area, the water quality in those areas, and the status of their ecosystems in time sequential order.