The George Washington University Regulatory Studies Center raises awareness of regulations’ effects to improve regulatory policy through research, education, and outreach. As part of its mission, the GW Regulatory Studies Center conducts careful and independent analyses to assess rulemaking proposals from the perspective of the public interest. This comment on the Environmental Protection Agency’s stated preference survey does not represent the views of any particular affected party or special interest, but is designed to evaluate the effect of the Agency’s proposals on overall consumer welfare.

Introduction

The making of regulatory policy often requires tradeoffs involving non-marketed commodities or non-use values. Non-use values are placed on “natural resources or environmental characteristics that are independent of any present or future use ... people might make of those resources” (Freeman 2003, p.137). Non-use values can include existence value, passive use value, option demand, and quasi-option demand, or essentially any value that does not arise from direct consumption. Stated preference methods have been developed and refined over the past several decades to provide insight about the values citizens might place on these non-uses, and thus inform public sector decision making regarding these tradeoffs.

The EPA has conducted a stated preference study to assess the benefits of the Agency’s Existing Facilities Rule. The proposed regulation involves the use of filters or closed-cycle cooling at facilities using water for cooling. Intakes for cooling water currently entrain fish (or fish larvae)
resulting in fish losses and smaller fish populations. The study has been conducted generally in accord with the academic literature. The current Notice of Data Availability (NODA) releases the method and results of the survey, along with preliminary results of a nonresponse study to adjust estimates for households which did not participate. The NODA does not offer estimates of the benefits from the proposed regulation.

The stated preference survey used statistically representative samples of households across four regions of the country and a separate national sample, which allows comparison of estimates calculated by region and then aggregated. The sample size was about 2,000 in total for the regional studies and about 300 for the national survey. The study uses a choice experiment design, where a survey question asks for a choice between the status quo and two distinct policy options, A and B. Each surveyed household answered three such policy questions. The policy options were designed to be realistic, with dominated policy options excluded. Each policy option was described by four measures of environmental quality, along with an annual cost for the option (also reported as a cost per month). The four attributes of environmental benefits included were:

- Commercial fish population
- Fish population for all species
- Fish saved per year
- Condition of the aquatic ecosystem

In each version of the survey (the Northeast, Southeast, Pacific and Inland regional surveys and the separate national survey), status quo or baseline values were reported for each of the four components, the values which would continue if neither option A or B were chosen. The survey also included a set of questions to evaluate the confidence of respondents in their answers (the questions and responses are in Table 6 of the NODA).

The survey responses were used to estimate a random utility model, following standard practice in the literature. Estimates of the implied willingness to pay (WTP) for a one percentage point change in each of the four attributes for each region and the nation were reported. Total benefits were not estimated, but “can be calculated by multiplying changes in environmental attributes due to regulation by their implicit prices, or WTP per percentage point change” (p.30).

The stated preference survey described in the NODA suffers from two significant weaknesses. The first is misconstruing the hypothetical nature of stated preference surveys for non-use values far removed from choices respondents will have made previously. Hypothetical bias in the stated preference literature has been interpreted narrowly as whether respondents truthfully reveal preferences in survey settings, but respondents will not have well-defined preferences to reveal for many non-use values. The survey results show evidence of hypothetical bias. The second is using stated preference methods to quantify both use and non-use values of fish losses.
Use values should be estimated using market data, and inclusion of the attributes for both fish losses and populations conflate stock and flow variables. The use value implied in the study is implausibly large, and given that non-use values are even larger, the results of the study provide little guidance for regulatory policy.

