

Editorial Note: This is a revision of one of the papers read at a conference on Wilderness Areas in October 1994. The scope of these meetings was explained in the Summer 1995 Special Issue. The reader may also wish to examine the Perspectives guidelines on the inside back cover.

Existence Value, Contingent Valuation, and Natural Resources Damages Assessment

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ABSTRACT The purpose of this paper is to review recent developments in economics and public policy with regard to environmental resources. We describe the traditional concepts of externalities, public goods, efficient property rights, and the more recent concept of existence values for wilderness areas and other natural resources. A feature is the inclusiveness of modern economic theory. We trace the development of economic approaches to estimating values. We briefly review approaches based on observable market behavior and contingent market responses. Contingent valuation plays a vital role in estimation because it is the sole technique available for estimating the potentially important existence values. Benefit-cost analysis for regulatory decisions and natural resource damages assessment for implementation of Superfund legislation are discussed. We conclude that estimates of existence values based on contingent valuation can be useful especially when the alternative is greater reliance upon an imperfect political process.

A Modern Economic Approach to the Environment

INDIVIDUALS CONTINUALLY MAKE CHOICES WHICH REVEAL THEY ARE WILLING to exchange something they value for a better natural environment. People choose to live in remote, wooded environments which they treasure even though they must commute loathsome distances to work.

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Societies continually make choices which demonstrate that collectively people are willing to sacrifice for a better natural environment. Higher rates are paid for electricity in order to have cleaner air and to preserve more wetlands in areas with coal deposits. Valuable forest land is set aside as wilderness area. Choices are made between a standard of living measured by consumption of produced goods and a quality of life which includes the amenities related to environmental and natural resources. Choices are made between collective enjoyment of environmental services and other desirable services including public enhancement of health, education, and freedom.

Economics can provide part of the basis for making good choices which affect natural resources. When scarcity requires that difficult tradeoffs be made between environmental goods and other desirables, economics can be useful. An inherently desirable feature of environmental economics is balance. An economic approach is neither pro-environment nor anti-environment. Rather, it is pro-environment in situations in which the value of the environmental improvement is relatively high and it is anti-environment in situations in which the value of the environmental improvement is relatively low. The purposes of this paper are: (1) to sketch, in a nontechnical way, principles of environmental economics and approaches taken to estimate values, or benefits, of environmental improvements, (2) to offer a policy perspective on the economics and politics of contingent valuation (CV) used to estimate existence values for wilderness and other natural resources, and (3) to discuss some current controversial issues in CV and environmental policy. Our intention is to provide an overview for people who are not doing research in environmental and resource economics and to offer our assessment. More technically-minded readers may want to consult the literature survey by Cropper and Oates (1992) or the reference book by Freeman (1993). These sources, as well as others listed in the references, address issues such as econometric specification and survey design. We conclude that estimating existence value is a challenge because the current state of the estimation art is imperfect. However, political alternatives to benefit estimation are highly imperfect too. We argue the combination is better than either taken alone.

Economic Concepts Useful for Environmental Issues

Efficiency and Market Failure. An insight of Adam Smith's (1776,1976) is that a smoothly functioning, competitive market economy produces outcomes that are, in one important way, socially desirable. Any reallocation of resources among producers or consumers in such a market society cannot improve one individual's state without making someone else worse off. The value of the size of the "economic pie" is as large as it can be if we are not willing to redistribute

away from some individual without full compensation. This achievement of a market economy is what Smith used to explain why some societies grew wealthier while others did not.

