Referendum Design and Contingent Valuation: The NOAA Panel's No-Vote Recommendation

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NOTES

REFERENDUM DESIGN AND CONTINGENT VALUATION: THE NOAA PANEL'S NO-VOTE RECOMMENDATION

Richard T. Carson, W. Michael Hanemann, Raymond J. Kopp, Jon A. Krosnick, Robert Cameron Mitchell, Stanley Presser, Paul A. Ruud, and V. Kerry Smith with Michael Conaway and Kerry Martin*

Abstract—This paper considers the effects for offering a "would-not-vote" option in contingent valuation (CV) questions framed using the referendum format. This approach arises from a suggestion made by the National Oceanic and Atmospheric Administration's (NOAA) panel on contingent valuation. The NOAA panel was asked to evaluate the use of this method for estimating the economic value of nonmarketed environmental resources in the context of natural resource damage assessments. This test used the CV questionnaire developed for the study of the Exxon Valdez oil spill conducted by the State of Alaska with in-person interviews. The findings suggest that when those selecting the "would-not-vote" response are treated as having voted "against" the program (a conservative coding), offering this option does *not* alter (1) the distribution of "for" and "against" responses (2) the estimates of willingness to pay derived from these choices, or (3) the construct validity of the results.

I. Introduction

Contingent valuation (CV) surveys have been used increasingly to present respondents with economic tradeoffs for proposed programs involving nonmarket environmental resources. In 1993 the National Oceanic and Atmospheric Administration (NOAA) appointed a panel of leading social scientists, cochaired by Kenneth Arrow and Robert Solow, to assess whether CV was capable of providing reliable estimates of lost passive use values (see Arrow et al. (1993)).

The panel recommended that CV surveys should elicit valuation information by asking respondents how they would vote if faced with a particular program and the prospect of paying for it through specified means, such as higher taxes. Noting that CV referendum questions follow the common survey practice of offering only "for" or "against" answer options (though interviewers are instructed to accept "don't know" or "not sure" responses if they are volunteered), the panel recommended that CV studies should also explicitly offer respondents a "would not vote" (WNV) option.[1]

This note evaluates the effects of such a WNV option. Our test is based on an in-person CV survey instrument that was previously used to value the effects of the Exxon Valdez oil spill. Two identical versions were administered to subsamples, one with and one without the WNV option. Our findings suggest that those selecting the WNV response when it is available would be most likely to select a vote "against" when the WNV option is not available. If WNV answers are treated conservatively as representing votes "against," then the addition of the WNV option does not alter: (1) the distribution of "for" and "against" responses, (2) the estimates of "willingness to pay" WTP derived from these choices, or (3) the construct validity of the results.[2] Section II outlines our hypothesis and survey procedures. The third section describes our results, and the last section discusses their implications.

II. Hypotheses and Survey Procedures

The main hypothesis tested in this note is that explicitly offering a WNV option will reduce the proportion of respondents favoring programs to increase an environmental commodity. There are at least three interpretations describing how people would respond to this formulation of a CV question. First, experiments with ordinary public opinion items have found that offering a "don't know" option increases the proportion of such answers, frequently by as much as 20 to 25 percentage points, but generally leaves unaffected the marginal distribution of the remaining response categories. If a WNV option attracts answers at equal rates from the "for" and "against" categories in a CV survey, then offering it and recoding WNV as "against" will lower estimates of WTP.[3] Second, the WNV option may be viewed as expressing indifference. Conventional preference theory assumes each individual is able to evaluate every possible bundle as preferred, inferior, or equivalent (indifferent) to another bundle. Within this framework it might be argued that those accepting a WNV option express indifference and would have voted "for" and "against" in equal proportions in the absence of such an option. Offering it with the conservative recoding would therefore lead to smaller estimates of WTP. Finally, some respondents may be reluctant to admit to an interviewer that they oppose a proposal to provide a socially desirable good such as environmental improvement. Explicitly offering a WNV option could give these respondents a more socially acceptable way to avoid supporting the program by selecting the WNV answer. Under this interpretation choices of the WNV option are apt to come disproportionately from respondents who otherwise would say they favor the program. Recoding them as "against" yields lower estimates of WTP.

