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Comparing the Economic Value of Fire Conditions and the Effects of Wildfire on Hiking in New-Mexico Recreation Sites using Contingent the Valuation Method and Travel Cost Method

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Abstract: There are some criticizes on Contingent valuation method (CVM) and Travel cost method (TCM), therefore many researchers have combined multiple methods of non-market valuation or have tried to value the non-market goods or services by different methods and check for convergent validity of the methods. In this paper both CVM and TCM are used. The empirical part showed that willingness to pay is more for New-Mexico recreation sites based on a dichotomous choice sample obtained from the data set gathered by Hessaln *et al*. In addition, fire age is shown to have less impact on WTP of visiting the sites in contingent valuation method. This study showed the two estimates *on willingness to pay calculated by TCM and CVM* are not significantly different at the 5% level.

Key words: Environmental amenities · Non-market valuation · Travel Cost method · Contingent valuation method · Recreation

INTRODUCTION

While fire plays an important role in most forest ecosystems in North America, the challenge of managing fire in North America is to find ways to effectively balance the positive ecological aspects of fire with the negative social and economic impacts. In the United States, the National Fire Plan (NFP), was developed in August 2000, following a landmark wildland fire season, with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future.

The major emphasis of NFP for increasing use of prescribed fire to prevent fires in fire dependent ecosystem, thereby moderating the effects of wild fire, although seems an effective ecological solution, may not be a socially acceptable alternative [1]. There is a need for cost and benefit information to determining the most effective and efficient management techniques with incorporating social values in the decision making process when determining fire management decisions, especially in the high use recreation areas.

There are a number of studies that address social aspects of fire. Englin *et al*. [2] used travel cost method to assess value changes for canoeing in Manitoba, Canada. Hessaln *et al*. [1] have investigated the fire effects on hiking and biking in different sites by TCM (there are also other studies which concentrate only on the economic value of ecotourism like hiking in forests-for example see Canham 2011[22]). While most of the investigations on the effects of fire on recreation sites are done by travel cost method, TCM has been criticized by several authors for failing to measure adequately the non-use or intangible values. Although this technique is used to value un-priced goods, it does so with error and so there are no grounds for believing that the TCM produces estimates are closer to the theoretical constructs. Therefore many researchers have combined multiple methods of non-market valuation because of performing a "methodological cross-check". This methodological

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cross-check is a reason for researchers to peruse multiple method of non market evaluation--to show that using only use values underestimates the total welfare change and to jointly estimate use and non-use values to provide a more complete picture of welfare change is a preferable approach.

In this study, a comparison of CVM (a stated preference method) and TCM represents a test of convergent rather than criterion validity. This convergent test is done by comparing the estimates of willingness-to-pay (WTP) from the CVM experiment with those from the TCM. This study undertakes such a comparison by employing these methods to estimate the WTP of hikers for using recreation sites in New-Mexico.

The study is divided into five sections. The next section provides some background on the history of these methods and discusses the nature of the values they measure. The third part covers the empirical work of the paper. Fourth section compares the result between two methods--CVM and TCM. Finally, in the fifth section the conclusions of the study are presented.

Background of Non-Market Valuation: When freely operating markets are observed, people can reveal their preferences through their actions. These can be used to ascribe monetary benefits to the goods or services traded in them (i.e. the WTP for the good or service can be derived from its demand curve). But the problem rises when there is no market to value the goods and services. In these circumstances, it is impossible to observe a demand curve and hence obtain a measure of the WTP. This problem arises when valuing environmental amenities, such as national Parks, recreation sites and etc. Environmental economists have developed two approaches to valuing these commodities:

- The TCM-a revealed preference method that estimates the benefits by using travel costs to estimate demand at different distances from the park;
- The CVM-a stated preference method that attempts to directly estimate the benefits by asking individuals their WTP for the park.

Testing the convergent validity of these methods by comparing estimates from the CVM and the TCM has a long tradition in environmental economics that dates back to the first contingent valuation study when Knetsch and Davis [3] compared their results with a study based on the travel cost method. Since then there have been many comparisons of revealed and stated preference methods in valuing quasi-public goods in order to test convergent validity. In this section some background definitions and literature review on this these methods is provided.

Travel Cost Approach: The travel cost approach is a way to value un-priced goods. This method estimates the value people place on recreational locations or amenities (such as nice trees for hiking or nice sand for laying on the beach). The theory is that a person's decision to participate in recreational activities in a specific place is a function of the costs of traveling to that place (the price for the trip) and the environmental amenities they will obtain by traveling there. The costs include gasoline, wear and tear on automobiles and the time traveling. Time traveling is often the most costly component of a trip, given the many demands we have for our time in modern society.

