Contingent Valuation of Quasi-Public Goods: Validity, Reliability, and Application to Valuing a Historic Site

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ABSTRACT

This paper employs the contingent valuation method to measure the nonmarket value of preservation of the Ste. Genevieve Academy, a quasi-public good. This study represents a new application of the contingent valuation method featuring a historical resource. As such, we explore the validity and reliability of this application of the method. Construct validity tests based on economic theory and the reliability test of internal consistency are conducted. We find evidence that the contingent valuation method can be a useful approach to measuring the nonmarket value of quasi-public goods such as historical resources. We also illustrate how the contingent valuation method can be used for policy analysis of preservation of historical sites.

INTRODUCTION

This paper employs the contingent valuation method (CVM) to measure the economic value of the preservation of a quasi-public good, a historical academy in Ste. Genevieve, Missouri. While the CVM has been used to value quasi-public goods such as recreational facilities (Combs, et al., 1993), the arts (Throsby and Withers, 1986), senior companion programs (Garbacz and Thayer, 1983), and damage to historic buildings (Grosclaude and Soguel, 1994), it is typically used to value changes in the allocation of environmental and natural resources. This study represents an application of the CVM for which the validity and reliability are unknown (see Carson, et al., 1994 for a comprehensive bibliography of CVM studies). Economic values measured with the CVM must have a certain degree of validity and reliability in order to be used for policy purposes.

The study of the valuation of historical and cultural resources is important since society devotes much of its resources to the preservation of these goods. Of the approximately $13.6 billion in discretionary spending authority included in the 1995 Department of Interior and Related Agencies Appropriations Bill, the National Park Service allocated $41.5 million for the Historical Preservation Fund. In addition to Federal grants, states are seeking innovative means to finance historical preservation projects (Poole, 1993). No study to date analyzes the economic benefits of this type of expenditure in the United States.

The case study that we have chosen, the Ste. Genevieve Academy (MO), is currently an important issue at the state government level. The existence of public good-type value for historical resources is often ignored by policy makers. The 1993 Mississippi River floods threatened several unprotected historical sites. If one uses a naive benefit-cost analysis

considering only the current market value of historic sites, they may appear to be unworthy of preservation. In order to obtain a more accurate estimate of a historic site, all values, including those that are held by people who are not in the real estate market, should be considered. Kaoru and Hoagland (1994) argue that for historic shipwrecks, conflicts among user groups have arisen and non-market valuation methods, such as the CVM, are important tools for resource management. The same arguments apply to other historic resources, such as buildings.

In this paper we describe our tests for the validity and reliability of the CVM for historic resources. We define the theoretical construct of nonmarket value for historical resources and specify construct validity tests. Next, we describe a mail survey of Missouri households, the variables which are used to test for internal consistency (reliability), and the resulting data. Univariate and regression results for the validity and reliability tests are presented. Lastly, we discuss some policy implications of this research and mention some future research needs.

VALUATION THEORY AND VALIDITY

The nonmarket value of historical preservation can be defined as willingness to pay (WTP). In order to theoretically derive WTP, consider a model where consumers have the utility function u(h,x,Z) where u is utility, h is the quality of the historical resource (i.e. the quality of its preserved state, required renovations, etc.), x is recreational or educational trips to see the historic site, and Z is a composite commodity of all other goods. Note that in this model ownership of the historical resource, or even travel to see it, are not necessary conditions for inclusion of h as an argument in u(·). Consumers can gain utility from interior or exterior tours of a historic building or simply reading and knowing about a preserved historic site.

If consumers minimize expenditures subject to a utility constraint, u=u*, the expenditure

function, $e(p,h,u^*)$, results where $e(\cdot)$ is the minimum amount of expenditures necessary to produce u^*, and p is the price of x. The price of x is measured as the travel and time costs of a trip to the site. The price of Z is assumed constant and suppressed in the expenditure function. The negative of the first derivative of e( ) is the Hicksian demand for visits to the historic site. If quality of the historic site and visits are complementary goods, then improvements in site quality will increase the number of visits (Whitehead, 1995).

