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Can Stated Preference Valuations Help Improve Environmental Decision Making?

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Decisions about preservation, protection, or development of environmental "commodities" like ground water, atmospheric visibility, open space, wildlife, wetlands, and forests are often made without good information about the value of preservation relative to the cost. Clearly, the economic cost of preservation is often substantial. The cost of preserving wildlife habitat, for example, often totals thousands of dollars per acre. Difficult choices must be made because protection of habitat for one species may mean less money available to restore habitat for another.

In order to make good choices, better information about the relative value of competing uses is necessary. But, much of the economic value derived from preservation of natural environments falls outside the normal workings of the market. In fact, research suggests that most of the value of preservation is often existence (or passive use) value that can only be measured using contingent valuation, CV, or related stated preference methods (see Loomis, 1996a).

Stated preferences are also important in making decisions that do not involve existence values. Consider the problem of food safety. The potential benefit of irradiated meat and poultry, for example, is likely to be significant because this process reduces the probability of illness caused by salmonella and other pathogens. However, since irradiated meat is not generally available in the market, stated preference techniques offer an effective way to gauge consumer acceptance and willingness to pay for irradiation.

In a stated preference valuation exercise one asks people, within the context of a hypothetical market, how much they are both willing and able to pay for commodities like clean water that are not valued in the marketplace.

Regardless of application, all stated preference techniques employ a survey instrument in which a hypothetical market for the item being valued is created. This market describes the item, reasons why payment is needed, and a payment vehicle. In the traditional contingent valuation approach, survey respondents are typically asked about the amount they are willing and able to pay for the commodity being valued. Other types of stated preference analysis like conjoint and contingent choice also employ a hypothetical market, but respondents are asked to rank, rate, or choose among "commodity packages" that typically contain several attributes, including price (Louviere, Henscher, & Swait, 2000).

Applications

One measure of the importance of stated preferences, SP, in decision-making is the extent to which this method has successfully been used for that purpose. A review of the literature indicates that SP has been used for more than 40 years and during this time well over 2,000 SP studies have been conducted (Carson, 2000). This method has been applied to a wide range of real world problems including water quality, wilderness and wildlife preservation, air quality, health care, and food safety. And, as noted by Carson, most modern SP studies are undertaken for the purpose of policy evaluation. Many federal and state agencies, foreign governments, and international organizations like the World Bank are now using SP. For example, an online nonmarket valuations database, EVRI, has been constructed by Environment Canada in cooperation with the US EPA and others to assist policy makers. As of March 2005, this database contained 757 stated preference studies, of which 290 focus on economic values associated with environmental commodities (www.evri.ca/english/tour.htm).

Perhaps the most widely known application of SP was the Natural Resource Damage Assessment of the infamous 1988 Exxon Valdez oil spill. Since that time, the demand

for SP as a tool for assessing natural resource damages has increased dramatically. Within this context, it is important to note that the courts have upheld the use of contingent valuation in damage assessment and that both the "superfund" and the Oil Pollution Act of 1990 allow for recovery of lost passive use (existence) values.

SP is also playing an important role in policy making with respect to pre-market goods, food safety, certification, and labeling (Cameron & James, 1987). Fox, Shogren, Hayes, & Kliebenstein (1998) examined consumer willingness to pay for irradiated pork, and Shogren, Fox, Hayes, and Roosen (1999) found that about 30% of SP survey respondents would pay a 10% premium for chicken breasts irradiated to reduce the risk of food-borne pathogens. It is interesting that male participants were willing to pay less for irradiated chicken than women and that households with children under 18 years old were less likely to buy irradiated chicken.

In a more recent SP study, Fox, Hayes, & Shogren (2002) examined how consumers responded to alternative descriptions of irradiated pork. Favorable descriptions of irradiation increased willingness to pay and unfavorable descriptions decreased willingness to pay. But, when given both favorable and unfavorable information, consumers gave the unfavorable description more weight and willingness to pay decreased. This pattern is consistent with the concept of loss aversion and alarmist reactions, and seems very relevant in light of recent controversy about food safety.

