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**COMPLIANCE BIAS IN DICHOTOMOUS CHOICE CVM:  
SOME EVIDENCE FROM A UTAH WILDERNESS STUDY**

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**Abstract**

Responses to a dichotomous choice contingent valuation (DCCV) of wilderness designation in Utah were used to determine if individuals who identified themselves as having no opinion or being neutral to wilderness designation in general and for two specific wilderness proposals would have nonnegative willingness to pay for such designation. In cases for which a sufficient number of observations permitted estimation, the estimated willingness to pay was positive and significantly different from zero and often exceeded that of individuals who identified themselves as supporting wilderness designation. This appears to support the contention that DCCV studies may generate values from respondents whether or not those respondents truly have positive willingness to pay.

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**Introduction**

Kemp and Maxwell define “compliance bias” in contingent valuation surveys as resulting from “a respondent's conscious or unconscious perception that to express oneself as willing to pay . . . is the socially responsible answer.” They suggest that the very fact that the survey is being undertaken “could suggest that the sponsor or interviewer believes the commodity has positive value.” A study of wilderness designation in Utah (Snyder et al.) provided the opportunity to test if individuals, who identified themselves as “neutral” relative to support or opposition to wilderness designation, would still respond positively to willingness-to-pay questions.

**The Study**

As a part of the larger examination of the economic consequences of wilderness designation in Utah, a contingent valuation (CV) study was conducted to determine Utah's willingness to pay for wilderness designation or nondesignation. While several proposals for wilderness have been made in Utah, only two are well-documented specific proposals:<sup>2</sup> the

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<sup>1</sup>This study was funded in part by the Utah Agricultural Experiment Station under the W-133 Regional Research Program.

<sup>2</sup>There is at least one other significant alternative proposal, the Hansen-Orton option. However, this alternative had not been sufficiently defined at the time of the study to provide the study respondents with enough detailed information on which to compare the three proposals. In addition, there have been many less well-specified proposals reported in the press and elsewhere.

Utah Wilderness Coalition (UWC) proposal, which was published as *Wilderness at the Edge*, and the U.S. Bureau of Land Management (BLM) recommendation, which was described in their related Final Environmental Impact Statement. The former proposal comprises approximately 5.7 million acres of BLM land; the latter, about 1.9 million acres. Most of this acreage is in sparsely populated areas of rural Utah, where traditional extractive resources have been a major component of the economic base.

The contingent valuation portion of the study focused on these two proposals for wilderness designation. A sample of 2,135 Utah households was drawn by Survey Research, Inc. of Arlington, Virginia. Because more than 80 percent of the population resides in the urbanized Wasatch Front, a second sample of 600 households from rural counties was obtained to ensure that rural populations would be adequately represented. The samples used in the study included the original general population respondents, the urban respondents from the general survey (households residing in counties along the Wasatch Front, plus Cache County), and rural respondents (from both the general and the rural-only sample).

A computer-based contingent valuation questionnaire was developed for the study. Prior to its implementation, a packet of information was sent to each household in the sample. That packet included a map showing the existing wilderness areas in Utah and the two proposals for designation with a brief explanation of the regulations associated with recently designated wilderness areas.<sup>3</sup> These regulations include clauses which prohibit reduction in existing traditional uses, unless these uses threaten “wilderness quality,” and allow for traditional means of extraction (for example, trucking and mechanized maintenance for

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<sup>3</sup>The map used was taken from *Wilderness at the Edge*.

grazing). However, further development of grazing, minerals, or other traditional extractive uses, and the use of mechanized recreational equipment, are prohibited.

In addition to the information regarding the wilderness proposals, a letter was included explaining the contingent valuation study and describing the survey itself. This letter indicated that willingness to pay for designation or nondesignation would be collected, along with attitudinal and socioeconomic data.

Upon contacting a household by telephone, the interviewer asked for the person 18 or older in the household who had the most recent birthday, an approach employed to insure a random sample. If the packet had not been received, read, or retained by the respondent, a new packet was sent and the individual was contacted again.