The economic value of historical preservation is WTP, the equivalent variation measure of welfare

(1)
$$WTP = e(p, h^0, u^*) - e(p, h^1, u^*)$$

where h^0 is a degraded level of historical preservation and h^1 is the preserved level. Since the preserved site provides the consumer with utility, the reference level of utility can be achieved with lower expenditures on other goods when the site is preserved. When the site is degraded, the consumer must spend more on other goods in order to remain at utility level u^*. The difference between what the consumer must spend in the case of degradation and the level spent with preservation represents the willingness to pay to preserve.

Willingness to pay can be divided further into use value and non-use value components. If p^c is the choke price at which no trips are taken to visit the historic site, then the value of the resource to non-users is

(2)
$$NUV = e(p^c, h^o, u^*) - e(p^c, h^1, u^*)$$

where NUV is non-use value. The total willingness to pay includes both use and non-use values

where use value, UV, is the residual difference between willingness to pay and non-use value, WTP - NUV = UV. Use value is the equivalent variation of on-site visits to the historic site.

The validity of a measure of nonmarket value, such as WTP, is the extent to which it measures the true value. There are several types of validity tests, including criterion validity, convergent validity and construct validity (Mitchell and Carson, 1989). A criterion validity test for the CVM would consist of a contingent value and a criterion variable, such as an actual market transaction. For a private good, the criterion measure of value would be the actual price paid by the consumer. For a quasi-public good, a good with both private and public attributes such as a goose hunting license or a historic building, the price paid for the good does not reflect the total value of the good. In the case of a hunting license, the price paid is typically nominal and is not determined by market forces. In the case of historic buildings, the market purchase would only reflect the value of the private good attributes of the building, not capturing the non-use values modeled above. For goods which generate significant non-use values, there are currently no ideal criterion validity tests that are available (Brown, et al., 1996).

Convergent validity tests compare two types of non-market values of the good. In the case of hunting and fishing, a convergent validity test would compare UV measured with the CVM with measures of equivalent (or compensated) variation estimated using the travel cost method. There is much evidence which suggests those recreational use values measured with both methods are convergent valid (Carson, et al., 1996). In the case of historic buildings, convergent validity tests are feasible if consistent sets of the two types of data, recreational use and willingness to pay from CVM, exists.

Construct validity is a type of internal validity test in which a measure should vary in expected ways as other variables change. Construct validity is also called theoretical validity since theory should be used as a guide to specify the tests. For example, a common theoretical validity test is for the effect of income on WTP. Assume that the reference utility level is associated with the preserved historical resource, $u^* = v(p,h^1,y)$, where $v(\cdot)$ is the indirect utility function. Substitution of $v(\cdot)$ into (1) yields

(3)

$$WTP = e(p,h^0,v(p,h^1,y)) - y$$
$$s = s(p,h^0,h^1,y;g)$$

where $s(\cdot)$ is the equivalent variation function and γ is a vector of taste and preference variables (McConnell, 1990). Comparative static analysis can be used to specify theoretical validity tests. The effect of a change in income on s is

(4)

$$\frac{\partial s}{\partial y} = \frac{\partial e(\bullet,h^0)}{\partial v}\frac{\partial v(\bullet,h^1)}{\partial y} - 1.$$

When evaluated at the same preservation levels, the marginal cost of utility is equal to the inverse of the marginal utility of income. Using this relationship we restate (4) as

(5)

$$\frac{\partial s}{\partial y} = \frac{\partial e(\bullet,h^0)/\partial v}{\partial e(\bullet,h^1)/\partial v} - 1.$$

If historic resource quality, h, is a normal good, the marginal cost of utility is higher with less preservation and income will have a positive effect on the equivalent variation, $\partial s/\partial y > 0$. This condition is expected to hold since historical preservation is typically considered a normal good.