The efficiency produced by a smoothly functioning market economy is referred to as the Fundamental Theorem of Welfare Economics because this concept serves as a point of departure for policy analysis; see for example Rosen (1995). If markets are not producing the desired efficient outcomes, something must be wrong with individual consumption and production decisions. Causes of inefficiency are referred to as sources of market failure. Externalities may be costs, such as when woods cleared by one leads to erosion which pollutes a stream which runs by another's home. Or externalities may be benefits, such as when an owner leaves unspoiled a habitat for wildlife that is enjoyed by others and increases the wildlife on their land also. Too much clearing tends to take place with the external cost and too little preservation tends to take place with the external benefit. The related concept of a pure public good can be thought of as the limiting case of an external benefit; once the public good is produced then all individuals collectively can enjoy the benefits of it. Everyone can consume knowing the bald eagle is flourishing and is no longer on the endangered species list. Together, poorly defined property rights and high costs of making transactions can prevent external effects from being considered through private arrangements.

The idea of a smoothly working market economy producing socially desirable outcomes provides a framework for policy analysis. If bad outcomes are observed with clearly too much environmental degradation for what is received in return, then a market failure must exist. Policy can be designed to remedy the market failure through bans, regulations, pollution taxes, abatement subsidies, marketable permits, information programs, clarification of property rights, and other environmental policies. Policy prescriptions follow from the framework of market functions and market failures.

Use Value and Existence Value. Even more relevant to the purpose of this paper, however, the economic framework provides concepts of value. They are values of environmental changes or preservation actions. Values for producers are based on the changes in cost or profit functions and are denominated directly in monetary units. For example, the value of improved water quality to a tour boat operator on a river is reflected in increased net revenue.

Values for consumers are based on individual preferences reflected in their utility functions. These preferences depend not only on the standard goods such as food, housing, and entertainment, but also on the broad array of factors which determine quality of life. Among the factors would be environmental amenities, the state of natural resources, and other things outside the traditional scope of

marketed goods and services. Whatever makes the individual better off, in a way that the individual is willing to give up something for it, is an economic good. Whatever the individual is willing to give up is its value. The inclusiveness of this approach is captured by Becker in his Nobel lecture:

Unlike Marxian analysis, the economic approach I refer to does not assume that individuals are motivated solely by selfishness or material gain. It is a method of analysis, not an assumption about particular motivations. Along with others, I have tried to pry economists away from narrow assumptions about self-interest. Behavior is driven by a much richer set of values and preferences (Becker 1993).

Nothing in the economics approach precludes values for nonmarket goods such as environmental amenities.

From individual preferences are derived the concepts of values used in environmental economics. These values allow a broad definition of self-interest which goes beyond simple material gain. On-site use value is the maximum amount an individual is willing to pay for enjoyment from visits to the natural resource. It is the value of fishing or backpacking in a particular location, for example. Off-site use value has historically been called existence value or non-use value, and more recently passive use value. It is the maximum willingness to pay for preserving the natural resource even though the individual does not visit the site. Existence value allows for value which a person may have for simply intrinsic worth, altruism, or bequest. As long as the individual cares about the resource and is willing to give up something else which is valuable in order to avoid a change in the environment, then the value matters for public decisions.

Use and existence values of the environment are anthropogenic by definition. They are the values to humans of the improvements, or damages avoided, in the environment. Economic value can include human value of cleaner water and better habitat for fish, but it is human value. The economic values are inherently useful because our human values determine how we allocate our resources. Whether by private consumption and investment decisions or by public consumption and investment, it is our human, economic values which we use to make decisions when tradeoffs must be made.

Use and existence values of the environment are teleological and utilitarian by their nature (Brandt-Rauf and Brandt-Rauf 1980). While the economic values can be influenced by moral code, they should be contrasted with deontological rights, or values, which rely upon an overarching moral code for guidance in making decisions. Deontological values are often applied in such a way in environmental policy as to render them impractical for making decisions. While deontology can make effective environmental rhetoric, it ignores marginal benefit-marginal cost analysis. Instead, it encourages a wasteful all-or-nothing

approach. Economic values facilitate choosing the most efficient of available alternatives. They are the amounts individuals are willing to pay, the amounts they are willing to trade off, to get the environmental improvement.