The respondent was first asked about his/her history of visitation to wilderness areas in Utah and his/her participation in various kinds of outdoor recreational activity. He or she was next asked to rank his feelings about wilderness in general on a scale of a 1 to 10, where 1 signified strong opposition; 5, neutrality; and 10, strong support. A ranking of 5 or above was classified as “supporting” wilderness in general; a ranking of 4 or less was classified as “opposing” wilderness in general. A series of CV questions (described below) was then asked. Respondents were then asked to apply the same ranking criteria to the BLM and UWC proposals, respectively, each of which was followed by a set of CV questions. At each step, the respondent was asked to refer to the map which was provided in order to identify the areas to which the questions referred. The CV questions were followed by a general question about voting in a referendum for the two proposals. Finally, information was obtained about the socioeconomic characteristics of the respondent and his or her spouse (if any), including race,

age, education, employment, marital status, and income. The telephone interviews lasted an average of about 20 minutes.

The dichotomous choice method (DC CVM) used for the CV questions is widely (although not entirely) accepted as a standard approach for minimizing various kinds of bias in CV studies.<sup>4</sup> The “bid values” were based on earlier work in Utah by Pope and Jones, on other wilderness studies as reported by Walsh et al., and on a pretest using a nonrandom sample of individuals on the Utah State University campus. Those values ranged between \$10 and \$2,000 and were selected at random by the computer program for each CV question.

Supporters were asked DC CVM questions about both the establishment and use of the wilderness areas or proposed wilderness areas. The first set of CV questions (wilderness in general) asked supporters for their willingness to pay for an annual permit to use the existing wilderness areas in Utah. The second set of questions involved two parts. First, the individual was asked a referendum question about his or her willingness to vote for the designation of the BLM-proposed areas when designation was accompanied by a specified annual loss in household income (in perpetuity). Next, the respondent was asked about his or her willingness to pay for an annual permit to use those wilderness areas. The UWC proposal questions followed the same pattern.

The willingness-to-pay measure (compensating surplus) was estimated for each of the six groups of respondents (general support, general opposed, urban support, urban opposed,

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<sup>4</sup>There has been considerable discussion of closed-ended, referendum CV questions in the literature. Some authors (Green et al., for example) suggest that this approach causes overestimates due to anchoring effects compared to open-ended questions. Others (Hoehn and Randall, for example) suggest that the dichotomous choice approach is preferable.

rural support, and rural opposed) using the logit estimator for the linear utility difference model (Hanemann 1984, 1989) for both supporters (those selecting a score of 5 to 10 on the 1 to 10 scales) and “neutral” respondents (those selecting “5”). We assumed that these neutral respondents were indifferent with respect to the wilderness proposals. Hanemann discussed two calculations, one of which admits negative responses and one which truncates the distribution at zero. The former would appear to be inconsistent with the bifurcation of the respondents. However, since the neutral participants were indifferent to the proposals and might respond negatively to the proposed payment, we also included an estimation using the full distribution. Confidence intervals at the 5 percent level were calculated using a bootstrap method (Cooper).

## **Results**

Table 1 indicates the results of the estimated logit equations for the three questions (wilderness in general, BLM proposal, and UWC proposal) for the general, urban, and rural samples. The variables included in the estimations were the bid value and household income. No other variables were consistently significant. Note that the statistical results for the existing wilderness areas are very weak. The small number of observations for these three estimations makes the results unreliable. Tables 2 and 3 indicate the willingness-to-pay calculations and confidence intervals for the truncated and full distribution, respectively.

It appears that, if the full distribution is used, consistent with the likelihood function estimated, neutral respondents' mean willingness to pay for the establishment of either the BLM or the UWC wilderness proposals is not significantly different from zero. This finding



Table 1. Logit Estimations by Population and Proposal (t value in parentheses)

