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Benefits and Costs of Resource Policies Affecting Public and Private Land

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## Introduction

This volume contains the proceedings of the 2000 W-133 Western Regional Project Technical Meeting on "Benefits and Costs of Resources Policies Affecting Public and Private Land." The meeting was held in conjunction with the 2000 Western Regional Science Association Meeting at the Sheraton Kauai Resort, Kauai, Hawaii, February 28 – March 1, 2000. The meeting included a joint WRSA-W-133 session that was attended by many WRSA participants.

The Kauai meeting was attended by academic faculty from many W-133 member universities in addition to researchers from non-land grant universities, federal agencies and private consulting firms. A list of those who attended the meeting follows.

The papers included in this volume represent a wide-range of current research addressing the W-133 project objectives, which are: 1) benefits and costs of agro-economic policies, 2) benefits transfer for groundwater quality programs, 3) valuing ecosystem management of forests and watersheds, and 4) valuing changes in recreational access. The complete program for the meeting follows the list of participants.

The trip to Kauai was a long one for most and made the meetings this year smaller than those in recent years. The overwhelming opinion of those who made the trip was that it was well worth it. The sessions were stimulating and the scenery and weather were superb. I'd like to thank Jerry Fletcher, John Loomis, Frank Lupi, Douglass Shaw for their help with this year's meeting and special thanks to David Plane of WRSA for taking care of so many of the logistics of the meeting.

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# VALUES, VALUES, VALUES

## Reflections on the Nature and Use of Non-Market Values

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Abstract: In a variation of the (in)famous triad of location, location, location, one might say that all that matters when doing non-market valuation are values, values, values. Usually, in W-133 workshops discussions focus on issues of operationalizing value observations (stated or revealed) into useful data. But what are we really measuring? Does what we measure have social relevance? Should it? How should the validity of this information be checked, and how should the information be used. In this paper I will briefly review the nature of the underlying value concept we attempt to measure, some conceptual issues in operationalizing these measures, and some issues in public choice concerning the validation and use of these measures. The paper is based partly on personal experience with using CV in contentious social circumstances. The purpose of the paper is to discuss some issues in moral philosophy and methodology related to contingent valuation specifically, and economic valuation in general.

## INTRODUCTION

A great deal of the professional effort of applied economists is devoted to improving methods for measuring economic values. This is as true of marketing economists estimating demand systems as it is of non-market specialists estimating recreational values or environmental damages. But exactly what is it that we are measuring? Clearly economists are not measuring the same kind of thing that chemists measure when the analyze chemical compositions or astrophysicists measure when examining the spectra of distant objects. And yet, measurements of economic values have real world implications. Policy actions can turn on estimates of economic value.

This essay comprises some thoughts about the nature of economic values based on the author's experience with the regulatory use of economic values and a liberal borrowing of notions from the philosophy of science, epistemology, and the writings of economists of greater experience and stature. If estimates of economic value are not based on the physical properties of things, what are they? How can they be measured, who should decide what they are, and who decides how they are to be used? This essay will explore some notions of value and attempt to help clarify the role of the researcher and the discipline in the policy process. I will briefly explore three questions, with most of the essay devoted to the first question. The first question is epistemological; what are the epistemological and scientific grounds for discovering and measuring economic values? The second question is moral; what is the ethical status of measures of economic value? The third question is political; how should estimates of economic value be used in the policy process?

The case which provoked these thoughts was a contingent valuation study of the benefits from a state rule to reduce smoke from burning of grass seed crops in Eastern Washington (Wandschneider et al, ). Washington state law requires a study of economic benefits and costs of a proposed environmental regulation. The state Department of Ecology contracted with researchers at Washington State University to provide this analysis. The resulting analysis supported the proposed regulation with a finding that estimates of economic benefits of the rule exceeded estimates of costs. Economic benefits were estimated using a contingent valuation study. In reaction to the study, stakeholders who believed that they would be harmed by the regulation attempted to overturn the benefit cost analysis by appeal to the

university itself and by appeal of the regulation within the framework of administrative law procedures. Opponents of the benefit cost study criticized both the particular methods of the cost benefit study, and, more generally, the use of contingent valuation. In a very modest way the situation parallels the vigorous debate over using contingent valuation which arose because of the Exxon Valdez mishap. The Exxon Valdez debate generated polar positions, with some, even in the economic community, questioning the legitimacy of contingent valuation economic value estimates (especially for "passive use" values), while others defended the method (See Portnoy, Hanemann, Smith, Diamond and Hausman, McFadden, inter alia.).