Our test of the effects of this response option was conducted as part of a larger experimental design (see Carson et al. (1994)) using face-to-face interviews conducted by the University of Chicago's National Opinion Research Center (NORC). These involved equivalent subsamples of English-speaking adults living in private residences.[4] We used a survey instrument originally developed for estimating the value of programs to protect Alaska from future injuries

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[1] The panel's report recommended offering a "no vote" option, explaining it as providing a choice alternative comparable to deciding not to vote in an actual referendum. However, the panel's report also acknowledges that further research was warranted on this issue: ". . . having urged that the availability of a no-vote option is an important component of the ability of the CV technique to mimic an actual referendum, we recommend further research into alternative ways of presenting and interpreting the no-vote option" Arrow et al. (1993, p. 4610).

[2] Construct validity refers to the degree to which a measure relates to other measures predicted by theory.

0.93, May 0.86, June 0.99, July 1.06, August 0.88, September 0.80, October 0.89, November 1.12, and December 1.43.

language newspapers in each city during 1960 was taken from data found in *Standard Rates and Data Services.*

TABLE 1.—EFFECTS OF "WOULD NOT VOTE" OPTION ON CHOICES WITH CONSERVATIVE RECODING

Choice[a]	Standard Version	"Would Not Vote" Offered
Tax amount = $10	$\chi^2 = 0.58$; p-value = 0.45	
Vote for	67.8%	73.2%
Vote against	32.2%	26.8%
n	87	82
Tax amount = $30	$\chi^2 = 0.66$; p-value = 0.42	
Vote for	56.1%	49.4%
Vote against	43.9%	50.6%
n	66	87
Tax amount = $60	$\chi^2 = 0.27$; p-value = 0.60	
Vote for	49.4%	45.2%
Vote against	50.6%	54.8%
n	81	73
Tax amount = $120	$\chi^2 = 0.46$; p-value = 0.50	
Vote for	33.3%	38.8%[b]
Vote against	66.7%	61.3%
n	66	80

Notes: [a] n—number of observations.
[b] Percentages do not add to 1 due to rounding error (e.g., percentages are 38.75 and 61.25, respectively).

TABLE 2.—EFFECTS OF "WOULD NOT VOTE" ON WTP ESTIMATES

Sample	N	Weibull Hazard Model[a] Location	Scale	log (L)	Median[b]	Turnbull Lower Bound Mean[c]
Standard	300	4.73	0.90	−198.35	46.03	52.81
		(15.28)	(3.74)		[30.40–69.68]	(4.08)
WNV	322	4.71	0.90	−212.89	45.54	54.01
		(16.53)	(3.92)		[30.64–67.70]	(3.89)
Combined	622	4.73	0.90	−411.25	45.77	53.50
		(22.51)	(5.42)		[34.38–60.95]	(2.82)
LR[d]				0.02		

[a] The numbers in parentheses below the estimated parameters are asymptotic Z-statistics for the null hypothesis that the relevant parameter was zero.
[b] The numbers in brackets below the estimated medians correspond to the 95% confidence interval.
[c] The numbers in parentheses are estimates of the asymptotic standard errors. The lower bound mean estimate from the original Alaska study (Carson et al. (1992)), based on a survey in 1991, was $52.08 with an asymptotic standard error of 2.11. Using a simple adjustment for the CPI this would imply an estimated lower bound mean that was not significantly different from these estimates.
[d] The likelihood ratio (LR) statistic is distributed as an asymptotic chi square with 2 degrees of freedom. The test cannot reject the null hypothesis of equal parameters in the model underlying the observed choices with and without the WNV option.

due to oil spills. This survey instrument was the product of extensive development work (Carson et al. (1992)) and used many of the design features subsequently recommended by the NOAA panel. Three hundred respondents received the original version of the Alaska questionnaire which asked respondents if they would vote "for" or "against" a program to protect Prince William Sound from a future Exxon Valdez–type spill and 322 received a version identical in every respect except for the addition of the explicit WNV option.[5] In both versions respondents were told that implementing a plan to protect Prince William Sound would cost their households a specified dollar amount, to be paid as a one-time addition to their federal income tax (either $10, $30, $60, or $120, randomly assigned to each respondent). In both versions interviewers did not explicitly mention "don't know" or "not sure" as possible answers to the WTP question, but accepted them as valid answers whenever respondents spontaneously stated them. In both versions these responses were conservatively recoded as voting "against."[6]

[5] The cases were assigned randomly to the two treatments. Another 560 interviews were assigned randomly to other treatments described in Carson et al. (1994).