	NOBS	Establishment			Use		
		Intercept	Bid	HHINC	Intercept	Bid	HHINC
<i>Wilderness in General:</i>							
General	21	N/A	N/A	N/A	5.6441 (0.73)	-0.107 (-0.87)	-0.368 (-0.63)
Urban*	16	N/A	N/A	N/A	3.109 (1.09)	-0.036 (-1.41)	-0.114 (-0.35)
Rural*		N/A	N/A	N/A	-1.705 (-1.24)	-0.001 (-0.18)	0.281 (0.97)
<i>BLM Proposal:</i>							
General	75	-0.328 (-0.45)	-0.011 (-1.62)	0.016 (0.12)	1.072 (1.64)	-0.009 (-3.31)	0.038 (0.29)
Urban	64	0.211 (0.26)	-0.013 (-1.59)	-0.048 (-0.34)	1.292 (1.76)	-0.008 (-3.00)	-0.02 (-0.15)
Rural	32	-1.869 (-1.83)	-0.001 (-1.15)	0.340 (1.48)	1.834 (1.25)	-0.026 (-1.96)	0.215 (0.66)
<i>UWC Proposal:</i>							
General	85	-0.139 (-0.25)	-0.003 (-2.41)	0.039 (0.33)	1.326 (2.30)	-0.006 (-3.40)	-0.128 (-1.11)
Urban	79	0.193 (0.32)	-0.003 (-2.43)	-0.015 (-0.13)	1.274 (2.19)	-0.005 (-3.13)	-0.133 (-1.15)
Rural	26	-2.330 (-1.25)	-0.025 (-1.69)	1.166 (1.77)	1.762 (1.21)	-0.011 (-2.09)	-0.129 (-0.48)

\*The values for the urban and rural estimations were made from a double-bounded question.

Table 2. Calculated Mean Willingness to Pay and Confidence Intervals—Truncated Distribution

	Establishment		Use	
	Mean	Confidence Interval	Mean	Confidence Interval
	\$	\$	\$	\$
<i>Wilderness in General:</i>				
General	N/A		51	(9–211)
Urban*	N/A		163	(50–539)
Rural	N/A		1,343	(99–1,727)
<i>BLM Proposal:</i>				
General	1,167	(836–1,429)	473	(316–712)
Urban	1,044	(752–1,336)	482	(300–728)
Rural	1,272	(799–1,540)	153	(45–409)
<i>UWC Proposal:</i>				
General	1,005	(750–1,233)	623	(323–802)
Urban	944	(695–1,200)	657	(338–833)
Rural	221	(74–479)	469	(181–880)

\*The values for the urban and rural estimations were made from a double-bounded question.

Table 3. Calculated Mean Willingness to Pay and Confidence Intervals—Full Distribution

	Establishment		Use	
	Mean	Confidence Interval	Mean	Confidence Interval
	\$	\$	\$	\$
<i>Wilderness in General:</i>				
General	N/A		41	(29–54)
Urban*	N/A		74	(35–95)
Rural*	N/A		273	(-1,497–900)
<i>BLM Proposal:</i>				
General	-23	(-85–28)	138	(76–196)
Urban	-0.15	(-54–45)	148	(50–199)
Rural	-561	(-2,952–4,623)	102	(67–145)
<i>UWC Proposal:</i>				
General	3	(-194–146)	146	(96–215)
Urban	41	(-132–189)	148	(53–224)
Rural	89	(49–125)	110	(11–177)

\*The values for the urban and rural estimations were made from a double-bounded question.

would not support the existence of a compliance bias. However, if the truncated distribution is used, the willingness to pay is often large and significantly different from zero. This result stems from using a calculation which is inconsistent with the estimated underlying functional form, as Hanemann pointed out but which has been used in numerous DCCV studies.

Further, when the willingness to pay for an annual permit to use the existing and proposed areas was examined, the mean values were, with one exception, positive and significantly different from zero. It could be argued that while these respondents were indifferent to the establishment of wilderness areas, once the areas were established, they would be willing to pay to use those areas. However, that also suggests that the total (existence plus use) value of these areas was not represented by the establishment bid, or that this total value was not a sum of the nonuse and use values. It seems unusual that individuals would be willing to pay to use an area but unwilling to pay at least the use fee to have the area established. There appears to be an inconsistency in these responses; either there is a compliance bias with the use values or that the total value of the establishment of wilderness areas is not the sum of use and nonuse values.

### **Summary and Conclusions**

A test of compliance bias was performed by separating out respondents who reported being “indifferent” to the establishment of specific wilderness areas in Utah and determining their willingness to pay for that establishment. The mean willingness to pay was not significantly different from zero, using bootstrapped confidence intervals, implying that compliance bias was not a significant problem. However, there was significant positive

willingness to pay for use of those areas once established. Because total value (existence plus use value) was estimated as zero, either the willingness to pay for establishment was not a total value or there was compliance bias in the use bids.

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