## THE SCIENTIFIC GROUNDS FOR THE MEASUREMENT OF ECONOMIC VALUE

In considering the scientific nature of estimates of economic value, topics can be organized into three subjects. These are not strictly separable topics, but they provide a convenient organization for the discussion. This section, the main part of the essay, considers: conceptual/epistomological matters; operational/measurement issues; and confirmation/validity issues.

### *The Epistemological Status of Economic Values*

Let us first consider what it is that is being measured in estimating economic values. At one level there is a simple answer. What is measured is what the measurement instrument measures. While this proposition is true, it is true at a tautological level and begs the question (although it has important empirical implications). The underlying question concerns the nature of the thing that one wishes to measure. One can then ask the question of whether the measurement has successfully captured this property.

So we must ask, what is the economic value of something? In addressing this question, one cannot avoid some rather deep metaphysical and epistemological questions. It is immediately clear that the economic value of a thing is not a physical property of the thing. Let us define an economic value as *a magnitude assigned to a thing or action indicating its worth (to the agent assigning the value)*. Notice the unusual quality of value compared to physical properties of objects. To measure a physical property of something, one addresses one's instrument to the object[1]. But for a value assignment, does one measure a property of the thing, or an aspect of the observer (the agent assigning value)?

The branch of epistemology dealing with value claims is called axiology. Axiology is largely defined by two polar positions concerning the nature of the entity "value." The *objectivist* position is that value resides in the value object, and that the observer is assigning value based on his or her perception of that "intrinsic" value. This position must be based on an idealistic metaphysical presupposition. An idealist believes that the fundamental nature of reality admits of certain non-material phenomenon. Perhaps the most famous idealist is Plato who asserted that the ultimate Reality comprises ideal objects -- e.g., the perfect sphere -- and that the material objects we experience in daily life are but weak reflections of the deeper Reality. The metaphysical foundation of other idealists rests on spiritual foundations; the ultimate reality is God (e.g., C.S. Lewis). Reality is whatever God says it is. The idealist interpretation of the valuation process is therefore that the observer is somehow able to understand (apperceive) this non-material quality which is a property of the valuation object itself, or, perhaps the connection of the

[1]Actually, the situation for physical properties is more complicated. For one thing, one might argue that perception or belief about the nature of an object is at least partly subjective. For another thing, modern quanturm theory raises the possibility that the state of nature might not be independent of the observation.

valuation object with a deeper Reality (God, the Ideal). The apperception process does not rely on the normal senses, which can detect no aspect of these ideal properties.

On one count, the objectivist position may seem attractive because it grounds the value concept in something that is absolute and "Real." The operational task becomes one of finding a mechanism to measure this magnitude. However, the objectivist position raises the considerable challenge of how to infer a material measurement from an immaterial essence. This is counter to the usual materialist epistemology of science. Science rests on a materialistic premise that the world we observe is the only reality. Their are no hidden, deeper realities. Everything can be understood and explained in terms of logic and observable entities.[2] Thus the idealist-objectivist position creates a conundrum - values are defined things, but they are things that cannot, in principle, be observed by the ordinary senses even augmented by instruments.

In contrast to the objectivists, the *subjectivists* hold that value resides entirely within the observer. All values are expressions of some subjective, emotional state of the observer. The pure subjectivist position implies that values are fundamentally arbitrary. Value measurements are at best measures of the emotional state of the observer and provide no information about the value object. An illustration of this subjectivist view is the discussion of "warm glow" in the valuation literature. Warm glow occurs when a valuing agent assigns a value to an object because it makes him/her feel good. The assigned value is a nearly meaningless, ad hoc emotional expression. It measures nothing about the value object at all. The pure subjectivist would see all valuation as "warm glow" (or cold void?). The pure subjectivist position spells doom for attempts at measuring economic values.

Subjectivism is clearly the position of some critics of the contingent valuation method (CVM). No amount of improvement in operational techniques will satisfy such critics because there is nothing to measure. However, it should be noted that the pure subjectivist position is different from the position of those who might accept that an economic value can be measured, but who believe that such measurements should be rejected on ethical grounds. I discuss this issue later.

