Consequentiality and Opt-out Responses in Stated Preference Surveys

Joonghyun Hwang, Daniel R. Petrolia, and Matthew G. Interis

The objective of this study was to test for the effect of consequentiality on the probability of a respondent opting out of voting in a stated preference survey. We find that respondents who believe that the survey is inconsequential are more likely to opt out than to vote yes in both binomial-choice and multinomial-choice formats and are more likely to vote no than to opt out in the multinomial-choice format. We also find that respondents who are uncertain about consequentiality are more likely to opt out than to choose yes or no under both choice formats.

Key Words: consequentiality, nonmarket valuation, opt-out response, stated preference, wetlands

Early in research conducted using stated preference surveys to value nonmarket goods, Arrow et al. (1993) issued guidelines for designing an ideal stated preference survey. Among their recommendations was inclusion of an "opt-out" response—"I don't know," "I'm not sure," or "I prefer not to vote"—in yes/no referendum questions.[1] However, they provided no guidance for handling such responses, and subsequent studies have moved in various directions to fill this gap.

One strand of the literature has focused on identifying types of respondents who opt out.[2] Those studies have found lower rates of incidence among respondents who have knowledge of, exposure to, behavioral experience with, and/or interest in the topic (Converse 1976, Durand and Lambert 1988, Faulkenbeny and Mason 1978, Krosnick and Milbum 1990, Rapoport 1981, 1982, Wright and Niemi 1983). Opting out also occurs less frequently among respondents who have relatively greater confidence in their understanding of

[1] We summarily refer to all such responses as opt-out responses.

[2] Krosnick (2002) and Feick (1989) provide good summaries of these studies.

Joonghyun Hwang is the economic analyst at Florida Fish and Wildlife Conservation Commission. Daniel R. Petrolia is an associate professor and Matthew G. Interis is an assistant professor in the Department of Agricultural Economics at Mississippi State University. Correspondence: *Joonghyun Hwang ▪ Florida Fish and Wildlife Conservation Commission ▪ Tallahassee, FL 32301 ▪ Phone 850.488.8898 ▪ Email joonghyun.hwang@myfwc.com*.

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and opinions on the topic and by those who feel that others are interested in knowing their opinions (Francis and Busch 1975, Krosnick and Milburn 1990). Finally, respondents who have higher levels of education (Bishop, Oldendick, and Tuchfarber 1980, Schuman and Presser 1981), who have better cognitive skills (Colsher and Wallace 1989, Sigelman, Winer, and Schoenrock 1982), and who are younger, male, white, and/or higher-income (Converse 1976, Francis and Busch 1975, Rapoport 1982) are less likely to opt out.

A second strand of the literature has focused on examining the merits of including an opt-out response in stated preference surveys. The original motivation behind Arrow et al.'s (1993) recommendation was to avoid forcing respondents to express attitudes they did not actually hold. However, Krosnick et al. (2002) concluded that including an opt-out response allowed respondents to avoid exerting the cognitive effort needed to determine and express their true attitudes or preferences despite some of them actually having well-formed preferences. Oppenheim (1992) warned of this possible outcome as well.

A third strand of literature has examined how opt-out responses should be treated during data analysis. Carson et al. (1998) found that inclusion of an opt-out response did not significantly change the proportion of yes votes and thus that, in the absence of such an option, respondents who chose to opt out would have chosen no. They concluded that opt-out responses can be recoded as no responses. Haener and Adamowicz (1998), however, argued that such an approach was not appropriate and advocated instead for use of a follow-up question to determine how to recode such responses. Groothuis and Whitehead (2002) found that an opt-out response was similar to a no response in willingness-to-pay (WTP) studies but similar to a yes response in willingness-to accept (WTA) studies. Wang (1997) argued that an opt-out response is a middle point between yes and no and that people choose to opt out when the offered bid is very close to their true WTP and it is thus difficult for them to determine which response is optimal. Fenichel et al. (2009) suggested a question format that can distinguish between respondents who are truly indifferent to the choice options and those who are unwilling to put forth the effort required to express their preferences.

