

# Do Reminders of Substitutes and Budget Constraints Influence Contingent Valuation Estimates? Another Comment

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## I. INTRODUCTION

Loomis, Gonzalez-Caban, and Gregory (1994; hereafter LGG) tested the NOAA panel (Arrow et al. 1993) recommendation to include substitute and budget constraint reminders in contingent markets. Their study of old-growth forests and Northern Spotted Owl habitat revealed that such additional information had no influence on estimated logit equations or willingness to pay (WTP). Before generalizing their results, however, they recommended replications with less familiar public goods. In response, Whitehead and Blomquist (1995; hereafter WB) proposed a replication with wetlands preservation. They found that additional substitute information changed WTP estimates from a positive amount to a number not significantly different from zero. While these results appear to conflict, LGG (1995) suggested that rather than a replication, WB's analysis is another investigation of the influence that different types of information have on contingent valuation (CV) estimates.<sup>1</sup> Therefore, uncertainty remains about the utility of including economic reminders in CV scenarios, as recommended by the NOAA panel.

This comment reports results from a more accurate replication of LGG's original study with lesser-known public goods, the peregrine falcon (*Falco peregrinus*) and shortnose sturgeon (*Acipenser brevirostrum*). As with LGG's study, the inclusion of substitute and budget constraint reminders is shown to have no significant influence on estimated logit equations or mean WTP; however, the inclusion of reminders is shown to substantially reduce the range of WTP interval esti-

mates. In other words, reminders substantially improve the efficiency of benefit estimates for the protection of two relatively unfamiliar species. This latter result implies that assessing whether economic reminders improve CV methods requires more than comparisons of estimated models and mean WTP.

## II. THE REPLICATION

Data were collected from a general population survey conducted in Maine during the spring of 1997 (Kotchen 1997). The primary objective of the survey was to obtain value estimates for peregrine falcons and shortnose sturgeons, both endangered species in Maine. The total sample size of 1,200 potential respondents was stratified in two ways. First, the sample was split with one-half receiving questions about peregrines and the other half

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<sup>1</sup> LGG explain how WB's study provides information for only one wetland, rather than a wide range of competing resource issues, as recommended by Arrow et al. (1993). Moreover, WB's study provides information about a substitute that will be available in the future in addition to a nearby substitute that currently exists.

receiving questions about sturgeons. Second, these groups were split again between those receiving and not receiving substitute and budget constraint reminders. The question format was a voter referendum to approve establishment of a statewide species protection fund. Just before answering the CV question half of the respondents for each species were given substitute and budget constraint reminders that were nearly identical to the ones used by LGG:

Before you decide if you would vote to approve this proposal, we would like you to keep in mind that the recovery program will *only* ensure protection of [species name] in Maine. Also remember that Maine has 18 other endangered animal species, including whales, turtles, eagles and several other bird species. If approved, money you would be required to spend to protect peregrine falcons would reduce the amount of money you will have to spend on the protection of other endangered species, other environmental programs, and on the every day products you buy.

A total of 194 surveys could not be delivered due to incorrect or incomplete addresses.<sup>2</sup> In total, 325 questionnaires were returned for the peregrine and 310 for the sturgeon, resulting in response rates of 64.4% and 61.9%, respectively, of the deliverable surveys.

The a priori belief was that people are relatively unfamiliar with peregrines and sturgeons compared to old-growth forests and Spotted Owls. The results provide empirical evidence of familiarity levels with peregrines and sturgeons in Maine. Prior knowledge of the species was reported by 47.9% and 26.6% for the peregrine and sturgeon, respectively. While both are assumed to be less familiar to people than old-growth forests and Spotted Owls, peregrines are significantly more familiar than sturgeons ( $Z = 5.23$ ).