It can also be shown that the comparative static effect of the price of a trip to the historic site on the equivalent variation, $\partial s/\partial p$, is negative if renovations or other improvements in quality shift the Hicksian demand for trips to historic sites to the right (Whitehead, 1995). However, this result holds only for consumers who currently make trips or plan to make trips with improved quality. For non-users, those consumers who face the choke price, p^c, which is constant and does not vary, the marginal effect of price changes is zero.

The effect of changes in tastes and preferences on the equivalent variation, $\partial s/\partial \gamma$, cannot be determined with economic theory (McConnell, 1990). However, using standard demographic variables to measure differences in tastes and preferences, some results can be typically expected. After a finding of WTP increasing in income, demographic results that make intuitive sense would tend to support a conclusion of construct validity rather than establishing construct validity on their own.

RELIABILITY AND THE CONTINGENT VALUATION SURVEY

The reliability of willingness to pay is its consistency over time or space and the extent to which it is due to nonrandom sources. With the CVM reliability has most often been assessed with the test-retest method (Loomis, 1990), the split-half method (Reiling, et al., 1990), or the alternative form method (Whitehead, et al., 1995). Another technique for assessing reliability considers WTP as a measure of value similar to attitudinal or behavioral measures of preference, such as perceptions of and visits to the site (Singleton, et al., 1988). Correlations in the expected direction with these value indicator variables would suggest that WTP is reliable in terms of its internal consistency.

The CVM requires that a constructed market be presented to survey respondents using

mail, in-person, or telephone survey instruments. A contingent market for historical preservation must contain: (1) a detailed description of the proposed historical preservation program, (2) the baseline preservation level and proposed increments in preservation, (3) constructed market institutions such as the payment rule and policy implementation rule, and (4) a value elicitation question (Mitchell and Carson, 1989).

In this study, survey respondents are presented with one constructed market in a mailed questionnaire. The market presents a preservation program for the Ste. Genevieve Academy. Respondents are informed about the current status of and threats to the Ste. Genevieve Academy:

> *"Ste. Genevieve was founded by French settlers in about 1750 (although local historians put the founding at 1735). It was the first permanent settlement in what later became the state of Missouri. Located in historic Ste. Genevieve, the Ste. Genevieve Academy is one of the oldest school buildings west of the Mississippi River. Construction of the academy began in 1808 and was completed in 1810. The structure is listed on the National Register of Historic Places and is currently unoccupied. Please consider the following hypothetical situation concerning the preservation of the Ste. Genevieve Academy. Currently, the building is owned by the State of Missouri. However, the academy may be sold to private owners and converted to a bed and breakfast inn."*

The survey instrument incorporated several questions about respondents' interest, visits to, knowledge of and concern about the academy in order to obtain measures of attitudes and behavior.

Following the description and the attitudinal and behavioral questions the valuation question was presented:

"Suppose a special trust fund was established. The trust fund would accept one-time money donations that would only be used to purchase the Ste. Genevieve Academy and permanently maintain it as a historic site. How much money would your household be willing to donate to the trust fund? Remember this would be a one-time donation."

Respondents could choose among seven donation categories in a payment card-type format: $0, $1-$5, $6-$10, $11-$25, $26-$50, $51-$100, and more than $100. Follow up questions were then presented to determine reasons for contributing to the trust fund or answering with a donation of $0.

THE SURVEY DATA

The sampling frame is Missouri households. A random sample of household names was drawn from telephone directories of St. Louis, an urban area 64 miles from the preservation site, which we expected would include visitors to Ste. Genevieve, and Warrensburg, MO, a rural area 269 miles from the site which represents the rest of the state. Samples of 151 and 154 households were drawn from the St. Louis and Warrensburg phone books, respectively. The survey was conducted during the Spring of 1994 following procedures described in Dillman (1978). An overall response rate of 51% was achieved.