[6] The text describing the program occupies most of the interview time. After outlining the injuries from the Exxon Valdez spill and the proposed plan to prevent these injuries in the future, the standard CV question was: "Because everyone would bear *part* of the cost, we are using this survey to ask people how they would vote if they had the chance to vote on the program. We have found some people would vote *for* the program and others would vote *against* it. Both have good reasons for why they would vote that way. Those who vote *for* say it is worth money to them to prevent the damage from another large spill in Prince William Sound. Those who vote *against* mention concerns like the following: Some mention that it won't protect any other part of the country except the area around Prince William Sound. Some say that if they pay for this program they would have less money to use for other things that are more important to them. And some say the money they would have to pay for the program is more than they can afford. (PAUSE) Of course whether people would vote for or against the escort ship program depends on how much it will cost *their household. At present,* government officials estimate the program will cost *your* household a total of $__. You would pay this in a special one-time charge in addition to your regular federal taxes. This money would *only* be used for a program to prevent damage from another large spill in Prince William Sound. (PAUSE) If the program cost your household a total of $__, would you vote for the program or against the program?" The WNV version's wording was identical to the standard version except that the phrase ". . . or would you not vote" was added to the WTP question.

III. Results

Our analysis considers the effects of offering the WNV option on: (1) the distribution of respondents among "for," "against," "not sure/don't know," and, in the case of the experimental treatment, WNV answers; (2) differences in WTP estimates across the two samples; and (3) tests of construct validity. When the WNV option was offered, the percentage of the sample answering with either a spontaneous "not sure/don't know" response or a selected WNV response significantly increased (p = value < 0.01) from 6.7% (20 of 300 respondents) to 17.7% (57 of 322 respondents).

To evaluate the effect of the option on estimates of WTP, we consider first the "for" and "against" responses by tax amount, conservatively recoding the "not sure" and WNV responses as "against." If this recoded distribution of "for" and "against" votes is not affected by the inclusion of the WNV option, then the estimates of WTP should be similarly unaffected. Table 1 reports the results of this test with the relevant chi-square tests. In contrast to what one might have expected based on the increase in people selecting the "not sure/don't know" or the WNV option, the recoded WNV option did not significantly reduce the proportion of respondents who vote "for" the program at any of the tax amounts.[7] This would suggest that most of these responses appear to arise from those who would have selected an "against" vote in the absence of the WNV option.

To test for differences in estimates of WTP for the prevention program, both median WTP (based on a Weibull hazard model specification using the first referendum response) and the Turnbull (1976) estimate of the lower bound mean WTP were used. The unobserved mean is bounded from below by the estimated lower bound mean.[8] The table 2 results show no significant difference in the estimated medians or parameters of the Weibull model across the samples. Tests using the Turnbull lower bound means are consistent

only available starting in the early 1940s, monthly labor force values were created by linear interpolation.

[8] The Turnbull (1976) nonparametric maximum-likelihood estimator for interval-censored data recognizes that a respondent's answer to a single referendum question distinguishes either a lower or an upper bound for his or her WTP. By combining respondents' choices, we obtain estimates for the relative frequency of responses at different WTP intervals, (0, W1AMTI) and (W1AMTI, ∞), where W1AMTI is one of the four tax amounts administered to the different price subsamples in each version.

with the contingency table results, indicating that adding WNV and conservatively coding the responses does not lower WTP as originally hypothesized by a number of CV practitioners.[9]

Table 3 considers whether construct validity tests would support the recoding of these responses to "against." A multinomial logit framework, distinguishing "for," "against," and WNV responses (with the "for" category serving as the reference outcome), is used for this analysis. The independent variables are from Carson et al.'s (1992) evaluation of construct validity. We added three variables associated with the respondent's education and dropped two from the original set because there was no discrimination for these variables in evaluating determinants of the factors influencing those selecting the WNV answer.[10] The estimates confirm the earlier Carson et al. model. Economic, attitudinal, and program-related variables are significant determinants of stated choices. Testing the recoding of the WNV (and "not sure") responses to "against" implies a restriction that all coefficients of variables hypothesized to affect "against" and WNV responses should be equal. The chi-square statistic in table 3 indicates that the hypothesis cannot be rejected.