How Human Values of the Environment Can Be Estimated

Benefit estimation for environmental and resource improvements has been emerging especially over the last 30 years. The value concepts and techniques for estimating values are grounded in economic theory. As Harberger (1971) postulated, we know that if a market exists for the environmental good, at least as a first approximation, we can use the market price to value marginal changes. For non-marginal changes in the environmental commodity the area under the demand curve would be a more appropriate measure since it allows the value to change with changes in the quantity. The challenge is that environmental and resource goods, such as wilderness areas, are not often traded in typical markets with observable prices; usually they are nonmarket goods.

Implicit Markets for the Environment. People reveal their values for environmental goods through the purchases of related goods for which markets exist. Through analysis of these markets, implicit values for the environmental goods can be estimated. For example, individuals incur costs of money and time to travel for recreational and ecological experiences. The fact that nearby users face lower travel costs and visit the site more frequently than distant users who face higher travel costs and visit the site less frequently allows estimation of a travel demand function for the recreation site. If travel and travel cost vary systematically with the environmental characteristics of the destination site, then people reveal how much more they are willing to pay for ecologically richer environmental experiences. Difficulties arise in valuing the time cost which is incurred and in incorporating possible alternative recreation sites. Nonetheless, the technique has been widely applied in various forms and enjoyed considerable success; see Smith and Kaoru (1990).

Housing and property markets can reveal implicit values for environmental goods. Houses in neighborhoods with cleaner air, along rivers with cleaner water, and further from hazardous waste sell for higher prices. House values depend greatly on structural characteristics such as interior living space and number of bathrooms and other neighborhood characteristics such as crime and schools. But, as long as the effects of structural and neighborhood factors which determine housing prices can be isolated, values associated with the more desirable environment can be estimated. The demand on data quality and detail is great and the task of estimating the values of large changes in environmental quality can limit the usefulness of this approach, but it too has enjoyed considerable success; see Smith and Huang (1995).

Jobs which are located in environments with cleaner air and fewer hazardous materials and preferred climates will attract people to work for lower wages. Wages depend greatly on education, occupation, and experience. But, as long as the effects of these factors which determine wages can be isolated, values associated with the jobs in the more desirable environment can be estimated. Again the demand on data quality and detail is great, but this application of the implicit market approach has enjoyed some success also; see Clark and Kahn (1989).

A hybrid of these two implicit market approaches combines the housing and labor market analysis in a multi-market analysis. When comparing differences in environmental characteristics across different regions, the implicit values for the location-specific characteristics can be revealed in a combination of differences in housing prices and wages. The implicit values for environmental characteristics are a combination of the values implied in the two markets (Roback 1982; Blomquist et al. 1988).

Contingent Market Valuation: A Direct Questioning Approach. The idea behind the contingent market approach to estimating values of environmental improvements is straightforward. If explicit or implicit markets for environmental goods do not exist, create hypothetical markets and ask people what they would be willing to pay contingent upon the existence of the markets, i.e., contingent valuation. This direct questioning approach uses some well-established survey techniques, but also uses techniques developed specially for eliciting willingness to pay for environmental goods. Crucial to the approach is the establishment of a so-called contingent market in which individuals are presented with a defined environmental good, told how they would pay for it, and asked if they would make purchases by giving up some of their own income out of their own household budgets. These questions are different from naive poll questions which ask essentially if people would like a cleaner, more robust environment if it were free to them.

While Hanemann (1992) mentions that the technique was suggested in the late 1940s, its importance to environmental and resource economics grew rapidly in the 1970s when it became apparent this technique had potential to estimate existence values. Contingent valuation was, and is, the only approach which can capture existence values. Partly through encouragement and funding by the U.S. Environmental Protection Agency the development of CV methods progressed rapidly; see Council on Environmental Quality (1983), Cummings et al. (1986), and Mitchell and Carson (1989). Questions have been raised about the usefulness of CV, however, since the values are revealed through behavioral intentions and not actual, observable behavior.