**Stated Preferences and Subjective Preferences**

The subjectivist theory of choice and cost provides an important, albeit overlooked, perspective on the uses and limitations of stated preference methods. All of economic theory is nominally a subjectivist enterprise - economics builds up from decisions, and economics tries to capture the means-ends framework as perceived by the decision makers. Thus consumers are modeled as maximizing utility, where utility is based on personal preferences, and opportunity cost is the value of the next best alternative foregone. At a surface level, all economists are subjectivist. And yet a consistently applied subjectivist approach has deeper implications, particularly outside of an exclusively equilibrium approach to modeling market activity. Consequently subjective cost and choice theory as reflected in the work of Ronald Coase, F. A. Hayek and the Austrian School, and Jack Wiseman and the London School tradition of the 1940s and 1950s does differ in some substantial ways from traditional textbook treatments. The reason that the subjectivist view has not had greater impact is its apparent incorporation in mainstream approaches. As James Buchanan puts the matter, “many economists rush headlong into their intricacies of analysis while overlooking certain points of elementary economic logic. ... [T]hey recognize that, in any preliminary confrontation, their own views parallel those developed here. ... Opportunity cost tends to be defined acceptably, but the logic of the concept is not normally allowed to enter into and inform the subsequent analytical applications.” (viii-ix)

Of relevance for stated preference methods, “cost is that which the decision-taker sacrifices or gives up when he makes a choice. It consists in his own evaluation of the enjoyment or utility that he anticipates having to forego as a result of selection among alternative courses of action.” (Buchanan 1969, pp.42-43, emphasis added) Cost is entirely connected to actual, or economic, choice, and is entirely ex ante; what one anticipates giving up. Ex ante expectations matter for choice, and may differ from ex post realizations, creating the potential for a mistaken choice, or a choice that would be different if repeated in the future. This subjectivist point has implications which have not been recognized in the academic literature on stated preferences and for the EPA’s use of stated preference methods.

The traditional economic model of consumer behavior postulates the existence of stable, complete preferences. Completeness implies that people have preferences between any two outcomes x and y: either x is preferred to y, y is preferred to x, or x is equivalent to y (indifference). The stability of preferences implies that if x is preferred to y now, this relation is likely to persist in the future. With complete preferences, a willingness-to-pay (WTP) for a quantity of a good or an environmental amenity can be calculated. Stated preference methods
have had to surmount economists’ prejudices that true preferences or a truthful WTP will only be revealed in market contexts, because outside of the market where choices have consequences, talk is cheap. Hypothetical bias has been seen as entirely a question of whether truthful revelation of preferences will occur through surveys, or outside of market contexts.

Hypothetical bias, thus narrowly interpreted, has been extensively examined in the stated preference literature. The entire stated preference project becomes moot if truth-telling does not prevail outside of market contexts. The outcome of this debate has been that people do seem to reveal preferences reasonably truthfully in surveys, as demonstrated not only in contingent valuation but also political polls and consumer research.

Subjectivist choice theory, however, provides an alternative and deeper interpretation of hypothetical bias: people do not have preferences in any meaningful sense when they have not previously made economic choices. If cost can be realized only at the point of choice and then exclusively ex ante, when choices - meaning the giving up of something of value - have never been made regarding a good or environmental amenity, people do not have preferences. Alternatively, people must discover their preferences between x and y. The type of non-use values the stated preference method is applied to elicit often involve amenities regarding which people have not had to make economic tradeoffs, in addition to there being no economic penalty for preference falsification in the survey context. Respondents typically will not have had an opportunity to discover their preferences, and thus have no preferences to reveal. Thus the question of truthful revelation of WTP outside of a market setting does not capture the entirety of hypothetical bias.

The problem created by undiscovered preferences has been implicitly raised in the stated preference literature, and consequently misconstrued. An objection is that people would be asked to value hypothetical goods which they are not equipped to value (Diamond and Hausman 1993). But this objection has been interpreted, not unreasonably given the textbook treatment of preferences, as a matter of information. If a survey is asking respondents their WTP for water quality, then the survey must provide information about the index of aquatic quality being employed. Information bias implies that without sufficient information, respondents may be confused about whether this is a choice between x and y or between w and z, and will not know which preferences to reveal. While not an unreasonable interpretation, viewing the “people can’t possibly value this” objection as merely an information problem limits the depth of the true hypothetical bias conundrum.