There are a large number of studies done using TCM, including Cooper [4], Berman and Kim [5], Font [6], Layman *et al*. [7], Englin *et al*. [2], Bowker *et al*. [23], Tuffour and Espineira [24] and Hesseln *et al*. [1]. Most often connected with recreational analysis in industrial countries, the TCM measures the benefits provided by recreation sites (parks, lakes, forests and wilderness). In this method, the area surrounding a site is divided into concentric zones of increasing distance. A survey of users conducted at the site determines the zone of origin, visitation rates, travel costs and various socio-economic characteristics. Users close to the site are expected to make more use of it, because its implicit price, as measured by travel costs, is lower than that for more distant users. Analysis of the questionnaires enables a demand curve to be constructed (based on the WTP for entry into the site, costs of getting to the site and foregone earnings or opportunity cost of time spent) and the associated consumer surplus can be determined. This surplus represents an estimate of the value of the environmental good in question [8].

While TCM is the most frequently used tool in estimating the WTP for non-market goods, several studies have addressed its weaknesses (Randall [9], Eberle and Hayden [10], among others. Randall [9] argued that the TCM cannot generate monetary measures of recreation site benefits for use in Cost Benefit Analysis. He argued that TCM can, at best, give ordinary measurable welfare estimates.

CVM Approach: The first contingent valuation study was conducted by Davis [11]. Since then this method is used on virtually any kind of public good or services imaginable. However, the method does pose some challenges, including problems of designing, implementing and interpreting questionnaires. While its applicability may be limited, there is now considerable experience in applying this survey-based approach in developing countries. Some have argued that with a proper survey design these associated problems can be minimized (Mitchell and Carson [12]).

The CVM is also a method of estimating the non-market value of environmental attributes or amenities, such as values of a recreational or scenic resources, endangered species or etc. These values are generally measured based on the WTP for improved environment or the willingness to accept (WTA) some compensation for damaged environment or to accept a condition of not having the improved environment. The most appealing aspect of the CVM is that it allows one to estimate total value rather than components of that total value (Frykblom [13]). The essential and most important task of CV analysis is the design of questionnaires and survey procedure. Mitchel and Carson [12] provide an analysis of the process and issues in the development of questionnaires and sampling.

The first point of the CVM is that the visitors are asked how much they would pay, above the current price (sometimes this price may be zero), for the good in question and this value will be consider as their net WTP. The second element of the CV question is the method or vehicle, for paying for the service that links the payment with the service such that without the payment there would be no service. Also the time dimension of the payment must not be ambiguous. As Mitchel and Carson [12] argued that the choice of a payment vehicle requires balancing realism against payment vehicle rejection. Respondents may reject the valuation exercises if the payment mechanism is not believable. A variety of payment vehicle has been used in different studies, for example income tax by Loomis and du Vaire [14] and admission fees by Lunander [15].

The final element of a CV scenario is the method of asking the questions. The key characteristic that differentiates the various types of contingent valuation question is the response format. This part of the questionnaire confronts the respondent with a given monitory amount and one way or the other induces response. This has evolved from the simple open-ended question of early studies such as "What is the maximum amount you would pay for …?".

Comparison of TCM and CVM: The TCM is a revealed preference model, meaning it uses actual expenditures by the respondents to derive a demand curve from which to estimate benefits, where as the CVM is a stated preference model, meaning no actual transaction will take place but rather intended behavior is used to estimate benefits. Both methods measure forms of consumer welfare, with the TCM measuring Marshallian consumer surplus, which is defined as the difference between the price a consumer was willing to pay for a good and the price actually paid, while the CVM can measure various forms of welfare (Fix and Loomis[16]). The hypothesis of this study is that the WTP using TCM is the same as using CVM, as shown in equation (1).

$$H_0 : WTP_{tcm} = WTP_{cvm} \tag{1}$$

Empirical Model: This study is based on a survey of visitors from ten sites on five national forests in New Mexico which were chose based on recreation use and fire history done by Hesseln *et al*. [1]. Because there were few trails that had burned in the last 50 years, they considered 8 control sites and 2 sites that had been burnt. One site included a 50-years old fire of 22,000 acres which was a mixed-severity burn. They also collected background information the respondent such as their age, gender and income and employment status, along with information on some site characteristics that may have affected the respondent's decision making like site location, plants and elevation. In addition, information on travel cost and time spent, which is necessary on a TCM study, were also collected. They asked the users to respond to other regime scenarios in order to augment the natural variation in fire ages and burn intensities, to better understand how their visitation would be affected by prescribed burning and recent crown fire.