Contingent valuation studies have also influenced decisions about the reintroduction of Gray Wolves to Yellowstone National Park and salmon restoration in New England. The net economic value of Gray Wolf reintroduction to Yellowstone National Park was estimated to total between 6.6 and 9.9 million dollars per year. This value, which consists entirely of existence value, represented between 22 and 29% of the estimated total economic impact associated with wolf reintroduction (USFWS).

The stated preference method was first used in 1963 to value hunting in Maine. Since then, stated preference valuation has become very popular, in part because it is the only method that can measure so-called passive use or existence values like the value of simply knowing that a particular natural resource exists. However, it is the most controversial of all nonmarket valuation techniques.

Atlantic salmon were virtually extinct in southern New England by the early 1800s. The Anadromous Fish Conservation Act (PL89-304) provided federal funds for salmon restoration, and the first Atlantic salmon to return to this region was spotted in 1974. Since then annual returns have ranged between 100 and about 500 per year and critics of the restoration program have noted that the cost of returning salmon is about $3,000 per pound. However, it turns out that Atlantic salmon produce substantial existence value. SP studies suggest that this value is about 16 million per year for residents of Massachusetts and as much as 81 million dollars per year for New England as a whole. The latter value is about twice that of annualized restoration program costs.

The Elwha River Restoration Project (ERRP) in Olympic National Park is another example where existence values played an important role in decision-making about wildlife. This study included estimates of nonmarket benefits associated with dam removal and salmon restoration. An SP survey asked each respondent if they would vote in favor of an increase in federal taxes over a ten-year period to remove two dams and restore both the river and fish populations. Results for the US totaled about 6.3 billion dollars per year; an amount that substantially exceeds market benefits, as well as program costs (Loomis, 1996b).

Other applications of SP focus on environmental quality. For example, Krupnick and Portney (1991) used willingness to pay data to evaluate the health benefits of reducing volatile organic compound emissions. Since considerable debate surrounds the problem of atmospheric pollution and visibility in wilderness areas and national parks, several SP studies of the value of visibility have been conducted (Smith & Osborne, 1996). One of the most recent (Halstead, Stevens, Harper, & Hill, 2004) examined the relationship between electricity deregulation and willingness to pay for atmospheric visibility in the Great Gulf Wilderness in New Hampshire's White Mountains. Visibility in this area is now about one-third of natural conditions, and visibility may get worse with electricity deregulation if consumers switch to lower cost coal fired generation. The SP question in this study presented each respondent with two pictures. One picture represented the status quo visibility, while the other represented reduced visibility with an option to pay a higher electricity bill to avoid this loss in visibility.

The stated preference methodology has also made important contributions to public policy about groundwater contamination. A Meta analysis of SP studies of the value of ground water protection suggests

that SP value estimates are appropriate measures of economic welfare for use by the US EPA in the design of policy (Boyle, Poe, & Bergstrom, 1994).

From a much broader perspective, SP has been frequently used to value entire ecosystems and wilderness areas. One recent example is a study of National Parks in Portugal (Nunes, 2002). Photo simulation was used to show alternative development/preservation scenarios and a total of 28 survey versions were used to test for effects of information, payment vehicle (a national tax or voluntary contribution), and level of park protection. SP has also been successfully applied to the problems of rain forest preservation, biodiversity, ecosystem management of forestland and wilderness, and open space preservation.

In addition, many applications of the SP method have assisted policy makers faced with local as opposed to regional or global concerns. Examples include analysis of black fly control in Maine, control of noxious weeds in national forests, reduction of fire hazard to old growth timber, urban quarry reclamation, beach quality, kayaking and whitewater rafting, rock climbing, and aircraft noise control.