Socio-demographic characteristics of respondents for each survey version are reported in Table 1. The results are similar across all versions: respondents' mean age ranges from 45 to 47.6 years; education from 13.8 to 14.2 years; income from \$35,928 to \$41,303; and number of household residents from 2.6 to 2.8. Furthermore, the proportion of female respondents ranges from 47% to

58%. Tests were conducted to determine if differences existed in the samples between those receiving and not receiving substitute and budget constraint reminders. No statistically significant differences were found; the absolute value of all Z values are well below 1.96, the 95% two-sided critical value. Hence, legitimate comparisons can be made across treatments for both the peregrine falcon and shortnose sturgeon.

Analytical procedures were similar to those used by LGG, including the treatment of protest responses. Results from the logit equations, benefit estimates, and interval simulations are presented in Table 2. The coefficient on bid amount is negative and significantly different from zero for all equations except the peregrine no-reminder version. This result for the peregrine is interesting since the reminder makes respondents sensitive to price (or bids), whereas without the reminder, price has an insignificant influence on the probability of yes/no responses. The coefficient on an index of general environmental attitudes (Dunlap et al. 1992) is positive and significant for all versions.<sup>3</sup> With the exception of the peregrine reminder version, prior knowledge of the species is also shown to have a positive and statistically significant effect on "yes" responses. The equality of the logit coefficients between reminder and no-reminder versions were tested with a likelihood ratio test. The insignificance of this test for both species supports LGG's finding that including economic reminders does not result in statistically different coefficient estimates.<sup>4</sup>

Mean WTP estimates were calculated by

<sup>2</sup> This rate of undeliverable surveys is to be expected when sampling from Maine state driver's licenses and registration cards, which only require renewal every seven years.

<sup>3</sup> Inclusion of this variable is based on social-psychological theory demonstrating how environmental attitudes are important predictors of behavior and behavioral intentions (see Ajzen 1988). Drawing on this theory, recent studies highlight how attitudinal measures can be used to help explain CV responses (Stern et al. 1995; Kotchen and Reiling, in press).

<sup>4</sup> These results, as well as others presented in this comment, were replicated in several other model specifications. The results from other specifications are available upon request from the authors.

TABLE 1  
SOCIO-DEMOGRAPHIC COMPARISON OF REMINDER AND NO-REMINDER  
VERSIONS FOR THE PEREGRINE FALCON AND SHORTRNOSE STURGEON

	Reminder	No-Reminder	Z Statistic
<i>Peregrine Falcon</i>			
Age	45.98	47.64	-0.94
Education	13.84	14.16	-1.1
Income	\$39,288	\$41,303	-0.68
Household Residents	2.75	2.82	-0.51
Gender (% female)	0.58%	0.51%	1.2
<i>Shortnose Sturgeon</i>			
Age	46.61	46.25	0.19
Education	14.2	14.0	0.65
Income	\$36,837	\$35,928	0.32
Household Residents	2.6	2.77	-0.96
Gender (% female)	0.53%	0.47%	1.03

truncating the cumulative distribution function at zero (Hanemann 1989). While LGG found nearly identical WTP estimates for both versions, the inclusion of reminders in this study results in lower estimates. No-reminder versions yield an estimate of approximately \$49 and \$26 for the peregrine and sturgeon, respectively, and these are reduced by reminders to approximately \$21 for both species. A comparison of simulated confidence intervals for mean WTP (Park, Loomis, and Creel 1991), however, failed to reject the null hypothesis of no statistical differences. The 90% interval estimates overlap, resulting in insignificant differences. The results support LGG's finding that reminders do not exert a statistically significant effect on mean WTP estimates.

There are, however, substantial differences in the 90% interval ranges between survey versions reported in Table 2. For both species, the substitute and budget constraint reminders improve efficiency of the mean WTP estimate. Models estimated from surveys including reminders produce relatively precise WTP estimates, ranging from \$18 to \$28 for the peregrine and \$15 to \$37 for the sturgeon. Without reminders, the confidence bounds for the peregrine and sturgeon widen to \$27 to \$297 and \$15 to \$107, a difference of several orders of magnitude. These wide ranges from no-reminder versions for both species render the corresponding benefit estimates highly questionable.