A contingent visitation behavior question based on photos that depicted half of each trail a severely burned, moderately burned and recovering from sever burn was asked. Contingent visitation behavior question was based on three fire scenarios using color photographs of the following:

- High-intensity fire: the fire was two years old, with blackened, standing trees and very little greenery.
- Light prescribed burn: fire same as above (two years old) except the underbrush was burned, trees were burned on the lower portions of the trunks and reddish needles were showing in the crowns.
- High intensity 20-year old burn: the photo indicated standing dead trees with white trunks and a mix of downed trees, with new green young trees.

Table 1: Descriptive statistics

Particulars	Mean
Travel	
Average travel time to site (h)	3.3
Average travel distance (mi)	231
Average gas cost($)	27
Visitation	
Hours spent on site(h)	10.2
Miles traveled onsite	10.4
Respondent characteristics	
Group size (pers.)	4.3
Male (%)	49.6
Retired (%)	19.5
Average age (years)	45.6
Education (years)	16.3
Employed (%)	74.0
Household size (pers.)	2.4
Average income($)	74,000
Trips taken actual (per person)	
Current year	3.29
Previous year	2.11
Trips taken hypothetical (per person)	
High intensity 2-year old fire	1.96
Low intensity 2-year old fire	3.08
High intensity20-year old fire	2.03
Increased cost scenario	1.88

Source: Hessaln *et al.* [1]

Respondents were asked how their visitation to each site would change if 50% of the trail they were on resembled the photo. This enabled them to efficiently convey the effects that high-intensity crown fire, prescribed fire and older burns have on recreation demand. Respondents were also asked how visitation might change if the cost of the trip had increased holding fire and non-fire characteristics constant for the trail on which they were intercepted. These stated preferences data were collected base on price using increased trip cost of $1,3,7,9,12,15,19,25,30,35,40 and 70.

Revealed preference and stated preference data were combined in six panels. To distinguish between revealed and stated preferences, a dummy variable was created HYPAC (hypothetical vs. actual). Actual trips taken for 2000 and 2001 were recorded as HYPAC=0. The first and second panels represented actual trips taken. Site data and fire characteristics were recorded in these two panels as actual observation and actual fire history. Panels three through five represented, for each individual, stated preference responses relating to each of the three fire scenarios presented in the photographs. While non-fire site characteristics remained the same, fire history was coded according to fire characteristics relating to each of the three scenarios depicted by the photos. For each scenario the percentage burn observable from the trail was recorded as 50%. Finally, the sixth panel included contingent behaviors based on increased travel cost. In this panel actual fire history and site characteristics were used. The data set was checked to see whether it can match for a contingent valuation study for calculating WTP. Some of the sample respondents were omitted because of missing values on WTP for trip bid. Table 1 shows the summary of the data set used.

Travel Cost Method: As described before, the travel cost method estimates the value people place on recreational locations or amenities by constructing a demand curve for trips to different recreation sites in the study area. In theory, the TCM model stipulates that a person's decision to participate in recreational activities in a specific place is a function of the costs of traveling to that place (the price for the trip) and the environmental amenities they will obtain by traveling there. Site characteristics variable are included as demand shift variables. By employing a count data travel cost model and combining revealed and stated preferences and using panel data methodology of Englin and Cameron [2], a model can be hypothesizes as shown in equation 2.

$$E[TRIPS_{ij}] = \exp(\alpha_0 + \beta_1 FireEffects_{ik}) + \beta_2(CostFactors_{ik}) + \beta_3(SiteCharacteristics_{jk}) + \beta_4(Demographics_i) \quad (2)$$

Where, i stands for individual, j stands for scenario and k stands for sites.

To calculate the travel cost, gas costs were combined with a fraction of the wage rate to value travel time, an approach conventionally used by US federal agencies. Income was also included in the demand specification as reported by respondents. Using Fix and Loomis [16], consumer surplus can be calculated by the inverse of travel cost coefficient (Creel and Loomis [17]), as shown in equation 3.

$$WTP_L = 1/[\beta_1 + 1.96(SE)] and WTP_U = 1/[\beta_1 - 1.96(SE)] \quad (3)$$

The estimates of consumer surplus and 95% confidence interval based on this calculation were $109.49 for WTP_L and $159.56 WTP_U. Consumer surplus is calculated by the above technique then divided by 4.3, which is the average group size for the sample, in order to estimate individual per-trip consumer surplus which is equal to $30.20. Dividing by group size of the sample assumes each member of the group receives equal benefits.