The data are summarized in Table 1. In general, item non-response was not a serious problem; however, the item-nonresponse rate on income would result in the deletion of about 15% of our observations. We therefore employ conditional mean data imputation for the missing income responses and unconditional mean data imputation for the other missing demographic variables (see Whitehead, 1994). The remainder of the item-nonresponse is due to missing WTP values and behavioral variables. The average household income is $36,231. Sixty-two percent of

the sample is male. The average age of the sample is 45. The average education is high school plus three years. The average family size is about 2.7 members. The sample, when weighted for urban and rural residents, represents the population of Missouri reasonably well.

The WTP responses are summarized by frequency in Table 2. Follow up questions were used to identify respondents who were not participating in the contingent market by stating their true willingness to pay for various reasons (Mitchell and Carson, 1989). The most frequent WTP response is $0. This result is not surprising since the Ste. Genevieve Academy is, perhaps, a relatively obscure historical resource. Respondents who gave a zero WTP response were then asked to choose a statement which best described why they were not willing to pay anything. Of eighty-four respondents, 4% answered I do not support historic preservation, 25% answered I do not have enough money, 7% answered I do not think the money will be used for this project, 11% answered I do not like these kinds of questions, 30% answered I do not think the conversion will significantly change the building and 24% answered some other reason. Respondents who didn t think that the money would be used for the project might have a positive economic value for the project but apparently did not believe the contingent market scenario. We interpret respondents who did not like hypothetical questions as rejecting the contingent market. These respondents are flagged as protest zero responses and deleted from the empirical analysis.

The two next most frequent categories of WTP are $1 - $5 and $6 - $10. Only about 13% of the sample stated a WTP greater than $11. None of the respondents stated a WTP greater than $100. Respondents who stated a positive WTP were asked to choose a statement which reflected the best reason for their answer. Of forty-eight respondents, the majority (54%) indicated a

reason that reflected non-use, or bequest, values, I want to preserve history for future generations. The next most common answer (25%) reflected use values, I like to visit historic buildings. Since the number of respondents who chose this response is double the number of respondents who gave a positive WTP and had seen the Ste. Genevieve Academy in the past, these responses suggest that a major motivation for WTP is option demand, or future use value. Of the other respondents, 13% answered I value all historic preservation, 4% answered I think the bed and breakfast inn will significantly change the building, and 2% (n=1) answered this sounds like a good cause and some other reason. One response was flagged as an outlier (Mitchell and Carson, 1989). The respondent who felt that this was a good cause was flagged, due to the indication of not desiring to pay for the Ste. Genevieve specifically but for the warm glow of charitable donations, and deleted from the empirical analysis.

Attitudinal and behavioral responses are described and summarized by frequency in Table 3. Attitudinal variables are INTEREST and CONCERN. Behavioral variables include KNOW and SEEN. Most respondents state that they have "some" interest in historic preservation in Ste. Genevieve while over one-third of the sample stated they had no interest. Over four-fifths of the sample had no prior knowledge about the Ste. Genevieve Academy before the survey was conducted. After learning about the Academy through information presented in the survey instrument, almost one-half of the respondents stated that they were at least "somewhat concerned" about the potential changes. Almost one-third of the sample had traveled to Ste. Genevieve but only eight percent had seen the Academy. This further suggests that a large portion of WTP can be described as non-use values, such as the value of the knowledge of historical preservation or bequests to future generations.

EMPIRICAL RESULTS

Our reliability assessment through internal consistency of the WTP statements was made by running Spearman rank correlations of WTP with the attitudinal and behavioral variables (Table 4). We hypothesized that WTP would be positively correlated with INTEREST, KNOW, SEEN, and CONCERN. For this analysis we collapsed each variable into two categories, the smallest category joining the next logical category, and coded WTP as a discrete variable equal to zero if WTP is equal to zero and equal to 1 if WTP is greater than zero. Table 4 shows that WTP and the attitudinal variables, INTEREST and CONCERN, are positively and significantly correlated suggesting that WTP is a reliable statement of preferences. In addition, the correlations between the various attitudinal variables are positive and significantly different from zero, suggesting that these measures are reliable.