Political Economy of Benefit Estimation in Environmental Policy

The Use of Estimated Values of Environmental Goods in Public Decisions.

The primary function of estimated values has been to facilitate economic analysis of environmental policy and policy proposals. At the federal level economic analysis has evolved from the occasional inflationary impact statements during the Ford Administration, through the cost-effectiveness analysis of the Carter Administration, to the full benefit-cost analysis of the Reagan, Bush and Clinton administrations. Currently under Executive Order 12866 on Regulatory Planning and Review new regulations and review of existing regulations should: (1) seek to correct market failures, (2) consider all benefits and costs of regulations, and (3) select a regulatory approach so as to maximize the net benefits to society; see Council of Economic Advisors (1994). This requirement for economic analysis has brought benefit-cost analysis into the rulemaking process for environmental and resource policy except where prohibited by law. The role of estimates of values, or benefits, of environmental goods has become institutionalized and more central to decision making.

What is more recent and more controversial is the use of CV to estimate the existence values for resources damaged by commercial activity. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also known as Superfund, and the Oil Pollution Act of 1990, provided governments the right to sue for damages to publicly-owned natural resources such as wilderness. When the scope of damages is expanded from lost revenue by people who make a living by using the natural resources to the loss of existence value by people who do not necessarily ever visit the site, the amount of damages potentially increases many times over. A great deal of the controversy surrounding the damages from the Exxon Valdez oil spill in Alaska is due to the use of CV for existence values in damages assessment and the large dollar amounts involved; see Kopp and Smith (1993) and Carson et al. (1994). While the use of CV to estimate existence values in benefit-cost analysis of environmental regulation and policy affected society's allocation of resources, their use in natural resource damages assessment (NRDA) made their importance highly visible. Unlike environmental regulations which affected industries and consumers in sometimes subtle ways, large damage costs were assessed to specific firms rather swiftly. At least in terms of concentrated damages or costs of environmental policy, CV and existence values attracted enormous attention.

Benefit Estimation and Contingent Valuation in Court. Implicit market valuation for on-site users of environmental goods has been accepted relatively well. The basic revelation of individual preferences through travel demand, and differences in housing prices and wages is accepted as the inherent strength of

these approaches to estimating benefits. Skepticism developed, however, about the accuracy of CV estimates of existence values. A desirable development was the recruitment of several highly successful scholars to work on environmental benefit estimation for the first time. They brought fresh looks at the research and estimation which had grown in the new area. Accompanying this introduction was an apparently ample array of research budgets to fund research related to the theory and empirical techniques used by environmental and resource economists to estimate values. The Cambridge/Exxon group especially brought about a revisiting to some issues in CV which deserved further examination; see Hausman (1993).

A further desirable development was the formation of a prestigious panel of scholars to advise the government, in this case the National Oceanic and Atmospheric Administration (NOAA). Under the Oil Pollution Act of 1990, NOAA has responsibility for damages due to oil spills. The NOAA Contingent Valuation Panel addressed economic benefit estimation and particularly the use of CV to estimate existence values, or what they called passive use values. The penultimate question concerned whether or not CV could give reliable measures of passive use values (Department of Commerce 1993).

An undesirable consequence of the heightened awareness of CV is that it has placed a new demand on the courts. The current legal system is not the most efficient institution for dealing with scientific issues in general, and issues surrounding the reliability of nonmarket, including contingent, valuation in particular. DNA tests, for example, are thought to be reliable in most settings, but in court they are questioned severely. Uncertainty is inherent in CV and any other approach to estimating values for environmental changes, and the adversarial courtroom process is not especially adept at coping with it (Duffield 1995). As Meier (1986) points out, experts are hired by opponents, not the court, and act as client's advocates. Science often proceeds with inference based on probability models, yet, uncertainty often pervades the understanding of an environmental phenomenon. As Meier observes, unfortunately, the unedifying spectacle of well-qualified experts providing analyses they interpret oppositely presents itself. Pioneering debates about the reliability of research techniques are carried out following the rules of the court rather than the norms of the profession. In our society, in which litigation is common, advocacy is usual. What is notable is the perception that some researchers involved are mixing their professional roles; they are performing a service as an advocate for their client and seemingly performing as objective technicians simultaneously; see Jenkins-Smith (1982). To people accustomed to the norms of the professional societies in economics, the Cambridge/Exxon critique appears anomalous (Randall 1993).