Contingent Valuation Method: The contingent valuation question included in the survey was increased travel cost. The dichotomous choice question included in the survey was: " If the cost of visiting this site today had been $______ higher, would you have made this trip to this site today?" to which they responded "yes" or "no". As it is mentioned above there were 12 different dollar amounts, ranging from $1 to $70, of which one was randomly given to the respondent. While the dichotomous choice format was the most appropriate format for the available data set and questionnaire, yet there is no apparent loss in reliability (Loomis [18]). Basically if one were trying to set the questionnaire for a CVM study dichotomous choices question was an easy question for the respondent to answer; it was very similar to how a market works. When using a dichotomous choice question format. This model is based on a random utility framework, which assumes that respondents' decision to accept or reject a given bid amount B is viewed as the outcome of a utility maximization decision (McFadden [19]; Hanemann, [20]. The probability that the respondent will pay more for the travel is modeled as:

Prob [Respondent pays more travel cost] =

$$= prob[U_m - U_{nm} > 0] \quad (4)$$

$$= prob[\varepsilon nm - \varepsilon m < a + by - cp + dz] \quad (4.1)$$

$$= \Phi(a + bW - cp + dz) \quad (4.2)$$

Where, y is income; p the more payment for travel and use the recreation site; z is a vector of socioeconomic and demographic variables and W is site characteristics vector; $a = \alpha m\text{-}\alpha nm$; $b = \beta m\text{-}\beta nm$; $c = \beta m$; $d = \delta m\text{-}\delta nm$; "m" stands for the decision to pay more; "nm" for the decision not to pay more; $\varepsilon nm\text{-}\varepsilon m$ is assumed to have a standard normal distribution; $\Phi(.)$ is the cumulative distribution function of the standard normal distribution. Therefore following using a dichotomous choice question format, one has to use a logit or a probit model estimate the maximum WTP (Loomis [21]). In this study, the hypothesized can be expressed as shown in equation (5).

$$\ln(probyes/1-probyes) = \beta_0 - \beta_1 * tripbid + \beta_2 * demographics + \beta_3 * sitecharachteristics + \beta_4 * Fire\,variables \quad (5)$$

where "tripbid" is the dollar amount the individual was asked to pay more, the demographics is the vector of the demographic variables like income, group size, travel time and cost and etc., "sitecharacteristics" is the vector of the site characteristics variables like facilities, scenery and elevation and etc., the "firevariables" is the vector of the variables related to fire age, fire extension and the acres burnt and etc.

Table 2 presents the names and descriptions of the variables and expected signs. The dependent variable is the probability that a respondent will choose to pay for

Table 2: Names and Descriptions of Variables used in the Logit/Probit Analysis

Variable Code	Description	Expected Sign
tripbid	The proposed bid amount	-
dscenery	Dummy variable 1=effective in decision making*	+
dforest	Dummy variable 1=effective in decision making*	+
dfacility	Dummy variable 1=effective in decision making*	+
dwildlif	Dummy variable 1=effective in decision making*	+
daccess	Dummy variable 1=effective in decision making*	+
dflowers	Dummy variable 1=effective in decision making*	+
dlocation	Dummy variable 1=effective in decision making*	+
Hike	1=if participated, 0=otherwise	?
onsite	hours=8 * no of days	+
groupsize	Number of the people participate in the group	?
Inc	Annual household income of survey respondant Income $	+
fee	Enterance fee $	+
burobs	Percent burn observable on trail	-
burnext	Extent burn visible	-
elev	Elevation	?
trlgnth	Round Trip length of trail, in miles	
fireint	Fire intensity based on flame	-
crown	Dummy variable 1=crown fire	-
fireage	Years since fire. We are using-50 years for unburned site	+
acres	Actual number of acres burnrd	-
ttbud	Total time budget available for travel*	-
tc	Travel Cost	-

*This variables were basically a four choice questions with following choices: 1=not important, 2=somewhat important, 3=important, 4=very important, the first one was considered as a 0 and others were signed effective in utility function

** TTBUD is calculated as annual vacation days and weekend days, In the case of retired respondents 180 days was used for the total trip budget.