WTP is positively correlated with the behavioral variables but only the correlation with SEEN is significantly different from zero. KNOW is significantly correlated with the attitudinal variables and with having seen the Academy. SEEN is significantly correlated with INTEREST, KNOW, and CONCERN about the Academy. These results also lend some reliability to our WTP estimates.

Since our data are censored at zero and measured in intervals (not precise WTP amounts), we use several econometric models to analyze the data and test for theoretical validity. We use the grouped data, Tobit and Cragg regression techniques (Greene, 1993; Greene, 1995). See Cameron and Huppert (1989), Halstead, Lindsay, and Brown (1991), and Goodwin, et al. (1993) for CVM applications of these techniques. The Tobit model is implemented by coding a point estimate for WTP that is equal to the midpoint of each interval (i.e., WTP=$3 if the respondent

stated $1-$5). The Cragg model is implemented by using the discrete variable for positive WTP in the first stage probit model and the WTP point estimate data in the truncated regression second stage model.

The empirical results of the estimated linear functional form of the equivalent variation function models are presented in Table 5. The models include INCOME, in order to perform our primary theoretical validity test, and demographic and attitudinal variables, in order to test for taste and preference effects and reliability. None of the WTP specifications include the behavioral variables, KNOW and SEEN, due to endogeneity (see McConnell, 1990). The data are weighted so that the St. Louis and Warrensburg samples are representative of the proportions of the population in urban and rural regions of the state.

In preliminary regressions, the price of a trip to the historic site was included, measured as the travel and time costs of a trip, in order to determine the extent of use/non-use values. The price variable was positive (indicating that transformation of the Academy would decrease trips to it), and statistically insignificant in all models, indicating that the proposed change in the Academy would have no effect on behavior. Therefore, our models indicate that all of the WTP estimates can be attributed to non-use values. There is a subtle link between revealed behavior and WTP in our data, however. Estimating probit models predicting whether respondents are concerned about the change in the Academy, we find that whether a respondent had SEEN the Academy in the past positively affected their CONCERN for preservation at the p=.10 significance level (t=1.81). This finding lends some convergent validity to our WTP data and link to observable behavior.

All WTP models reveal that WTP increases as INCOME increases. This result is

important in that it reveals that those respondents most able to pay for preservation are more likely to state positive and higher WTP amounts. This result suggests that the WTP measure has some degree of theoretical validity. Also, all models find that female respondents are willing to pay more than male respondents. In order to better understand this result, we ran correlations of SEX with the attitudinal and behavioral variables from Table 3. SEX (male=1, female=0) is negatively and significantly correlated with INTEREST in and CONCERN about historical preservation in Ste. Genevieve. This result suggests that female respondents have attitudes more conducive to preservation of the Academy and therefore are willing to pay more. AGE has no statistically significant effect on WTP. EDUCATION has a positive effect on whether WTP is positive in the probit model. FAMILY SIZE has a negative effect in the Tobit model. This result might be related to ability-to-pay: as family size increases, budgets tighten, and WTP falls.

In each model, CONCERN about the future of the Academy is included in order to conduct a reliability test while holding other variables constant. In each model, CONCERN has a positive effect on WTP, strengthening the previous simple correlation results. However, inclusion of the other attitudinal variable, INTEREST in the Academy, had no effect on WTP whether it was included with or without the CONCERN variable.