Regardless of the desirability of the means, the end result of the critique of CV and benefit estimation is likely to be desirable. The thought-provoking arguments and evidence presented have already prompted further research in benefit estimation. This new work has led to a deeper appreciation for the degree to which existence values can be estimated accurately and to a better understanding of methodology and techniques that produce reliable estimates.

Reliability of Contingent Valuation Estimates for Environmental Policy

Based on the NOAA Panel recommendations NOAA and the Department of the Interior (DOI) are developing guidelines for the conduct of CV studies for damages assessment under the Oil Pollution Act, Superfund, and the Endangered Species Act (Department of Commerce 1994; Department of the Interior 1994). The NOAA Panel made several recommendations for NRDA to be reliable (accurate). The least controversial recommendations are that contingent market design should incorporate the referendum framework and that CV data should be representative of the population. Several questions regarding the practice of CV are being considered by NOAA and DOI. Some of the more controversial issues concern internal validity, information provision, the familiarity of respondents, and the "calibration" of existence values. Other research issues, which were not emphasized by the NOAA Panel, remain of interest. For instance, studies on appropriate question format, survey design, and CV econometrics can be found in recent issues of journals such as the *Journal of Environmental Economics and Management*, *Land Economics*, and *American Journal of Agricultural Economics*.

Internal Validity. The internal validity issue concerns whether the value concept behaves according to economic theory. For instance, since most environmental goods are thought to be normal goods, the value measured by CV should increase with increases in income. The value concept should also increase with increases in the quality and quantity, or scope, of the affected environmental good; see Diamond and Hausman (1994) and Hanemann (1994). The empirical evidence of the internal validity of CV is contradictory. For instance, Loomis et al. (1993) and Carson and Mitchell (1995) for Australian natural resources, and Whitehead (1993) and Loomis and Larson (1994) for protection of marine wildlife species, find that contingent values have significant scope effects. In some of our own research, we find that contingent values vary significantly with the quality of wetlands—a significant scope effect (Blomquist and Whitehead, forthcoming). On the other hand, several studies find that significant scope effects do not occur. Some problems which have been identified that may hinder the finding of scope are warm glow effects (Kahneman

and Knetsch 1992), part-whole bias (Boyle et al. 1994), and embedding (McFadden 1994).

The current research shows that a CV study can, but may not always, detect scope effects. Other internal validity tests concern important theoretical determinants of contingent market values such as income, own-price, and cross-prices (Whitehead et al. 1995). A common result is that willingness to pay increases with income, which is evidence of internal validity. McConnell (1994) emphasizes that CV respondents do tend to behave rationally in referendum contingent markets, passing the most basic of internal validity tests by being more likely to refuse to pay higher and higher policy, or opportunity, costs. These results from basic internal validity tests for income and price should be remembered along with some of the less supportive evidence on scope.

Information Effects. The NOAA Panel also recommends that contingent markets should provide enough information that respondents are aware of the characteristics of the natural resource, available substitutes, and their own budget constraints. Again, the empirical evidence on this issue is mixed. Bergstrom et al. (1990) and Blomquist and Whitehead (forthcoming) find that information about quality does affect contingent values for Louisiana and Kentucky wetlands, respectively. Whitehead and Blomquist (1991) find that willingness to pay changes with information about different related environmental goods. However, Boyle (1989), Boyle et al. (1990), and Loomis et al. (1994) find that information about quality, substitutes, and budget constraints does not affect contingent values in expected ways. The interesting research question becomes: Under what conditions does information affect CV response? As Magat and Viscusi (1992) demonstrate in their research about product labels, the effect of information can vary with the survey format chosen. Without consensus, and in terms of contingent market design, additional information presented to respondents in some form may be necessary in order to improve the validity of responses.