Table 3: Parameter Estimates for the Contingent Valuation Method using Logit

Variable	Coefficient	Std. Err.	P-value
Constant	-4.8849	0.6003	0.0000
DSCENERY	0.0025	0.0017	0.1447
DFOREST	-0.0007	0.0009	0.4524
DFACILIT	-0.0034	0.0013	0.0073
DWILDLIF	0.0013	0.0006	0.0409
LACCESS	0.0037	0.0015	0.0120
DFLOWERS	-0.0020	0.0017	0.2539
DLOCATIO	0.0008	0.0005	0.1169
HIKE	-0.3487	0.1902	0.0668
ONSITEHO	0.0046	0.0015	0.0024
GROUPSIZ	0.0002	0.0004	0.5188
INC	.9372	. 1096	0.0000
FEE	-0.0720	0.4040	0.8586
BUR0BS	-0.0010	0.0038	0.7959
BURNEXT	0.0621	0.4195	0.8823
ELEV	0.0006	. 5953	0.0000
TRLGNTH	0.0044	0.0211	0.8347
FIREINT	-0.0001	0.0032	0.9646
CROWN	0.0006	0.0015	0.6856
FIREAGE	0.0006	0.0037	0.8610
ACRES	.5298	. 9345	0.0000
TTBUD	-0.0012	0.0010	0.2332
TC	0.0008	0.0005	0.0825
TRIPBID	-0.0229	0.0026	0.0000

Table 4: Parameter Estimates for the Contingent Valuation Method using Probit

Variable	Coefficient	Std. Err.	P-value
Constant	-3.0081	0.3560	0.0000
DSCENERY	0.0016	0.0009	0.0854
DFOREST	-0.0004	0.0005	0.4797
DFACILIT	-0.0021	0.0007	0.0033
DWILDLIF	0.0007	0.0004	0.0558
LACCESS	0.0022	0.0007	0.0024
DFLOWERS	-0.0010	0.0010	0.2885
DLOCATIO	0.0005	0.0003	0.1105
HIKE	-0.1783	0.1119	0.1110
ONSITEHO	0.0026	0.0009	0.0038
GROUPSIZ	0.0001	0.0002	0.6080
INC	0.5767	0.6472	0.0000
FEE	-0.1448	0.2174	0.5052
BUR0BS	-0.0009	0.0023	0.7114
BURNEXT	0.1459	0.2259	0.5186
ELEV	0.0004	0.3465	0.0000
TRLGNTH	-0.0043	0.0122	0.7267
FIREINT	-0.6345	0.0019	0.9740
CROWN	0.0004	0.0010	0.6826
FIREAGE	0.0006	0.0022	0.7796
ACRES	0.3158	0.5620	0.0000
TTBUD	-0.0008	0.0006	0.2163
TC	0.0005	0.0003	0.0998
TRIPBID	-0.0060	0.0008	0.0000

the hypothetical extra expense payment. It assumed to be dependent upon the bid proposed extra amount, the respondent's household income, group size and site characteristics and facilities and finally hypothetical fire variables. Also different dummy variables were included: (1) whether or not different site characteristics influenced the respondents utility function and consequently their decision making; (2) whether the respondent is answering a hypothetical question; (3) whether the respondent has come for hiking or biking or even other purposes; and finally (4) the dummy variable related to the existence of the crown fire. This equation was tried to be specified with the same demographic variables as the TCM equation. Bid amount was expected to be negative while income's coefficient is expected to be positive as those who have higher income were expected to have more willingness to pay. On the fire characteristics we are expecting significant percentage of burn observable form the trail, presence of the crown fire and aging crown fire.

As noted earlier, the appropriate model for the CVM is either a logit or a probit model. Using Limdep software, both probit and logit models ere estimated. To assess the robustness of parameter estimates and results, several specifications of independent variables were tested. Missing values in the data set complicated hypothesis of some specifications. Table 3 and 4 summarizes the estimations results.

RESULTS

CVM Results: As expected the coefficient for bid amount was negative and significant. The coefficient on income was positive and again quite significant. Next step was to calculate the WTP and the confidence interval for it. Mean WTP is given by equation (6).

$$meanWTP = 1/\beta_1 * (\ln(1+\exp(\beta_0)) \quad (6)$$

where β_o is the combined or grand constant obtained by multiplying the coefficients other than bid amount by the sample mean. Using the significant coefficients the calculated mean WTP was \$49.9 per day trip. WTP calculated by CVM was higher than that using the TCM which was equal to \$30.20. Since these estimates are different, there is need to test if these are statistically different or not. This requires a comparison of the two estimated which is described below.