Ironically, the polar positions of both objectivist and subjectivist would seem to leave the scientific study of economic values in a bad place. However, alternative positions exist. One alternative philosophical position is that of the pragmatists. Pragmatists believe that assigning a value to an object is an interactive process between a community of observers and the value object. A value assignment requires both (a community of) observers and objects. Economic valuation must rest on something like the pragmatist's epistemological position. A value assignment is a social fact. In some sense it resides inside (is subjective) the observer, but it refers to the object and so is not merely a subjective, emotional expression. The implication of such a view is that, while economic value is not a defined property (like mass), there is something material to measure. This material thing comprises a relationship between the object and the observers, so an economic value is necessarily a contingent property. The nature of the economic value property depends on the relationship between observers and value object.

### *The Nature of Economic Values*

Assuming something like the pragmatist's position, the question is, what is the nature and stability of the property, economic value. Are economic values stable or even "fixed," or are they constructed on the fly - are they arbitrary and ad hoc. Economics has followed two tracks in attempting to answer this question: a theoretical approach based on hedonic psychology, and an operationalist approach grounded

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[2]However, scientific models can have theoretic terms which are not observable as long as the overall model can be justified using experiential data. See, e.g., Hausman, 19__

in observation. Revealed preference theory attempts to join the two - unsuccessfully according to Hausman (1999).

An operationalist approach defines what is measured in terms of the measurement instrument[3]. An economic value is whatever is measured by the tools that we have which measure value. It would seem that there is no need for theory. However, such a completely atheoretic approach is unsatisfying because the measurements have little meaning. Suppose one measures a value of P for object X. Who is to say how long and under what conditions this magnitude is valid? Without a theoretic structure, one does not know how to interpret economic value observations. Consider either a revealed or stated preference value. If it is simply an empirically observed action or recorded utterance, how are we to know under what conditions it holds? Repeated observations may give us some clue about stability, but how do we distinguish an accidental string of similar observations from true underlying stability. We are faced with the classical (Hume's) problem of how to gain demonstrable inductive knowledge.

The hedonic psychology approach provides a systematic explanation for behavior and economic value[4]. Using this theory of a self-interested, hedonic agent, an economic value can be characterized as a stable, existing property - given a stable relationship between observer and object. A theoretic meaning is assigned and the operational objective becomes a search for a sound method to measure the conceptually defined thing. Unfortunately, the theoretic property which confers meaning to economic value, utility, is not directly measurable. Moreover, it is not clear, on a priori grounds, how well defined and stable this utility structure is. Current economic micro-theory assumes that people can only rank alternatives. While the rankings can be represented by a utility index under certain assumptions, the magnitudes of the utility index have little significance. In theory, they are valid only up to a monotonic transformation. If the magnitudes attached to economic valuation are only valid up to a monotonic transform, what information does a numeric measurement (a price or willingness to pay) convey?

Perhaps surprisingly, a numeric value does convey information. However, the information is a good deal more convoluted than is sometimes portrayed. Suppose we are able to measure a true economic value consistent with the standard ordinal utility theoretic structure. What a numeric price or willingness to pay value says is that, under certain regularity conditions, certain kinds of money measures will generate an ordering that is consistent with the ranking of the valuing agent. That is, the magnitude of the money measure has meaning only within the context of measuring all other things of interest with the same measuring scheme under the same "initial conditions."

Let us repeat for emphasis. The magnitude of the economic value is non-unique. It is not arbitrary, since the price for thing C must place it in an overall ranking consistent with the internal preference ranking of the valuing agent. However, an infinite number of price structures can theoretically produce the same ranking. In empirical work, this raises a number of issues.

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[3]Extreme operationalists deny the existence of anything which is not measurable. Thus early behavioral psychologists denied the existence of any internal brain processes (a black box), and even defined thought as some kind of not-yet-detected sub-vocalizations.

[4]Economists tend to be somewhat schizoid, teeter back and forth between a purely empiricist, operationalist view and a theoretic psychological model built around the hedonic calculus. In principle, the two should inform each other. In fact some claim that the utility index is recoverable from only choice data based on the weak axiom of revealed preference - but see Hausman for contrary view. In fact, there has been considerable work to use the theoretical structure to inform empirical studies, including empirical value studies. The extensive literature on the theory and measurement of the various concepts of consumer surplus exemplifies this connection. However, economics is not yet a mature science with theory being constantly confronted with evidence and adjusted accordingly.