In the literature on consequentiality, several studies have shown that perceived consequentiality of the survey affected responses to the choice questions. Consequentiality is a measure of the degree to which the survey will affect policy, and Carson and Groves (2007, 2011) argued that consequentiality, as perceived by respondents, is a necessary condition for obtaining meaningful welfare estimates from stated preference studies. An important question is how consequential the survey must be to obtain meaningful responses. Does the respondent need to be fully confident that the survey will affect policy or only have to believe that the survey will affect policy with some strictly positive probability? Carson and Groves (2007, 2011) argued that even a small degree of consequentiality is sufficient. Herriges et al. (2010) found this "knife-edge" result—that varying degrees of consequentiality (as distinct from being completely *inconsequential*) result in similar behavior. Vossler and Watson (2013) argued in favor of the knife-edge interpretation of consequentiality as well and found that respondents who perceived the survey as consequential were more likely to choose a yes response. However, Vossler, Doyon, and Rondeau (2012) found that respondents who perceived the survey to be *more than weakly consequential* behaved differently than those who did not. Finally, Hidano, Kato, and Izumi (2005) found that the degree of perceived

consequentiality affected the amount of time spent on the survey but did not result in behavioral differences.

We examine how consequentiality affects the probability of a respondent choosing to opt out of voting in a choice question in a stated preference survey about coastal habitat restoration projects in Louisiana and use two common formats for the choice question: a binomial-choice format in which a single public project is proposed and respondents vote for (yes) or against (no) implementation of the project and a multinomial-choice format in which two alternative projects are proposed and respondents can vote either for implementing one project or against implementing any project. Our work bridges the gap between studies of reasons for opting out that did not focus on consequentiality and studies of the effect of consequentiality on incentives to respond to choice questions that did not examine the choice to opt out of voting. We find that respondents who viewed the survey as inconsequential were more likely to opt out of voting than to vote in favor of the project. The relationship between opting out and voting against the project varied with the format of the question. The majority of opt-out responses came from respondents who were uncertain about the consequentiality of the survey.

Survey Context and Data

Data were collected through an online survey of U.S. households that was administered by Knowledge Networks in June and July of 2011 to obtain welfare estimates (i.e., estimates of WTP) associated with coastal wetland restoration programs in Louisiana. The survey presented one or more wetland and barrier-island restoration programs and asked respondents if they would hypothetically be willing to pay a specified amount to implement one of the proposed restoration programs. Because welfare estimation is not the focus of the present study, we did not include welfare estimates in the analysis. See Petrolia, Interis, and Hwang (2014) for the welfare estimates and other details obtained from the survey.

The survey explained to respondents that wetlands and barrier islands in the estuary were being lost due to "natural erosion, sea-level rise, sinking of land, winds, tides, currents, and major storms" and to human development such as construction of river channels and levees. Respondents were asked to consider, evaluate, and indicate their preferences for a set of proposed projects that would restore roughly 50 percent of the land lost since 1956[3] through large-scale land restoration programs that included "wetland building, barrier island restoration, freshwater and sediment diversions, and the movement of large amounts of soil on barges and via pipelines."

The survey focused on three ecosystem services that were presented to respondents as the primary benefits of restoration: (i) wildlife habitat, measured as the percentage of created land that was generally suitable for wildlife habitat; (ii) storm-surge protection, measured as the percentage of residents in the area who would have improved storm-surge protection; and (iii) commercial fish harvests, measured as the percentage improvement in

[3] The survey used 1956 because that was when diligent measurement of land losses began according to experts at the Barataria-Terrebonne National Estuary Program center in Thibodaux, Louisiana.

Once again, here are the available options. Both Project A and Project B would be completed in 5 years and the benefits are expected to last for 50 years. The No Action option means that neither restoration project would be implemented. For this advisory vote, assume that the choice receiving the most votes would be adopted. Please indicate your choice at the bottom of the table below.

	With Project: 50% of lost land restored	**Without Project (No Action):** Land loss expected to continue at 4,500 to 7,100 acres per year
Wildlife habitat	*50%* of restored land suitable as habitat	*No additional habitat* and current habitat expected to decline
Storm-surge protection	Improved protection for *30%* of residents	*No improvement* and current protection expected to decline
Commercial fish harvest	*15%* higher harvest levels	*No improvement* and current harvest levels expected to decline
Share of total cost to your household (one-time tax)	$925	$0
I prefer:	☐	☐

I prefer not to vote: ☐

Figure 1. Example of the Binary-Choice Valuation Question

harvest levels of major commercial (Gulf of Mexico) fish species such as oysters and shrimp.

There were two versions of the survey—binomial-choice and multinomial-choice. In the binomial-choice version, the survey presented a single restoration project and respondents were asked if they were willing to pay a stated amount to implement the project—the standard "referendum style" question. The project would restore 50 percent of the land lost since 1956 and half of the land restored would be suitable for wildlife habitat, would increase storm-surge protection for 30 percent of residents in the estuary, and would increase levels of fish harvested by 15 percent. The price (bid) posed took one of nine randomly assigned dollar values {25, 90, 155, 285, 545, 925, 1,305, 2,065, and 2,825}, and the payment mechanism was a one-time tax paid on the next federal income tax return. Respondents could choose to pay the tax and implement the project (a yes vote), take no action and pay no tax (a no vote), or not vote (the opt-out response). Figure 1 shows an example choice question for the binary-choice version.