IV. Implications

Offering a WNV option in CV surveys increased the fraction of respondents choosing WNV or "not sure/don't know" significantly. It seems that these respondents would have voted "against" the proposal had WNV not been offered. This conclusion follows from three separate tests that show the following. (1) The original distribution of "for" and "against" responses to the WTP question remains unchanged. (2) The various estimates of WTP are not significantly different. (3) The coefficients for determinants of voting "against" are not significantly different from those for selecting the WNV option.

Moreover, it is also reasonable to ask why we don't observe the effect found in traditional attitude surveys that offer "don't know" or "not sure" options. Unlike ordinary attitude questionnaires, the Exxon Valdez CV instrument included several design features to discourage cursory responses in favor of the program. The respondents were given 20 minutes of carefully pretested information, both verbal and pictorial, about what the program would and would not accomplish. Equally important immediately before they were asked to vote, the questionnaire provides several reasons why they might want to vote *against* the program. With this context, those voting "for" the program are likely to be sufficiently sure of their responses so that they are not attracted to the WNV option.

Of course, these results relate to only one CV survey. Nonetheless, they suggest that offering a WNV option with conservative recoding of responses is unlikely to increase the valuation estimates derived from CV surveys that are similar in format and design to the Exxon Valdez survey.

[9] If we drop the "not sure/don't know" responses from the standard version and this category plus the WNV answers from the second sample, the Turnbull lower bound mean increases to 57.27 (4.33) for the standard version and 66.97 (4.45) for the WNV case, but these are not significantly different ($Z = 1.56$). Dropping the "not sure/don't know" from the WNV sample with the conservative coding yields a lower bound mean of 59.71 (4.17), close to that of the standard version without the "not sure" responses.

[10] The two variables dropped correspond to qualitative variables (0, 1) identifying those respondents who think there would be no damage from another oil spill and those indicating the proposal will not reduce the damage at all.

TABLE 3.—SELECTING "WOULD NOT VOTE" AND ITS EFFECT ON CONSTRUCT VALIDITY OF CV

Independent Variables	Multinomial Logit: Against Plan	Multinomial Logit: "Would Not Vote"
Tax amount	0.017	0.015
	(4.72)	(2.66)
Log(income)	−0.205	−0.595
	(−0.97)	(−1.83)
Self-identifies as strong environmentalist (=1)	0.084	−0.431
	(0.26)	(−0.71)
Would like to visit Alaska (=1)	−0.511	−1.565
	(−1.62)	(−2.42)
Protecting coastal areas from oil extremely important (=1)	−0.333	−0.407
	(−0.93)	(−0.78)
Government should set aside a "very large amount" or a large amount of wilderness (=1)	−0.678	−1.308
	(−2.28)	(−2.69)
Caucasian (=1)	−0.649	−0.148
	(−1.67)	(−0.24)
At least college education (=1)	0.486	−0.666
	(1.39)	(−0.79)
Below high school (=1)	0.335	−0.095
	(0.69)	(−0.14)
Names Exxon Valdez as major environmental accident caused by humans (=1)	0.110	−0.401
	(0.36)	(−0.75)
Respondent thinks there will be less damage in absence of escort plan (=1)	1.355	1.539
	(3.75)	(2.84)
Respondent thinks there will be more damage in absence of escort plan (=1)	−0.969	−0.856
	(−2.20)	(−1.45)
Respondent thinks there will be a great deal more damage (=1)	−1.223	−34.164[a]
	(−2.24)	(−0.00)
Respondent thinks proposal will prevent some damage (=1)	1.471	1.546
	(3.71)	(2.56)
Respondent spontaneously protests payment, thinks Exxon should pay all the cost (=1)	0.984	0.418
	(2.43)	(0.56)
Respondent thinks Valdez spill more serious prior to interview (=1)	0.141	−0.359
	(0.46)	(−0.65)
Intercept	1.550	5.060
	(0.72)	(1.60)
Test of equality (χ^2, df = 20)	18.34	
	p-value = 0.304	
n	322	

Notes: The numbers in parentheses below the estimated coefficients are asymptotic Z-statistics for the null hypothesis that the relevant parameter was zero.