People do face situations where they must act when plausibly they have not discovered their preferences. One could interpret whatever preferences revealed by their action as their preferences; yet this ignores the potential to refine preferences, or cost or WTP estimates, based on experience. As Buchanan points out, anticipated cost is the true cost of an action, and may differ from the “choice induced cost” or loss of utility suffered as a consequence of the decision.
The choice induced loss of utility is irrelevant as a cost for the present choice, but “may modify anticipations about choice alternatives in the future” (p.48). This adjustment process is the discovery of preferences, and requires the feedback of actual sacrifice. Repeated “choices” which do not involve foregoing any alternative will not help in identifying preferences. Consequently if we strictly infer preferences based on choices, preferences will be changing as people discover their preferences. The tendency for some choice anomalies to disappear in repeated experiments would be another illustration of this discovery process. An important element of this discussion is how choice outside an economic setting - choice when there are no consequences - will not lead to discovery of preferences. People make many choices in political settings, such as responding to polls and voting in elections or referenda, yet with choice removed from consequences, irrationality persists in politics. Choices in the political sphere do not produce feedback, and the beliefs of voters remain biased as a consequence (Caplan 2007).

If people have not discovered their preferences, this might be interpreted as simply injecting error into estimates of WTP derived from stated preference studies. Guessing at one’s true preferences is likely to increase standard errors, but if this were the only effect, the impact of a subjectivist critique of stated preferences would be not worth mentioning. People will discover their preferences through a process of trial and error. It is plausible that people will make guesses about their preferences based on information provided in the survey and similarity to known preference situations, but responses when people have not discovered their preferences through economic choices are likely to be biased. This is the importance of rational ignorance in political choice settings; not only do political preferences contain errors, they are also biased (Caplan 2007). WTP estimates are bounded below at zero (in most cases), and individuals reporting zero WTP likely have a small but positive WTP, limiting the size of the error, while overestimates of WTP are not similarly bounded. Erroneous estimates are not likely to cancel out across a sample of respondents.

**Subjectivism and the EPA Stated Preference Survey**

The subjective approach to choice and preferences has a relatively straightforward implication for practice of stated preference surveys. Hypothetical bias is far more fundamental than simple preference falsification outside of economic settings. Furthermore, the more removed from familiar choice economic settings a valuation exercise is, the greater the potential for hypothetical bias to contaminate the results. The major weakness of the EPA’s stated preference survey has been to rely on the shallow version of hypothetical bias to dismiss the entire issue. The NODA concludes, “ Appropriately designed choice-based stated preference methods may reduce hypothetical bias that can result from asking questions versus assessing WTP through market transactions or binding referenda.” (p.2) Evidence does suggest that people reveal their preferences accurately in surveys or polls, but this does not address the error and bias created when people have not discovered their preferences. And comparison to binding referenda are misleading because the political process does not create conditions under which preference
discovery will occur (Caplan 2007).

Fortunately methods exist to detect, limit, and correct for hypothetical bias. The blue ribbon panel of economists convened by the National Oceanic and Atmospheric Administration (NOAA) to evaluate the contingent valuation method offered several prudent suggestions (Arrow et al.1993). Unfortunately the stated preference study conducted by the EPA in this NODA simply cites hypothetical bias as a problem already solved in the literature and does not consider the NOAA panel’s recommendations. Some of the suggestions cannot be implemented now that the study has been conducted, like conducting surveys in-person to allow researchers to possibly observe hypothetical bias through participant comments or debriefings. The NOAA panel recognized the potential for overstating benefits and recommended conservative designs to control for this. The NODA does not include estimates of total benefits of the proposed regulations, but this caution should inform the benefits calculation. And statistical techniques can be applied on the respondents who chose one of the policy options in each of the three choices in the survey to investigate evidence of bias (Hanemann 1994).