Familiarity. Environmental issues can involve obscure natural resources about which people have no prior information until it becomes a political issue. Boyle et al. (1993) and Whitehead et al. (1995) find that respondent familiarity is a key determinant of the quality of contingent market responses. In further analysis of the results found by Blomquist and Whitehead (forthcoming), significant scope effects are found for familiar respondents, however, those respondents who were unfamiliar with the resource before the survey exhibited insignificant scope effects (these results are available upon request from the authors).

In general, respondents who are more familiar with the resource allocation change under consideration are more likely to behave rationally in contingent

markets. This result may partially explain the lack of scope effects found by Boyle et al. (1994) and McFadden (1994), who analyze data with respondents who are relatively unfamiliar with the resource allocation change.

The current policy debate concerns the aggregation rule for NRDA's. One position is that since contingent values are valid when even unfamiliar respondents are given appropriate information, then benefits should be aggregated across the entire population for efficient policy. Another position is that since no welfare change has occurred for unfamiliar respondents after environmental damage, benefits should be aggregated only over the portion of the sample that is familiar with the resource allocation change. This position is that even if unfamiliar respondents were educated by contingent market information and could behave rationally in contingent markets, no welfare change has occurred. Ultimately, the answer lies with the initial implicit property rights allocation, an issue that is difficult to resolve using economic theory; see Bishop and Welsh (1992).

Calibration. Perhaps the most controversial issue concerns the measurement of existence values. Since existence values lead to no observable behavior and have not been measured without CV, it is difficult to ascertain their external validity. Much published evidence has been assembled which suggests that the correlation between hypothetical transactions in contingent markets and actual transactions in experimental or simulated markets is not equal to one for private goods; see, for example, Cummings et al. (1995) and Neill et al. (1994). Cummings and Harrison (1994) and Diamond and Hausman (1994) argue that contingent market environmental values are inherently greater than true environmental values and that a downward calibration factor is needed for contingent values. Presumably, the bias is due to the hypothetical nature of contingent values which people do not have to pay actually. This idea is not accepted universally.

Some economists are grappling with methods for calibrating existence values revealed through behavioral intentions with revealed behavioral values. Two approaches to calibration have been suggested. The first involves the joint estimation of contingent values and implicit market values for on-site resource users (Cameron 1992; Adamowicz et al. 1994). For off-site resource users Larson (1993) and Whitehead (1995) have suggested tests for consistency between existence values and revealed behavior. Another calibration approach is the statistical bias function which has been developed by experimental economists (Blackburn et al. 1994).

Our brief review of some controversial issues suggests that the validity and reliability of CV to measure existence values are still in dispute. Naturally, further research is needed to resolve satisfactorily some of the problems

encountered when measuring existence values with CV. We have identified studies with findings that suggest valid existence values stated by respondents who are familiar with the natural resource can be measured. Several studies provide evidence of the opposite result, however. Perhaps the difference in results is because respondents who are unfamiliar with the resource do not always pay attention to scope or their budget constraints when making willingness-to-pay statements. One conclusion from the conflicting evidence might be that existence values do provide information about the preferences of nonusers, but at times, the correlation between true willingness to pay, or revealed behavior, and stated willingness to pay, or behavioral intentions, is not perfect. Research which investigates this correlation is likely to be fruitful in terms of environmental policy.