In the multinomial-choice version, the survey presented two versions of a proposed project that differed in how much habitat would be restored, how many people would receive increased storm protection, how much fish harvest levels would increase, and the cost to the household. Table 1 shows the attribute levels used in the multinomial-choice survey and their descriptions.

Respondents could choose to pay the tax and implement project A, pay the tax and implement project B, take no action and pay no tax, or not vote. The specific attribute levels shown to each respondent depended on the choice set to which the respondent was randomly assigned.[4] Figure 2 shows an example choice question for the multinomial-choice version.

Of the 5,185 individuals sampled, 3,464 (67 percent) responded; 1,397 completed the binomial-choice version and 2,067 completed the multinomial-choice version. Table 2 shows how the respondents voted according to the

[4] Note that the attribute levels in the binomial version corresponded to the "medium" levels in the multinomial version.

Table 1. Attribute Levels and Descriptions

	Action Alternatives: 50 Percent of lost land restored			**No Action Alternative (*SQ*):** Land loss expected to continue at 4,500 to 7,100 acres per year
	Low	**Medium**	**High**	
Wildlife habitat: x percent of restored land suitable as habitat	25%	50%	75%	*No additional habitat* and current habitat expected to decline
Storm-surge protection: improved protection for x percent of residents	5%	30%	50%	*No improvement* and current protection expected to decline
Commercial fisheries harvest*:* x percent higher harvest levels	Maintains current harvest levels	15%	30%	*No improvement* and current harvest levels expected to decline
Price: $x one-time tax	$25, $90, $155, $285, $545, $925, $1,305*, $2,065*, $2,825*			$0

* These bids appear in the binary-choice version only.

Table 2. Bid Levels and Votes of Respondents in the Binary-Choice Version

Bid	**Opt Out**		**Project (Yes)**		**No Action (No)**	
$25	33	(0.19)	117	(0.67)	25	(0.14)
$90	49	(0.25)	102	(0.52)	45	(0.23)
$155	44	(0.25)	75	(0.42)	58	(0.33)
$285	42	(0.23)	94	(0.52)	46	(0.25)
$545	45	(0.26)	65	(0.39)	59	(0.35)
$925	51	(0.34)	45	(0.30)	53	(0.36)
$1,305	44	(0.33)	38	(0.28)	53	(0.39)
$2,065	43	(0.30)	44	(0.31)	57	(0.40)
$2,825	19	(0.31)	21	(0.34)	22	(0.35)
Total	369	(0.27)	601	(0.43)	418	(0.30)

Note: Proportions are provided in parentheses.

Once again, here are the available options. Both Project A and Project B would be completed in 5 years and the benefits are expected to last for 50 years. The No Action option means that neither restoration project would be implemented. For this advisory vote, assume that the choice receiving the most votes would be adopted. Please indicate your choice at the bottom of the table below.

	Project A: 50% of lost land restored	**Project B:** 50% of lost land restored	**No Action:** Land loss expected to continue at 4,500 to 7,100 acres per year
Wildlife habitat	*25%* of restored land suitable as habitat	*50%* of restored land suitable as habitat	*No additional habitat* and current habitat expected to decline
Storm-surge protection	Improved protection for *5%* of residents	Improved protection for *30%* of residents	*No improvement* and current protection expected to decline
Commercial fish harvest	*Maintains current* harvest levels	*15% higher* harvest levels	*No improvement* and current harvest levels expected to decline
Share of total cost to your household (one-time tax)	$155	$285	$0
I prefer:	☐	☐	☐

I prefer not to vote: ☐

Figure 2. Example of the Multinomial-Choice Valuation Question

offered bid in the binary-choice treatment. Overall, 43 percent of respondents chose yes, 30 percent chose no, and 27 percent chose to opt out. As the offered bid increased, the percentages of no and opt-out responses tended to increase. Table 3 shows the attribute and price levels presented in the multinomial survey and how respondents voted. With the exception of choice sets 1 and 7, respondents were more likely to choose the project alternative with the relatively lower bid.[5]

The perceived consequentiality of the survey was elicited by a direct follow-up question: "How likely do you think it is that the results of this survey will shape the direction of future policy in the Lower Barataria-Terrebonne Estuary?" Table 4 presents the relationship between respondents' votes and their perceptions of the survey's consequentiality, which were defined as very likely, somewhat likely, unlikely, and "I don't know." Respondents who viewed the survey as consequential (very likely or somewhat likely) were least likely to opt out, followed by those who perceived the survey as unlikely to be consequential. The greatest number of opt-out responses came from those

[5] Obviously, the choice is based on the set of all attributes, not just price. Nevertheless, this tendency toward the cheaper alternative (ignoring, for the moment, all other attributes) is a useful finding to motivate the analysis.