**Choice Experiment Hides Outlier Values**

The EPA employs a choice experiment framework for its survey, which is recommended in the literature, and further ensures that all of these policy and cost alternatives are reasonable. As a consequence, the largest annual cost in any of the scenarios involved is $72, with costs ranging as low as $12. The specific way in which undiscovered preferences are likely to bias responses in a stated preference survey is through overestimation of WTP. Respondents who recognize value in the aquatic resources conserved by regulation may be unable to establish a precise value and presume that the value must exceed a few dollars each month. In this context, the credibility of the survey would be significantly enhanced by having some of the choices involve very large costs. EPA reports that 56% of respondents never chose the status quo alternative, selecting a costly policy option in all three choice questions answered. Some of these individuals, forced to guess what their preferences might be, are undoubtedly reporting a WTP that they themselves would revise if they faced economic choices regarding these amenities and could discover their preferences.

The EPA should conduct and present the results of a detailed examination of the 56% of survey responses choosing one of the policy options each time. The extent of hypothetical bias and overestimation of the benefits of the regulation will depend on whether many of these responses are outliers. The highest cost scenario that these respondents faced is one highly relevant factor. Individuals who chose policies with the highest costs might particularly be overestimating the value of environmental protection.

**Use Values Should be Valued Separately**

Stated preference surveys are our best available instrument for quantifying non-use values. Yet the first attribute of quality in the survey was commercial fish populations, which implies a use
value for commercial fishing. Larger fish populations will benefit both commercial and recreational fishing, and the impact of the proposed regulation on both commercial and recreational fishing should properly be included in a benefit cost analysis. A stated preference survey of the U.S. population at large is a very circuitous means to quantify the effect of a larger fish population on commercial fishing. Asking the U.S. population to quantify the value of increased populations for commercial fishing would be like asking these same respondents to quantify the value to the auto industry of a new type of robot to be used on the assembly line. Most of the survey respondents report that they eat fish, but purchasing seafood at the local market does not provide insight into the costs of commercial fishing, or the market demand for fish. The value created by the regulation for commercial fishing should be estimated directly, based on data relating commercial fish populations to fish catch, industry costs, and the demand for various types of commercial fish, to estimate increased consumer surplus.

While the value of an increase in the commercial fish population should be valued directly, the reported marginal WTP can be used to evaluate the plausibility of the stated preference findings. The WTP per household for commercial fish populations is $4.93 in the national survey, while the weighted value from the regional estimates is $4.67 (Table 14 of the NODA; the proportion of households in each region are the weights). Applying the number of households in the nation (111 million, Table 3), this yields a value of $522 to $551 million for a one percentage point increase in the commercial fish population. The national baseline for the commercial fish population is 51% (Table 2), so a one percentage point increase is about a 2% increase in the stock. According to the National Marine Fisheries Service, the total value of all commercial fish species landed in the U.S. was $4.5 billion in 2010 (http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html). The stated preference survey implies that a 2% increase in total commercial fish populations produces value equal to about 12% of the value of the entire U.S. commercial fish catch. This is an implausibly high figure, but can hardly come as a surprise, since most Americans have never worked in the commercial fish industry and have no reason to have researched current cost and demand conditions in the industry.

The value of recreational fishing in the stated preference survey is ambiguous. The fish populations and index of aquatic quality could be used by respondents to infer improved opportunities for recreational or sport fishing. Nonetheless, as a use value, value created for recreational fishing should be estimated more directly. A better way to value this would be a stated preference survey targeting to recreational fishers to determine how numbers of fish caught affect the enjoyment from a fishing trip. Regular recreational fishers will have made economic choices regarding the activity (purchasing tackle and other equipment, taking trips to fish) and should have discovered their preferences.

Relying on a national stated preference survey to attempt to value use values in these cases is not defensible. The EPA should quantify the benefits of reduced fish losses for the fishing industry
using indirect valuation methods (e.g., market data), or a stated preference survey targeted toward recreational fishers. The current stated preference survey detailed in this NODA could be used to value the non-use components of value, such as fish saved and aquatic quality. The inferred value for commercial fishing from the WTP for commercial fish populations should be compared to estimates of value creation for commercial fishing from market data, as a means of checking the plausibility of the stated preference survey results.