Comparing the regression models, the most striking result is that the second stage of the Cragg model has no explanatory power. Also, conducting the likelihood-ratio specification test between the Tobit and Cragg models (Goodwin, et al., 1993; Greene, 1995) we reject the Tobit model in favor of the Cragg (χ^2=108.24[7 df]). These results strongly indicate that in the grouped data and Tobit models the variation explained by the independent variables is simply the consumers decision whether to state a WTP amount greater than zero or not. This result is not

uncommon in CVM research with continuous WTP data (see Brown, et al., 1996), but it does weaken our ability to interpret the coefficients of the models. Calculation of the marginal effects of independent variables on WTP will have little meaning and this analysis is not conducted.

POLICY ANALYSIS

Expected WTP, E(WTP), estimates are also presented in Table 5. Expected WTP is equal to the predicted WTP values from each model evaluated at the means of the independent variables. For the interval data model, some of the predicted WTP values are negative. Since negative WTP is inconsistent with the value of economic goods, we set the negative predicted values equal to zero. For the Cragg model, predicted values are only obtained for those respondents who are willing to pay more than zero. We use the zero WTP values for those other respondents when calculating predicted WTP. The predicted estimates from each model range from $5.07 to $6.48. The lowest two estimates bracket the raw data WTP estimate of $6 suggesting that these expected values are reliable. Since this is a one-shot donation, aggregate benefits of preservation (aggregate WTP) can be found by simply summing the household WTP estimates over the number of households in the Missouri population.

We adjust the aggregate benefit estimates downward by setting the values of non-respondents to zero in order to obtain a conservative estimate of aggregate nonmarket value. This adjustment assumes that the WTP values of non-respondents are lower than those of respondents to the survey due to sample selection bias. Setting these values equal to zero accounts for this assumption but may result in a downward bias of aggregate benefits (see p. 278, Mitchell and Carson, 1989).

We also adjust the aggregate benefit estimates downward by setting the values of those

respondents who have no knowledge of the Ste. Genevieve Academy (before the survey) to zero. Whitehead, et al., (1995) find that CVM participants who have no knowledge of the survey issue have less valid and reliable WTP estimates than respondents who do have prior knowledge. Since invalid and unreliable WTP estimates may be biased and not reflect true economic values, a conservative approach to dealing with this potential bias is to set these values equal to zero. Bishop and Welsh (1992) argue that prior knowledge is not a necessary condition for positive WTP values and argue that aggregation should include respondents with imperfect information. If true, our aggregation rule will result in a downward bias.

The point estimate of the aggregate nonmarket value of preservation of the Ste. Genevieve Academy is in the $.86 million to $1.1 million range (1994 dollars). The 95% confidence intervals range from a low of about $.56 million to a high of about $1.27 million. The Academy was listed for sale from the State of Missouri's Historical Property Offering with an asking price of $55,000. The aggregate WTP is sufficient to cover the asking price and a maintenance fund for several years. We conclude that preservation of the Ste. Genevieve Academy was the socially preferred alternative. Note that adoption of the assumptions of Bishop and Welsh (1992) would not change this conclusion, although it would potentially change the rankings of acceptable public programs in favor of preservation of the Academy.

CONCLUSIONS

This paper has employed the CVM to measure the economic value of the preservation of a quasi-public good, a historical academy in Ste. Genevieve, Missouri. While the CVM has been used to measure quasi-public goods values for the arts and senior companion programs, the existence of public good-type values for historical resources is often ignored by policy makers. In

order to obtain a more accurate estimate of the value of quasi-public goods, all values, including those that are held by people who are not active participants in the relevant market (due to nonrival consumption) and those who do not visit the historical resource site, should be considered.

Our CVM estimate of nonmarket value, WTP, passed some suggestive validity and reliability tests. Willingness to pay is significantly correlated with attitudinal variables that are consistent with a preference for historical preservation. Willingness to pay also increases with income so that historical preservation can be considered a normal good, as one would expect. Willingness to pay is higher for females and increases with education. We therefore tentatively conclude that the willingness to pay estimate provides relatively valid and reliable measures of nonmarket economic value. This paper provides preliminary evidence that the CVM can be a useful approach to measuring the value of historical and cultural resources for public policy analysis.