- How do we know that the measured price (revealed or stated preference), correctly places the value object in the right ranking; what conditions are necessary to assure consistency of measurement? The considerable literature on surplus measures and compensation tests addresses these issues.
- The question of whether the sum of all price times quantity exhaust the total budget is not per se at issue. The purpose of the budget constraint is to see that the respondent is answering under the same conditions as are used for pricing all the other objects which the target object is to be ranked against. However, the budget constraint is only one of a set of incompletely understood conditions required to assure that the prices are consistent.
- More generally, we must calibrate any empirical values, specifying the circumstances under which they apply.
- Under what conditions can we aggregate the price/ranking of different agents. How do we know they are all using the same valuation scheme?

An obvious illustration of the non-uniqueness of economic value measures is the difference between willingness to pay and willingness to sell (accept compensation). In fact, in principle, there are a half dozen theoretic measures of the value of a welfare change to an indiviudal[5]. A large literature exists about the relative merit of these measures (which ones will produce the most utility-consistent ranking), and the circumstances under which they approximate each other. Without entering that discussion, the point here is that, according to the accepted standard economic micro-theory, the measurement of economic value is, in principle, fuzzy.

In summary, there is a kind of Heisenberg's uncertainty principle for economics - any value we measure is not unique and has meaning only as a relative quantity in relationship to all other values. At a deep, conceptual level, economic values are embarrassingly slippery. Any particular measurement is, in principle, a contingent value. There exists no underlying unique value to be measured. One must pay careful attention to the context in which the value is measured. Different contexts may invoke different comparisons and hence different numeric magnitudes for the economic value of a thing. In fact, two different empirical measurements, elicited on two different occasions may BOTH be valid - but in different contexts.

Three final points. First, while this argument has been developed within the framework of ordinal utility, having cardinal-measurability for utility improves things, but cardinal utility is still unique only to an affine transformation. With stronger measurability, information on intensity becomes meaningful. Still, we do not know what the relative values are unless we know the "exchange rate" between agent ones internal utility metric, the exterior metric, and agent B's metric. Moreover, the fundamental non-uniqueness of economic values remains - unless we are prepared to assign absolute values to things like the objectivists do.

Second, it must be emphasized that the fuzziness of economic value measurement does not mean that such values are entirely arbitrary. In fact, given the multitude of objects which must be ranked, the freedom to assign arbitrary values is drastically reduced. If one values a new car at $30,000, one clearly cannot value a can of soup at $60,000 with any kind of consistency.

Finally, it must be acknowledged that the economic utility hedonic may not be the correct psychological model. Perhaps the human valuation system works differently. For example, perhaps

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[5]In mathematical terms, the magnitude of a welfare change is determined by a line integral, which depends on the path of integration.

value assignments are based on what people think prices should be, or perhaps altruism is important.

### *Operational Issues in Measuring Economic Values*

So the conceptual investigation leads to the conclusion that any empirical measurement of economic values will have some potential fuzziness to it, and that applied studies must carefully assess and report the circumstances under which they measure values, as the values will be contingent. Now we should ask whether operational measures of economic value can be constructed. Broadly speaking the experience of economics is that economic values can be measured but that there are many obstacles and challenges to obtaining sound empirical measures. (See, for example, the NOAA panel report (Arrow, et al), Mitchell and Carson, or Diamond and Hausman, Freeman, or any of a large number of other works for discussions of these difficulities.) Difficulties exist in measuring revealed preference, market values and even more difficulties exist in measuring the economic value of non-marketed goods and services. Of course, the primary purpose of the W-133 research project is to address these difficulties for the non-market case. Overall, economists have developed an impressive set of techniques for measuring economic values, but challenges remain.

In summary, the discussion at the conceptual level says that some ambiguity is unresolvable and numerical values are inevitably contingent. On top of this is a layer of operational question that doubtless will occupy economists for many years. Operationally, we are very unlikely to get a precise measure of the underlying economic value - even were it to "sit still" so we could take a picture of it. Still, at least with operational problems, we know that greater effort will be rewarded with improved estimates of values.

### *Problems in Testing and Confirming Knowledge about Economic Values*

Since economic value research is plagued by both conceptual and operational uncertainties, how are we to determine whether our theories about economic value and our protocols and the resulting estimates of economic value are "good." Actually, there are two questions here - one of scientific validity and one of practical use. Let us postpone the discussion of the practical/policy use of estimates of economic value and turn to the issue of judging scientific validity. Specifically, let us focus on how we can know if we have a "good" estimate of economic value - how can we determine if the measurements are correct?