Why Imperfect Estimates of Environmental Values are Useful in Environmental Policy

Economics can provide part of the basis for good environmental and natural resource policy when scarcity requires that difficult tradeoffs be made between nonmarket environmental goods, such as wilderness amenities, and other market and nonmarket goods. An inherently desirable feature of the environmental economic approach is balance; it is neither pro-environment nor anti-environment. Environmental theory and valuation methods facilitate identification of situations in which the value of the environmental improvement is relatively high and situations in which the value of the environmental improvement is relatively low. Modern environmental economics is a practical framework which can be used to find middle ground for fundamental environmental and resource policy problems. The framework can be used to develop balanced policy for potential oil spills in pristine waters, clear-cutting of endangered species habitat, or mining of wetlands.

Existence values estimated by CV reflect behavioral intentions motivated by a rich set of preferences such as intrinsic worth and altruism. We have given examples of several recent empirical applications of CV in which values are reliable for people who are familiar with the environmental good, whether they are familiar through prior information or information acquired through the contingent market. Clearly, CV estimates are not random values; they can be internally valid and reliable. Clearly also, they can be unreliable. Contingent values, especially existence values, are imperfect sources of information on a vital aspect of our natural world. Should they be ignored in public policy decision making?

The economic concept of a substitute, an alternative, is crucial to understanding why the CV estimates of existence values matter. Diamond and Hausman

(1993) argue that existence values estimated through CV are so imperfect that decisions should be left to the political process. But the political process is imperfect also. While few would advocate replacing the democratic process, it has recognized shortcomings. Voting cycles, agenda setting, lobbying, and externalities caused by geographic-based representation are evidence of the imperfections in the political process in producing socially desirable outcomes. The journal *Public Choice* provides numerous examples that rent-seeking people attempt to use government for their own, rather than the common, good. The budget problems of federal and state governments indicate the difficulty of heavy reliance on votes and polls to deal with complex issues involving choices forced by scarcity. We think the problem is more than free riding. Revelation of people's values for environmental commodities will be imperfect whether it is through political markets or contingent markets.

Public decisions informed by the best estimates from reasonably valid contingent markets are likely to be better than public decisions without these imperfect estimates. A portion of the protest against imperfect CV estimates is a desirable consequence of the impact of existing environmental policy in inducing individual decision makers to consider the full impact of their choices when potential environmental effects exist. To the extent people who do use the Prince William Sound off site are willing to pay for higher expected environmental quality in the sound, users such as Exxon must now be considering how much it might be worth to those passive users when they make shipping decisions. The challenge is to continue improving the estimates of the values of these off-site users so neither too little nor too much of the desirable activity is sacrificed in providing the optimal environmental conditions. It could be that troublesome environmental situations arise more due to malfunctions in the political process than due to inadequacies in the economic theory or measurement of the values of environmental changes. Based on the available evidence, the conclusion of Diamond and Hausman (1994) is too strong. In other words, we find that "some number *can be* better than no number" for environmental policy even if the number is an imperfect estimate of existence value based on CV. The alternative is information from an imperfect political process.

In summary, we make four points about valuing the environment. First, economic theory includes values for nonmarket goods such as environmental amenities and preservation of natural resources. Existence value can be motivated by several factors, including altruism. Second, on-site use value is widely accepted theoretically and estimates of on-site use values based on implicit market methods are widely accepted also. Travel demand studies yield imperfect estimates, but are given substantial credibility in benefit-cost analysis and other policy situations. Third, estimates of existence value, which is the

portion of total value above and beyond any on-site use value, are typically measured only by CV and can be controversial. Contingent values for people who are familiar with the environmental good and have information about it and experience with it or similar environmental goods can be valid enough to provide useful information for policy decisions. Fourth, CV estimates are neither always perfectly reliable nor always perfectly useless. The same holds for the political process in which expression of values for environmental goods is neither always perfectly reliable nor always perfectly useless. Decision makers should dismiss neither source of information, but should use both contingent market estimates of existence values and demands expressed through the political process. Given the alternative, information provided by contingent valuation can be useful.

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