Unraveling Willingness to Pay Dynamics: Exploring the Effects of Ordering, Certainty, and Goods Bundling

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Introduction

The study employs the contingent valuation method to examine the effects of survey ordering, impact certainty, and goods bundling on consumer preferences, aiming to deepen understanding of individuals' decision-making processes. The three key objectives of the research are as follows:

1. Unraveling the Impact of Treatment Scenario Ordering:

- By investigating the order in which treatment scenarios are presented, we assess whether the sequence of two nested public goods (water clarity and forest fire risk reduction) influences respondents' WTP.
- Six distinct ordering sequences were explored to uncover potential shifts in WTP values

2. Analyzing WTP Variations between Impact Certainty and Uncertainty:

- Compare WTP responses between a treatment scenario with demonstrable impact in an already treated region (perceived as loss-prevention of an existing good) with an expansion scenario to new areas with uncertain outcomes

3. Assessing the Significance of Goods' Bundling on WTP:

- By bundling together two goods of equivalent importance (treatment of Milfoil & treatment of Asian Clams), we examine whether the combined presentation leads to significant changes in respondents' WTP

Study Design

- Participants were randomly assigned to one of three aquatic management programs:
  1. **Treating Milfoil only in Tahoe's Emerald Bay (MFEB)** where an earlier experiment had demonstrated that milfoil can be successfully controlled (certainty of impact)
  2. **Treating Milfoil (MF**) in various popular recreation areas around the lake, including Emerald Bay (certainty of impact in EB, uncertainty elsewhere)
  3. **Treating milfoil and Asian Clams (MFAC)** in various popular recreation areas around the lake, including Emerald Bay
- In addition to the above, participants also undertook a survey on wildfire risk reduction program
- The order of program presented, whether forest or aquatic management, was randomized.
- The programs were presented as referendums, with households committing to an annual increase in costs for ten years.
- The bid design was generated through pretesting and a pilot study in 2014
- Participants were initially presented with the first program scenario (either water or fire) and willingness to pay (WTP) question without prior knowledge of a second program.
- Internet-based surveys were used, and reminders including mailing booklet-form surveys sent
- Address lists were purchased to include residents in the Lake Tahoe Basin (California and Nevada) and individuals from urban and rural areas of Nevada within a four-hour drive
- Out of 2000 surveys, a total of 364 surveys were returned (18.2 % response rate).

Sample Information Sheet

Before milfoil treatment, Emerald Bay, Lake Tahoe (2009)

After milfoil treatment, Emerald Bay, Lake Tahoe (2014)

How does Milfoil affect Lake?

- Swimmers feel the **weeds in shallow water**
- Dense growth of milfoil **clogs boat propellers**
- Milfoil stimulates algae growth, **reduces water clarity**
- **Brown clumps float** in water and can **smell bad**

Proposed Methods to control Milfoil

- First, tarps are placed over weed beds to kill weeds
- Then scuba divers pull remaining weeds by hand.
- Finally, scuba divers perform maintenance for 7-14 days *every year* to prevent new weed beds formation

Referendum

`Eliminating the Threat of Milfoil Infestations at Lake Tahoe: What is it Worth to You

Unless steps are taken, milfoil *will* spread throughout the near shore areas of Lake Tahoe. Because it is so aggressive, milfoil will spread even without further introductions by watercraft.

Suppose that a proposed program could *guarantee* milfoil infestations were controlled in Lake Tahoe. The program would target nearby shore areas, including public beaches. Marinas and areas with heavy boat traffic would not be targeted because of the high cost of controlling milfoil in these areas.

Program costs would be covered by residents of California and Nevada, and by visitors to the region through a variety of fees. Examples are: special sales taxes, property taxes, and user fees. **The program would guarantee that milfoil infestation in near shore areas of Lake Tahoe are controlled for 10 years. Funds would be dedicated to this program only. The program and its required funding would be reviewed at the end of this 10 year period.**

How would you vote if the annual costs to your household were as shown below?

These costs may seem very high or low to you. Different versions of this questionnaire present different dollar amounts, so that we get a wide range of responses overall. For each dollar amount, please consider your household budget and needs, along with the value you place on water quality at Lake Tahoe.

1. How would you vote if the cost to you was $ <A> per year for next 10 years? Yes/No
2. How would you vote if the cost to you was $ <B> per year for next 10 years? Yes/No
3. Would you support the program in principle, if it cost your household nothing? Yes/No

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Results

Table 1: Summary Statistics

	Sample	LT Residents in NV	LT Residents in CA	Urban Nevada	Rural Nevada
Age (Years)	57.3	56.7	57.8	57.5	57.5
Female (Binary)	0.34	0.33	0.35	0.32	0.34
White (Binary)	0.89	0.90	0.90	0.85	0.90
Household Income > $100,000 in 2013 (Binary)	0.34	0.45	0.35	0.26	0.17
Schooling (Years)	15.1	15.2	15.4	15.1	14.2
Employed (Binary)	0.55	0.59	0.61	0.53	0.41
Retired (Binary)	0.34	0.28	0.32	0.37	0.43
Own Property (Binary)	0.54	0.72	0.84	0.18	0.21
Distance (Miles)	30.7	10.9	10.3	41.1	90.7
N	364	122	97	87	58

Table 2: WTP for Aquatic Invasive Species Control Programs and Ordering

WTP for Water Program	Obs	WTP	95% Conf. Interval	
1. Treatment of Milfoil in Emerald Bay (MFEB)	**116**	**56.4**	**52.3**	**60.1**
MFEB asked first; Forest second	63	72.1	63.8	81.8
Forest first; MFEB second	53	50.9	43.2	58.6
2. Treatment of Milfoil Across Lake	**113**	**48.3**	**44.9**	**51.2**
MF asked first; Forest second	52	52.9	43.8	61.2
Forest first; MF second	61	56.3	52.2	60.5
3. Treatment of Milfoil & Asian Clams (MFAC)	**91**	**95.0**	**84.8**	**105.2**
MFAC asked first; Forest second	55	84.5	75.3	93.6
Forest first; MFAC second	36	175.7	124.3	227.3

Discussion

The Impact of Survey Ordering:

- Our study reveals no significant impact of survey ordering on individuals' willingness to pay (WTP).
- This strengthens the validity of the estimates derived from the CVM

Impact Certainty and WTP:

- WTP to keep an existing good (i.e., prevention of reinfestation of Milfoil in Emerald Bay) is higher than WTP for new expansionary programs with uncertain outcomes (i.e., treating Milfoil in other popular recreation areas in addition to Emerald Bay)

Goods Bundling and Enhanced WTP:

- The significance of goods bundling becomes evident in our study.
- Combining the treatment of Asian clams with milfoil results in a substantial increase in WTP