Assessment

SP has become widely used in policy analysis, in part because it is the only technique that can measure existence value and nonmarket values associated with new policy initiatives. Many of the potential problems initially associated with SP have been overcome. However, this technique is still somewhat controversial; we cannot always be certain of the accuracy of SP value estimates since SP surveys are hypothetical in both the payment for and provision of the good in question. The presence of this so-called hypothetical bias is well documented in both laboratory and field settings. Meta analysis conducted by List and Gallet (2001) and by Murphy, Stevens, Allen, and Weatherhead (2005) suggests that mean hypothetical values are about 2.5 to 3 times greater than actual cash payments. Unfortunately, although this bias is well known, its underlying causes are not well understood. Possible reasons for hypothetical bias include lack of consequence associated with

an individual's response, desire to increase the likelihood that the good is provided at little or no personal cost, and respondent uncertainty or ambivalence. Of particular concern is that hypothetical bias is associated with private as well as public goods, and this suggests that the underlying causes of hypothetical bias may be quite complex.

Although the exact nature and cause of this bias remains unknown, several promising techniques have recently been developed to adjust for it. Of these, uncertainty adjustment appears to offer considerable promise. This approach assumes that those who are uncertain about their "yes" response in a hypothetical setting are likely to respond "no" when confronted with a real payment situation. Although validity tests indicate this assumption is often reasonable, determining the exact level of certainty to use seems to vary with the nature of the public good. An alternative approach pioneered by Cummings and Taylor uses "cheap talk" to reduce hypothetical bias. This approach entails reading a script that explicitly highlights the hypothetical bias problem before participants make any decisions. Although cheap talk may sometimes eliminate hypothetical bias, recent research suggests that it may only do so for respondents facing relatively high payments (Murphy, Stevens, & Weatherhead, 2005). Consequently, research associated with the problem of hypothetical bias continues and policy makers are advised to exercise caution in application of SP results when many respondents are uncertain.

Another unresolved issue from the perspective of policy analysis involves the interpretation of SP responses. Several studies have suggested that some respondents fail to make meaningful tradeoffs. These individuals may, for example, refuse to make tradeoffs between money and wildlife on the basis of ethical or moral grounds. Yet, these same individuals often appear to place a very high value on wildlife preservation. Others may base payment decisions on the notion of paying their *fair share* instead of what the commodity is really worth to them. Another potential problem is that some respondents may be paying for something other than what is being valued. When asked to pay for atmospheric visibility, some individuals appear to be paying for environmental quality in general. And, some may simply be paying for a *good cause* when the cause itself does not really matter to them.

Another concern is that since the various stated preference methods differ in several respects, value estimates may vary depending on which technique is used (Stevens, Bellner, Dennis, Kittredge, & Willis, 2000). For example, the hypothetical market in conjoint analysis focuses on the various attributes and characteristics of each commodity, substitutes are made explicit and in comparison with the traditional CV approach, respondents can express ambivalence or indifference directly. Moreover, from a psychological perspective, the process of making choices in a conjoint format may be quite different from that associated with making decisions about willingness to pay in a traditional CV setting. As a result, several studies suggest that there may be substantial differences in value estimates depending on the type of stated preference methodology that is used (Stevens et al., 2000).

Yet, despite these problems, CV is the only method that can measure both existence values and the impacts of policy that has not yet left a significant trace in the marketplace. CV has been subjected to intense scrutiny by industry, academics, government agencies, and the courts. The accumulated evidence clearly suggests that CV is a very useful methodology for decision-makers. This is especially true in making assessments between potential policy alternatives before any policy commitment has been made. For information to be of use in real world policy making, decision makers need to know the likely economic effects of a policy change before they occur. That is, the policy change comes first and changes in economic behavior follow. In such situations, it is difficult to use valuation methods based on observations of actual behavior such as travel costs or avoidance cost, because the policy is intended to change behavior. In evaluating these new policies, or in cases where existence values are likely to be significant, stated preference methods are of particular importance to decision makers.[1]

For More Information

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