Valuing Natural Resource and Environmental Amenities: Can Economic Valuation Techniques Be Made Defensible: Discussion

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In determining how to make welfare measures more defensible, I think we first need to state our goals in a more operational manner. The ideal, of course, is to derive an accurate measure of social value, hence a measure which zeros in on the true social value. An accurate measure is both precise, which is roughly equivalent to small variance, and meaningful, which can be roughly equated to a reasonably small bias. My feeling is that accuracy is too much to hope for. This is the spirit of Cummings, Brookshire, Schulze, and Coursey (1984) in their State of the Art Assessment of Contingent Valuation, who state that the level of accuracy of welfare measures allows at most one significant digit, resulting in a "confidence interval" of ± 50% of the measured value. If accuracy; i.e. a precise, meaningful measure, is too much to hope for, then we face a choice of working towards a measure which is meaningful, but not precise or a measure which is precise, but not meaningful. Clearly, I would argue for the former over the latter.

Even this simple goal of working towards meaningful, though explicitly imprecise measures, suggests a direction for future research. The questions of prime importance are whether our measures are meaningful and how can we make them more meaningful. Given the large, sophisticated body of literature on precision of welfare measures (Willig, 1976; Hausman, 1981; Vartia, 1983; McKenzie and Pearce, 1982) I would argue that the precision of our theoretical estimates must be viewed as sufficient for all practical purposes. This is particularly true given all the uncertainties involved, and the resulting errors in specifying functional form (Bockstael and McConnell, 1980) and the inherent weakness in the data with which we must work. I believe that far greater benefits are forthcoming from improvements in, or establishment of the meaningfulness of our estimates, and here is where our efforts should lie.

To address this question, we have and must continue to extend our paradigm beyond the simple perfectly informed, utility (or expected utility) maximizing individual who faces perfect and complete markets. Obviously, much progress has been made in some of these extensions, particularly under incomplete and imperfect markets. In a sense this is our whole reason for being.

Somewhat surprisingly, much less work has been done in the area of welfare measurement where the economic agents face risk (Pope, Chavas, and Just, 1983; Newberry and Stiglitz, 1981; for example). To the contrary most of our work in welfare measurement assumes that the economic agents make decisions within a context of complete certainty. While little has been done within the context of risk, we have done even less work on welfare measures where the actors face uncertainty—that is under conditions where probabilities, payoffs, and even possible states of the world are unknown. This is clearly the most difficult task, but because the world is, in fact, characterized by uncertainty, we must at least think very hard about how robust our measures are within an uncertain context if we wish to establish that our measures are indeed meaningful.

When we move from very simple extensions towards incomplete information on the part of economic agents, or even incomplete informa-

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tion on the part of researchers, we find that our results are biased in ways which are not trivial to correct. As Nancy showed even under the case where we have unbiased estimates of demand parameters, we find that welfare measures, which are nonlinear transforms of these unbiased parameters, are themselves biased. Further, this bias depends upon the sources of random deviations, which in any realistic case is likely to be quite complex and probably unknown. An important question is whether we can estimate the size and/or the sign of bias using information which we can extract from the data. Can we at least estimate Willig-type bounds on these sources of bias?

The next step into incomplete information involves examining situations, with known probabilities and payoffs. As shown by Pope, Chavas, and Just (1983), even with simple types of uncertainty—price uncertainty with non-constant absolute risk aversion—results diverge from traditional findings. Extending the decision environment to production (or utility) uncertainty in the absence of constant absolute risk aversion leads to significant problems. To quote Pope, Chavas, and Just "(n)o ordinary supply or demand relationship permits welfare calculations in this case, although appropriate correction factors can in principle be estimated with restrictive assumptions." Again it is important to estimate a relative size of this bias to determine if our welfare measures are meaningful.

The final, and most difficult step we face is extending our welfare analysis to cases where economic agents face a decision environment of uncertainty, where payoffs and probabilities are unknown. Within such an environment our expected utility maximization assumptions must be placed in question. It seems that an overwhelming majority of the empirical evidence concludes that individuals do not behave as though they were expected utility maximizers, and instead people appear to use other types decision rules including simple heuristics (Tversky and Kahneman, 1974; Schoemaker, 1982; Arrow, 1982). While those behavior rules are sometimes treated as irrational, its not clear that these imprecise rules do not dominate precise, but unmeaningful expected utility rules within a real world decision environment where the actors have scarce and limited cognitive skills; that is in a world of bounded rationality.

I know of no work within the welfare measurement literature which attempts to deal with this issue, although considerable work has been done by economists and by others from related fields, examining issues within more descriptive contexts. Here I'm talking about the work of people like Herbert Simon, (1955); Lancaster, (1975); Leibenstein, (1979); Cyert and March, (1963); Kahneman and Tversky, (1979); Akerlof and Dickens, (1982); and Heiner, (1983), among many others. One thing that becomes clear from this work is that behavior diverges from that predicted by expected utility maximization, where ". . . departures from objectivity tend to follow regular patterns that can be described mathematically" (Kahneman and Tversky, 1982) which is both a curse and a blessing. Such patterns are a curse to the extent that they are inconsistent with approaches where "irrational" behavior is viewed as random (normal) disturbances around maximizing behavior, such as that suggested by Becker (1962). They are a blessing to the extent that they follow rules which can potentially be modeled and/or predicted. In such a case can we relate meaningful welfare measures to observed demand functions which are formed from non-maximizing behavior? Clearly preferences are filtered by this behavior so that they are incompletely revealed in market behavior. To what extent can we use market behavior to infer preferences? How reasonable are our present measures under these circumstances? For what types of goods is this important?