The issue of confirming putative scientific knowledge is an issue of scientific (economic) methodology. Current understanding of economic methodology is that scientific procedures can neither demonstrably prove, nor disprove a theory. Of course, simple factual assertions can be demonstrably proven by direct experience. Also, logical systems can be evaluated to determine whether they are valid in the sense of consistent. However, assertions generated by a theory depending on scientific laws cannot be demonstrably proven. This difficulty is due to the impossibility of proving an inductive law of nature (the problem of induction, Hume's problem) on the one hand, and the difficulty in disproving a theory on the other hand. The difficulty in proving a theory stems from the necessity to specify initial conditions and to posit auxiliary assumptions in order to subject a theory to an empirical test. (This is sometimes called Duhem's problem.) The presence of context means that what Lakatos calls "immunizing strategies" can be found to "protect" a theory by claiming that the initial conditions had changed or that an auxiliary hypothesis didn't hold. For instance, it is very difficult to disprove the rationality theorems of economic theory because instances of possible irrationality can often be ascribed to changes in preferences or other conditions.

The point of this discussion is that the community of scientists, economists in this case, must

determine how to test proposed economic knowledge - within the framework of proper scientific methods. Professional value judgements are required to determine when a particular theory, hypothesis or finding passes the test.[6] The scientific community must have a "loss-function" to decide when a theory (provisionally) passes the test (this is another kind of value that enters the value discussion).[7] Knowledge is (provisionally) confirmed if the methods used to generate it have satisfied the conditions set by the community of scholars. Thus, theories and protocols are expected to pass tests of logical consistency, of replicability, of empirical correspondence, and consistency with the existing body of knowledge. Scientific panels (peer review) adjudicates and enforces these procedures, but it is not the review process, but the protocols and tests in conformance with the rules of the "scientific method," that establish the legitimacy of knowledge. "Good research" is therefore defined by adherence to the specific protocols and general methods of science (economics), not (per se) by peer review. Peer review is "the good housekeeping stamp of approval" of science.

Turning to the issue of the estimation of economic values, the conclusion from this discussion of general principles of scientific methodology is that it is the discipline itself, based on the "rules of science" which establishes the conditions for determining the legitimacy of estimates of economic values. The discipline establishes the groundrules for distinguishing "good estimates" of economic value from bad estimates. In doing so, the discipline follows the general methodological principles of the scientific methods as well as many specific rules which define good theory building and good empirical protocol. Obvious instances of this in the non-market valuation field include influential pieces which set standards such as Mitchell and Carson, and the NOAA panel (Arrow, et al.). Meetings of the W-133 research group are important for precisely this reason - they help establish the theories, protocols and procedures which comprise the acceptable tool kit of non-market valuation.

For concreteness, consider a brief list of some of the theory and measurement issues currently under debate in the profession. These include procedural issues like: what is the best elicitation mode/format; how should don't know and undecided responses be treated, how should non-commodity linked values like altruism and "warm-glow" be detected and counted. They also include specific issues of survey design and of econometric estimation.

## THE NORMATIVE/ETHICAL STATUS OF ECONOMIC VALUES

Suppose one can measure economic value empirically. Suppose one has consensus that the value is measured in a legitimate fashion and so is a valid measurement. What is the normative significance of the measurement of economic value? What moral weight should be put on the value. As noted earlier, in principle, one may believe that an economic value can be measured but then declare it morally irrelevant. For instance, in pretests people often say that they cannot, will not, or should not "put a price" on air quality. However, when people are put in a CVM context, most people will, in fact, confess to a value. It would seem that these people are capable of generating an economic value but that they are denying its legitimacy. We are faced with yet another level of values. What is the normative value

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[6]The problem is more complicated. Some philosophers of science believe that, while demonstrable knowledge is impossible, degrees of confidence can be assigned to knowledge propositions. Others believe that knowledge can be falsified, but not demonstrably affirmed (popperism). Still other believe that the science community sets tests which a theory can be said to have provisionally passed. See, e.g., Hausman.

[7]In a now classic article, Rudner established that scientists cannot avoid the necessity to makae value judgements - judgements about whether a theory or hypothesis is accepted or not. Some scholars argue that such scientific value judgements are a unique and separate category of value judgements.

(significance) of the estimated economic value?

Standard normative economics (welfare economics) rests on the Utilitarian ethical system. From the Utilitarian perspective expressions of willingness to pay are not only social facts, they are the proper indicator of the ethical worth of things. Therefore, from this point of view, there is no question about the normative significance of economic value estimates, they are the proper measure of the moral value of things, at least when they are constructed in the proper way.