This result for the peregrine is likely related to the insignificance of the bid coefficient in the no-reminder model. Note should be taken, however, that the coefficient on bid amount was significant in a peregrine model (not presented here) that included bid amount as the only independent variable, and a substantial difference in confidence intervals was still observed. Rather than question the results presented here, the inconsistency of significance for bid amount may provide evidence that models including only bid amount, which are frequently used in CV applications, are susceptible to omitted variable bias. Moreover, the same relationship is demonstrated for the sturgeon in Table 2, for which the bid amount variable is statistically significant for both reminder and no reminder versions.

### III. CONCLUSION

This comment reports a nearly identical replication of LGG's study investigating the influence of substitute and budget constraint reminders on CV estimates. Peregrine falcons and shortnose sturgeons provide subjects that are lesser-known public goods than old-growth forests and Northern Spotted Owls. The results support LGG's original findings. For both species, the inclusion of substitute and budget constraint reminders has no statistically significant effect on estimated logit models and mean WTP.

TABLE 2  
MULTIVARIATE LOGIT EQUATIONS, BENEFIT ESTIMATES, AND INTERVAL SIMULATIONS

	Peregrine			Sturgeon		
	Pooled	Reminder	No-Reminder	Pooled	Reminder	No-Reminder
Constant	-2.9566* (1.0152) <sup>a</sup>	-2.4012* (1.3902)	-3.6433* (1.534)	-3.9767* (1.0807)	-2.7160* (1.5358)	-5.4847* (1.5955)
Bid	-0.0399* (0.0130)	-0.0691* (0.0204)	-0.0183 (0.0181)	-0.0638* (0.0204)	-0.0831* (0.0292)	-0.0508* (0.0297)
Environmental Attitudes	0.0619* (0.0181)	0.0631* (0.0256)	0.0642* (0.0263)	0.0905* (0.0195)	0.0763* (0.0278)	0.1091* (0.0283)
Prior Knowledge (1 = yes, 0 = no)	0.5262* (0.2914)	0.2138 (0.4167)	0.9606* (0.4256)	0.7619* (0.3771)	0.4601 (0.5707)	1.1188* (0.5337)
Sample Size	221	118	103	212	109	103
Pseudo R Squared	0.158	0.211	0.174	0.237	0.228	0.290
% Correct Predictions	66.1	66.1	66.0	66.5	67.0	69.0
Log-Likelihood	-137.87	-70.04	-64.08	-122.29	-62.62	-57.50
Likelihood Ratio Test	7.494			4.348		
Mean WTP (\$)	28.03	20.95	49.25	23.32	20.63	26.37
90% Confidence Interval (\$)	22.96-45.14	17.64-28.19	26.81-296.74	17.48-39.48	15.49-37.11	15.09-107.07

<sup>a</sup> Standard errors in parentheses.

\* Indicates significance at the .1 level or greater.

Beyond this, however, an additional finding was discovered in the course of replicating LGG's analysis. Inclusion of the reminders results in substantially more efficient estimates of mean WTP. This surprising result may be explained, in part, by one of the potential reasons LGG originally suggested for the insignificant effects. They explained how the effect of reminders may be small compared to other sources of variability in responses. For example, respondents unaccustomed to thinking about the economic value of endangered species may only have defined values within a wide range. Within this range, any bid amount is as valid as any other. Therefore, the effect of economic reminders could be easily overshadowed. While this appears to be a possibility based on the consistency of insignificant effects on logit models and mean WTP, the substantial effect on confidence intervals observed in this replication appears to indicate something further. While economic reminders have no significant influence on mean WTP, they may substantially reduce the range of bid amounts that respondents are willing to pay.

The additional results of this replication imply that assessing whether substitute and budget constraint reminders are truly an improvement to CV methods requires more than comparisons of estimated models and mean WTP. Much attention has been given to improving CV techniques for policy purposes, and many of these efforts seek to improve the efficiency of benefit estimates. These results provide initial evidence that including substitute and budget constraint reminders in CV surveys may be an important step in this direction.

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