The final question which I will raise cuts somewhat more deeply into the neoclassical paradigm, and as such may be somewhat more controversial. Here I would like to ask whether utility, or to avoid the well defined form, whether happiness can be thought of as a scalar measure reflecting tastes only. For the sake of argument, let me start with the assumption that utility depends upon values (i.e. descriptions of the way the world ought to be) and tastes (i.e. descriptions of what the individual likes) (see, for example, Sagoff, 1981). Values and tastes clearly are not exclusive, in the sense that they may be in concert or in conflict. My values and tastes are in concert if I believe that the environment ought to be untainted, and I like to breathe clean air. They are in conflict if I believe that I ought to tell the truth, but by lying I can get what I want.

A key question which arises is whether an individual can trade off values for tastes and remain indifferent, or is there something richer

here which does not allow simple tradeoffs. If the former is true then there is nothing new, and essentially we end up with a state dependent utility approach. Under this assumption, more income is needed to maintain indifference in states of the world where values are fulfilled to a lesser extent (see for example Hirshleifer and Riley, 1979).

However, it is conceivable that tastes and values are not comparable, that they conform to different standards and are subject to different measures. Here I'd like to question whether our paradigm includes all relevant concepts of comparison.

One of the basic assumptions of utility theory is that given two bundles of goods, A and B, one of the following must be true: A is preferred to B, B is preferred to A, or A is indifferent to B. Here I'd like to propose an additional measure of comparison, that A and B may be ambivalent so that there are strong opposing feelings. That is, A may conform more strongly to the individual's values, while B may conform more strongly to the individual's tastes. If tastes and values are perfectly comparable, ambivalence simply reduces to indifference, and there is no operationally significant distinction. A second and related question is whether people respond differently to ambivalence versus indifference, and is this response translated into observable behavior.

In order to examine this question, assume the following framework. An individual has values and tastes, which interact to a greater or lesser degree. However, in making market decisions, tastes predominate over values. To make this clear, let me give a counter example. Because of some environmental ethic, an individual may choose to purchase unleaded gasoline for a car without a catalytic converter, despite the fact that unleaded gas is more expensive and has lower octane, so that the car does not run as well. This is a case where the individual's values are revealed in the marketplace.

I'm sure that many other examples can be constructed, but I think that they will tend to be exceptional cases, rather than typical behavior. More typically, values will be expressed in the market place only to the extent that they interact with tastes. On the other hand, answers to hypothetical questions will more likely elicit both tastes *and* values, or at least will reflect the individual's values more than market actions do. Quoting Cummings et al., ". . . the (Contingent Valuation Method) may elicit attitudes (i.e. values) rather than intended (i.e. market) behavior . . . and psychologists find attitudes a poor indicator of intended behavior." If this is true, can we identify both tastes and values from information from hypothetical questions and from observed market behavior? If this is true, does it help us to do so?

So long as the market is the ideal to be emulated, tastes are the only factor in the utility function. However, if values are distinct and important factors in welfare, then they become an important aspect to be measured and considered in social decisions. If tastes and values are in conflict, is this conflict resolved through simple indifference, or must this conflict resolution be characterized differently? Stated somewhat differently, what are the welfare implications of this type of cognitive dissonance, as psychologists would term it?

In a recent article, Akerlof and Dickens (1982) examine the resolution of cognitive dissonance for workers in dangerous occupations. Here the conflict arises because workers like to believe that they are intelligent individuals, but at the same time they risk their lives in dangerous occupations. Akerlof and Dickens argue that to resolve this conflict, workers choose to believe that their occupations are not really dangerous (although this may reflect selection bias), despite overwhelming evidence to the contrary. Because of this belief, workers tend to "underinvest" in safety, both in terms of underutilizing available equipment, and in not demanding that employers make the work place safer, say through union contracts. The implications are that some type of government involvement, through say, OHSA, is needed to provide an optimal level of workers safety. A more traditional framework would conclude that job danger would be fully reflected in wages and employers would face optimal incentives for providing safety equipment, since this would lower the wage which the firm would have to pay.

Here is an example where the policy conclusion depends critically upon the way in which cognitive dissonance is resolved, and hence whether ambivalence and indifference are identical. If they are identical, then no government intervention is necessary. However, depending upon the way in which strongly conflicting feelings are resolved, intervention may be needed to achieve a socially desirable solution. Hence concepts of cogni-

tive dissonance, and ambivalence are potentially important concepts which may prove invaluable in unifying economic theory and observed behavior.

In summary, I feel that our major efforts in non-market benefit estimation should be towards meaningful measures, where precision is of secondary importance. Certainly much of this effort should be within the current paradigm, deriving meaningful measures of potentially major factors such as the value of time, as Nancy has discussed. However, we should also place greater efforts in expanding our current welfare paradigm to encompass mainstream topics such as risk and estimation errors, as well as more peripheral concepts such as non-maximizing decision rules, non-scalar measures of utility, and concepts such as ambivalence and cognitive dissonance. Only through innovative research on such topics can we enrich our thought process, our analysis, and ultimately our paradigm in order to embrace a broader spectrum of human behavior. In doing so we may be better equipped to improve and establish the extent to which our analysis represents meaningful measures of social welfare.

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