Table 5: Comparing CVM and TCM Results

	CVM Results		TCM Results	
Variable	Coefficient	P-value	Coefficient	p-value
Constant	-3.0081	0.0000	3.0041	0.0000
GROUPSIZ	0.0001	0.6080	-0.0982	0.0000
INC	.576777D-05	0.0000	8.86D-7	0.9850
BUR0BS	-0.0009	0.7114	-0.0158	0.0000
CROWN	0.0004	0.0010	-0.2415	0.0030
FIREAGE	0.0006	0.0022	0.0113	0.0000
ACRES	.315871D-04	.562059D-05	-4.9D-05	0.0000
TTBUD	-0.0008	0.0006	-0.0011	0.0590
TC	0.0005	0.0003	-0.0077	0.0000

Comparison of TCM and CVM: The comparable coefficients between TCM and CVM results are listed in Table 5. The coefficients on fire variables are the percent burn observable on trail and acres burnt, are significant in TCM at level of 5% and they have negative signs. The coefficient of ACRE shows that as the percentage of crown fire increases, the number of trip taken decrease. The coefficient of fire age is significant and has a positive signs. Travel cost, which included the value of travel time, is significant and negative at $p<0.01$. Significant demographic variables also include group size and total income budget (TTBUD). These had negative signs in Hesseln *et al*. [1]. In the CVM study the Logit model coefficients have different intuition. There are some other variables that have been considered and were significant in CVM model. One can discuss the variables in following categories:

- Site characteristics variable: We expect that as the scenery, facilities and other improving characteristics of site increase, the utility of using the site and consequently the probability of WTP more for travel cost increases. However the result shows significant coefficients on the facility, location access, elevation and the time that people are spending on site.
- Demographic variables: In this category of variables one can see that income has a positive effect. This is to be expected based on the theory. In contrary with TCM model group size was not significant.
- Fire effect variable: For these variables, one does not expect a priori sign. Besides most of the coefficients are insignificant. However, fire age is shown to have less impact on WTP of visiting the sites in CVM than TCM.

The important point to keep in mind, while interpreting logit function coefficients is that they are marginal effects. The appropriate marginal effect for a binary independent variable is a partial slope coefficient and measures the change in the estimated logit for a unit change in the value of the given regressor. Thus, the TRIPBID coefficient of-0.0060432 means, with other variables held constant, if TRIPBID increases by a unit, on average the estimated logit decreases by about 0.006 units, suggesting a negative relationship between the two. As one can see, some of the other regressors have a positive effect while some others have a negative effect. All of these are consistent with economic theory, although some of the variables were not statistically significant.

As explained before, the objective of the study was to calculate WTP from different methods to see whether there is convergent validity. This was accomplished by testing the hypothesis: H_o: $WTP_{tcm}=WTP_{cvm}$. Comparing the 95% confidence intervals demonstrates that the two estimates are not significantly different at the 5% level.

CONCLUSION

In this paper a logit model was used to estimate the WTP a higher travel cost for using the recreation sites in New Mexico. As it was expected there was a negative relation between the bid amount and WTP. Also there was a positive and significant relation between the income and WTP. This paper follows the literature which compares the estimates of the TCM and CVM. These two methods, with the CVM being considered stated preference and the TCM using the actual behavior and revealed preferences, are capable of estimating WTP from two different ways. This study's objective was to compare them and check whether they are providing statistically significant different results to see if convergent validity is implied.

While there have been some studies that results on comparing CVM and TCM were showing convergent validity, this study shows the same result on WTP calculated by TCM and CVM. In the TCM the result from Hesseln *et al*. [1] study was used. The confidence interval for WTP was calculated between \$24.46 and \$37.106 per trip (divided by group size). The mean of WTP in 5% significant level was \$37.106. Dividing by group size of the sample assumes each member of the group receives equal benefits. CVM calculated per trip WTP equal to \$49.9. Comparing the 95% confidence intervals demonstrates that the two estimates are not significantly different at the 5% level. These resemblance results of CVM and TCM have been expected as the sample size is relatively small (Shrestha and Loomis [25] and Chaudhry and Tewari [26]).

Finally, this paper also illustrates the applicability of the TCM and CVM to estimate the economic benefits of the recreational activities in recreational site. Thus, either the TCM or CVM can be used to estimate the benefits to allow comparison to the management cost of acquisition of public areas for new trails. It will be interesting to compare these results to studies done on less well-known trails.

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