**Near Double Counting**

The choice experiment framework should involve different attributes of environmental protection. Respondents can then attempt to weigh the different components of environmental benefits with cost. The inclusion of a benefit component two separate times in a list of benefits, just described differently each time, could be confusing to respondents and lead to overestimation of benefits. The attributes list used by the EPA in this stated preference study comes dangerously close to listing the same components of benefits twice. The first two attributes are fish populations, while the third attribute is the number of fish saved. Fish saved are a flow while fish populations are stocks, and the two are obviously related. Commercial and overall fish populations will increase as a result of these regulations because fish will be saved. The fish saved component could elicit preferences regarding the human effect on fish populations. A five percent change in fish population will affect commercial fishing regardless of whether the change is due to human or natural causes. The fish saved attribute plausibly measures the extra effect of human actions - the current design of cooling water intakes - on the fish population, and thus its inclusion is theoretically defensible. As the survey is constructed, the inclusion of the “flow” in addition to the “stock” of fish may simply be inflating the apparent benefits for respondents (like when the announcer on an infomercial says, “But wait ... there’s more!”). In addition, the final listed component of benefit, the index of aquatic quality, again is related to fish populations, since higher quality of the environment might be thought of as adding more to the value of fishing, or be closely related to fish saved. In principle inclusion of the index might be attempting to elicit respondents’ value to non-fish related, non-use aspects of the environment. If respondents do not value this, inclusion of the index could serve to inflate the value they assign to the regulation.

The survey results show indications of this exact inflation of values of the other attributes. To see this, consider the implied household WTP for the maximum improvement in each attribute in the stated preference survey. For the nation, these were a 6 percentage point increase in commercial fish populations, a 4 percentage point increase in all fish populations, 95% fish saved, and a 4 percentage point increase in aquatic value. The NODA offers no total benefits estimates, and I do not mean to imply that this level of benefit will be attained or has been promised. I am interested in the contribution to total household WTP of each component. In the national sample, household WTP for this maximal improvement is $181 per year, of which $30 is from the increase in commercial fish population. Overall 84% of household WTP comes from
the other attributes, and 68% are from the clear non-use values of fish saved and aquatic quality. The stated preference survey claims then that the non-use values are twice the fish population values. Since the commercial fish population attribute almost certainly overstates the potential value of the increase in fish population to the U.S. commercial fishing industry, the remaining values must also be viewed with caution.

**Conclusion**

Regulatory policy making often involves non-use values for which revealed preference methods cannot be used to impute values. Stated preference or contingent valuation methods have been developed to help estimate these non-use values. No economist likely would claim stated preference methods are perfect, and eliciting some guidance regarding non-use values from the public is better than making tradeoffs completely in the dark. The practice of stated preference valuation would be strengthened by returning to economics’ subjectivist roots. Subjective cost theory stresses that cost (and preferences) are intimately related to choice. When venturing into unchosen territory, people will not have discovered their preferences; the practical implication is that hypothetical bias will never be vanquished. Hypothetical bias means more than simply whether respondents will truthfully reveal WTP in a survey or other non-market settings.

The stated preference study conducted by the EPA and described in this NODA suffers from two weaknesses. First, it dismisses hypothetical bias as a solved problem, and as such fails to apply any corrections or controls developed in the literature or recommended by NOAA’s Blue Ribbon panel on contingent valuation. Second, the EPA relies on a state preference survey to value both use and non-use values from reduced fish losses due to entrainment in cooling water facilities. Use values should be valued using market data, and their inclusion in the stated preference survey has likely contaminated inferences about the non-use value of fish losses. The marginal willingness-to-pay for commercial fish populations in this NODA is implausibly large, and since this represents less than half of household WTP, suggests that the marginal WTP in the stated preference survey offer little value for regulatory policymaking.
References