Based on a simple benefit-cost analysis, we conclude that preservation of the Ste. Genevieve Academy is the socially preferred alternative. However, the Academy was recently sold for nonpreservation purposes, an inefficient government action according to our results, perhaps due to the ignorance of the magnitude of the preservation values. We caution that much further research concerning the validity and reliability of the CVM for historical and cultural resources needs to be conducted before WTP estimates from the CVM are used for policy analysis. Further validity and reliability research is especially needed. This research should focus on criterion validity tests by comparing the CVM for historical resources with simulated/experimental markets or convergent validity tests with comparisons to revealed

preference approaches, such as the travel cost method or the hedonic price methods. Additional reliability tests, such as the test-retest, split-half, or alternative form tests should be conducted for WTP for changes in historical resources. Finally, we encourage the application of the CVM to public programs involving other cultural and historical resources (i.e. historic shipwrecks) to assess the breadth of our conclusions.

TABLE 1: Data Summary

Variable	Mean	Standard Deviation
INCOME (Household, 1993 $)	$36,231.21	22,169.88
SEX (Male=1)	0.61	0.49
AGE (years)	44.77	16.80
EDUCATION (years)	14.85	2.31
FAMILY SIZE (number of members)	2.70	1.23

TABLE 2: WTP Responses

Willingness to Pay	Frequency	Percent
$0	69	60.7
$1 - $5	12	10.3
$6 - $10	20	16.2
$11 - $25	6	5.1
$26 - $50	8	6.8
$51 - $100	1	0.9
More than $100	0	0.0

TABLE 3: Attitudinal and Behavioral Variables

Variable	Frequency	Percent
"INTEREST in historic Ste. Genevieve?"		
Very Much	10	8.6
Some	67	57.7
None	39	33.6
"KNOW about the Ste. Genevieve Academy?"		
Very Much	0	0.0
Some	20	17.2
Nothing	96	82.8
"CONCERN about the possible changes?"		
Very Concerned	8	6.9
Somewhat Concerned	50	43.1
Not Concerned	58	50.0
"Ever SEEN the Ste. Genevieve Academy?"		
Yes	9	7.8
No	107	92.2

TABLE 4: Spearman Correlation Coefficients

Variable	WTP	INTEREST	KNOW	CONCERN
INTEREST	.32*			
KNOW	.13	.23*		
CONCERN	.57*	.45*	.18*	
SEEN	.18*	.20*	.55*	.16**

*,**Significantly different from zero at the α=.05, .10 level.

TABLE 5: Theoretical Validity Tests

			Cragg	
Variable	Interval	Tobit	Probit	Truncated
CONSTANT	-21.67 (1.50)[a]	-27.27 (1.54)	-3.29 (1.32)	130.39 (0.92)
INCOME	0.00020* (2.17)	0.00024* (2.15)	0.000018* (2.12)	0.00057 (0.59)
SEX	- 9.45* (2.56)	-11.75* (2.59)	-1.15* (3.44)	16.97 (0.45)
AGE	-0.0048 (0.05)	0.0051 (0.04)	0.012 (1.25)	-1.04 (0.79)
EDUCATION	1.00 (1.25)	1.26 (1.28)	0.14** (1.88)	-6.24 (0.71)
FAMILY SIZE	-2.40 (1.58)	-3.07** (1.65)	-0.13 (0.94)	-11.93 (0.69)
CONCERN	15.99* (3.92)	19.63* (3.97)	1.77* (5.58)	-54.36 (0.91)
σ	14.37 (8.62)[b]	17.95 (9.81)		34.14 (1.69)
Log-Likelihood	-148.18	-266.77	-44.98	-167.67
E(WTP)	$5.07 (9.61)[b]	$6.48 (5.80)		$6.01 (8.29)

*,**Significantly different from zero at the α=.05, .10 level.
[a]Absolute value of the t-statistic in parentheses.
[b]Standard deviation in parentheses.

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