[a] This large estimate for the coefficient for the variable intended to reflect the effect of believing a new spill would create a great deal more damage on the likelihood of selecting the WNV option arises because of the split of respondents between "for," "against," and WNV choices in the two subgroups defined by this variable. The specific distribution was

Choice	*Respondent thinks a great deal more damage* No	Yes
For	142	25
Against	119	6
WNV	30	0
Total	291	31

An absence of respondents selecting the WNV option who also felt there would be a great deal more damage is consistent with a priori expectations and provides the reason why this measured coefficient is large and insignificant. There is no basis for discrimination on this dimension.

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JOB VACANCIES IN THE UNITED STATES: 1923 TO 1994

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Abstract—Empirical investigations of the U.S. macroeconomy often examine only the post–World War II period because very few key data series exist for earlier years. However, this brief time period misses major economic shocks like the Great Depression and World War II. Using a previously unknown data set, this paper solves part of the problem by creating a long-run job vacancy series from 1923 to 1994 based on help-wanted advertising data. Analysis suggests that the series is consistent and has no significant biases.

I. Introduction

Empirical investigations of the U.S. macroeconomy often examine only the post–World War II period because very few key data series exist for earlier years. This note addresses one part of the problem by creating a long-run job vacancy series based on help-wanted advertising data. This new series, shown in figure 1, sheds additional light on interwar labor market conditions and enables researchers who use economic models with job vacancy variables to include major events like World War II and the Great Depression in their empirical estimations.

Job vacancies are an important economic indicator which summarize businesses' hiring plans and reveal future directions in labor market demand. Vacancies complement labor market supply information since most workers leave unemployment by filling a vacant job, not by dropping out of the labor force.

In addition vacancies are a key business cycle indicator since short-run production changes are often accomplished by altering the work force's size, causing firms to post or cancel vacancies. While economists agree that job vacancy data are useful, little information exists for the United States (Abraham (1983)).

Since direct measures of job vacancies do not exist, help-wanted advertising is used as a proxy for U.S. vacancies. For example, help-wanted advertising is included in the U.S. Commerce Department's *Survey of Current Business* monthly release of cyclical indicators because of its relationship to hiring. Help-wanted advertising (series 46) is classified as L, Lg, U, which means that it is considered by the U.S. government to be a leading indicator of the business cycle peak, a lagging indicator of the trough, but unclassified over the entire business cycle.

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Beyond forecasting, empirical macroeconomic research (Abraham and Katz (1986), Blanchard and Diamond (1989), Layard et al. (1991), Brainard and Cutler (1993)) has used help-wanted advertising as a job vacancy proxy to address topics such as Beveridge curves and sectoral shifts. In addition vacancy data test the models produced by the rapidly expanding theoretical literature on job matching.[1] Hence the creation in this research of U.S. job vacancy rates from 1923 to 1994 provides more business cycle data, allows replication of previous empirical research over a longer time frame, and enables better testing of new theoretical models.

The rest of the note is organized as follows. Section II describes the history behind using help-wanted advertising as a job vacancy proxy. Section II explains how the two data sets underlying this research were collected and processed. Section IV builds the long-run vacancy proxy. Section V investigates the biases to this proxy. Lastly, a conclusion summarizes.

II. History

The United States has rarely measured job vacancies directly (Abraham (1983)). Since no long-run national vacancy series exists, much previous research has used help-wanted advertising as a proxy. As early as 1908, Beveridge (1930)[2] used help-wanted ads as a vacancy proxy when he analyzed the number of ads published in three major London newspapers for one day in May. This early work sparked a widespread interest in formulating a general "indicator of the demand for labor" (Bezanson (1929)) and caused a variety of American help-wanted indexes to be tabulated in the mid-1920s (Berridge (1961).

Most of these indexes were created by business and academic economists because during the early 1900s few labor statistics were tracked by either the federal government or state governments. The two most important U.S. indexes begun during this period were Bezanson's Philadelphia index and Berridge's national index.

Bezanson, working at the University of Pennsylvania, disaggregated Philadelphia's help-wanted advertising by industry and occupation to provide a barometer of labor needs. Her monthly compilations, from 1923 to 1929, are important because they show that the number of newly hired workers in 52 metal manufacturing plants closely follows help-wanted advertising by this subindustry. While the fit is not perfect since advertising consistently overshoots hiring at the peaks of the business cycle and undershoots at the troughs, her

[1] See, for instance, "Search and Matching Models of Unemployment" (1994).

[2] Beveridge published his original research before World War I and then revised the book extensively after the war.