We must be careful here. Utility is not only a positive, psychological theory (or in revealed preference mode, an operational, behavioral model) which explains behavior, but an ethical theory. Positive utility theory says people do what pleases them. Normative utility theory says that what pleases people is good. This is a source of confusion for economists and non-economists alike and, as a result, positive and normative economics are often blurred.

Let's briefly review the main tenets of Utilitarian ethical theory. The strong Utilitarian position is based on the normative assumption that the only information normative significance concerns the utility of individuals. Things are of value only to the extent that they generate utility value (pleasure) to individuals (non-paternalistically). General qualities of society, like income distribution, are of value only to they extent they please individuals. Environmental values are anthropocentric; endangered species are only of value to the extent they are valued by someone. Virtue (e.g., altruism) is important only if it gives pleasure.

General social value is simply an aggregation of these individual values. For the English neoclassical school, individual values were cardinal and interpersonally measurable and could be aggregated by simple summation. For modern ordinal utilitarianism, numeric values cannot be mathematically combined because they are non-comparable. Still, one can identify increasing welfare, which is indicated by a Pareto improvement.

In principle, economic estimates of value can quantify these ethical properties. The economic value is both the empirical value of a thing and a measure of the normative value -worth - of the object. In practice, there are a number of problems in determining whether the measured value is the "right" value. The empirically observed market price may not be the ethically proper, efficient price.

So let us review. The Utilitarian perspective says that economic value estimates have normative significance and so can presumably help distinguish between good and bad social situations and thereby help us make social decisions. However, not all economic values (prices) are correct. Estimates of economic value must be corrected to conform to the ethical theory if they are to be used to evaluate social policy. An additional difficulty is that we know from economic theory and our earlier discussion of values, that economic values are contingent so that there is no unique "best." (Thus, in general equilibrium theory there are an infinite number of Pareto optimal allocations, each of which can be associated with a different set of prices and a different "initial condition" of wealth distribution.)

While Utilitarianism gives us a link between estimated, quantified economic values and normative significance, not everyone accepts it. Following is a brief list of some of the objections to Utilitarianism (See, e.g., Sen and Williams, Weinz)

- Are we willing to say that process and rights do not matter, only the consequences count? Who "creates" the pollution is not important.
- Are we willing to say that motives (virtue) and right behavior (duty) do not matter? Upright behavior has not special claim.
- Do we wish to banish non-utility information, such as the physical state of people or the distribution of material goods? Is there no difference between consumption of jam and heroin,

except in their utility consequences?

- Are we willing to say that deservedness does not matter, the manner of acquisition of an economic asset does not matter?

## POLITICAL/POLICY GROUNDS FOR USE OF ECONOMIC VALUES

Once estimated, how should economic values be used? How they are used is in program and project analysis, in regulatory benefit cost analysis, in judicial actions, in administrative and enterprise allocation decisions, and so forth. But what determines when and how they should be used.

Of course, use of estimates of economic values should depend partly on the quality of the estimates. Are the estimates sound, reliable? Use should also depend on the perceived ethical relevance the values. But while the positive and normative standing of value estimates matters, ultimately the political process determines there use. One might say that the final test of validity of an economists estimate of value is a test of praxis - is it used in the policy process.

## CONCLUSIONS

Many of the topics discussed in this essay could lead to a pessimistic view about the program of assigning economic values, particularly non- market values. More considered thought should lead to a council of caution and care, not despair. For instance, it is undeniable that estimates of economic value rest on metaphysical and ethical foundations with which not everyone will agree. This does not mean that economic values convey information of no empirical or ethical significance. Rather, it means that economic values do not have a unique claim on empirical and ethical truth. Policy might be informed by other values, but this is exactly what a pluralistic, democratic process does.

Much of this essay was devoted to an exegesis of the inherent fuzziness of estimates of economic values. This inherent fuzziness is especially irksome to non-market valuation analysts, because it provides an opportunity for critics to attack the method. It must be admitted that there is some truth to much of the criticism of non-market valuation, partly because results are sometimes presented with a false precision. Clearly, economic values are not absolute, exact and unique. Clearly it is also prudent to use precision in the estimation and calculation phase of analysis. But for policy purposes measurements of economic values should be presented with caveats because we know that the values are fuzzy. Value estimates should be presented as contingent, not absolute; in terms of upper and lower bounds rather than point estimates.

But the overall most important implication of this essay is the importance of continued research into economic valuation. The economics discipline has a social responsibility, beyond any scientific curiosity, to develop the procedures, theories, and protocols by which validity can be assigned to estimates of economic value.

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