Table 3. Attribute Levels and Votes in the Multinomial-Choice Version

Choice Set	Alt.	Wildlife Habitat: x percent of restored land suitable as habitat	Storm-surge Protection: Improved protection for x percent of residents	Commercial Fisheries Harvest: x percent higher harvest levels	Price: $x one-time tax	Votes of Respondents				
						Project A	Project B	No Action (No)	Opt Out	Total
1	A	25%	30%	Maintains	$155	38	49	39	37	163
	B	50%	50%	15%	$285	(0.23)	(0.30)	(0.24)	(0.23)	(1.00)
2	A	50%	50%	15%	$545	28	55	35	42	160
	B	25%	5%	30%	$155	(0.18)	(0.34)	(0.22)	(0.26)	(1.00)
3	A	75%	5%	Maintains	$285	19	98	29	29	175
	B	50%	30%	30%	$90	(0.11)	(0.56)	(0.17)	(0.17)	(1.00)
4	A	50%	30%	Maintains	$545	25	84	27	45	181
	B	25%	5%	15%	$90	(0.14)	(0.46)	(0.15)	(0.25)	(1.00)
5	A	25%	30%	15%	$25	92	28	26	33	179
	B	75%	5%	Maintains	$90	(0.51)	(0.16)	(0.15)	(0.18)	(1.00)
6	A	75%	30%	15%	$545	77	21	36	48	182
	B	25%	50%	30%	$925	(0.42)	(0.12)	(0.20)	(0.26)	(1.00)
7	A	25%	5%	30%	$90	36	70	31	33	170
	B	75%	30%	15%	$155	(0.21)	(0.41)	(0.18)	(0.19)	(1.00)
8	A	75%	30%	30%	$925	38	64	31	45	178
	B	50%	5%	15%	$285	(0.21)	(0.36)	(0.17)	(0.25)	(1.00)
9	A	25%	50%	Maintains	$155	49	41	43	41	174
	B	75%	5%	30%	$285	(0.28)	(0.24)	(0.25)	(0.24)	(1.00)
10	A	75%	50%	Maintains	$155	44	83	18	20	165
	B	50%	30%	30%	$25	(0.27)	(0.50)	(0.11)	(0.12)	(1.00)
11	A	50%	5%	Maintains	$25	61	42	19	40	162
	B	75%	30%	30%	$285	(0.38)	(0.26)	(0.12)	(0.25)	(1.00)
12	A	50%	5%	Maintains	$25	57	51	15	37	160
	B	25%	30%	15%	$90	(0.36)	(0.32)	(0.09)	(0.23)	(1.00)

Note: Proportions are shown in parentheses.

Table 4. Survey Consequentiality Results

	Very Likely		Somewhat Likely		Unlikely		I Don't Know	
Binary Choice								
Opt out	14	(0.15)	90	(0.17)	112	(0.25)	148	(0.48)
Project (yes)	66	(0.72)	301	(0.57)	142	(0.32)	89	(0.29)
No action (no)	12	(0.13)	138	(0.26)	195	(0.43)	71	(0.23)
Total	621		529		449		308	
Multinomial Choice								
Opt out	15	(0.14)	102	(0.13)	116	(0.18)	207	(0.43)
Project A	42	(0.40)	274	(0.34)	163	(0.26)	82	(0.17)
Project B	37	(0.36)	345	(0.42)	190	(0.30)	111	(0.23)
No action (no)	10	(0.10)	91	(0.11)	165	(0.26)	82	(0.17)
Total	104		812		634		482	

Note: Proportions are provided in parentheses.

who selected "I don't know." Almost half of the respondents who were not sure about the consequentiality of the survey chose to opt out.

Econometric Model

The probability of respondent *i* choosing alternative *j* is given by

$$\text{Prob}(Y_i = j \mid \mathbf{x}_{i1}, \mathbf{x}_{i2}, \ldots, \mathbf{x}_{ij}) = \frac{\exp(\mathbf{x}_{ij}'\boldsymbol{\beta}_j)}{1 + \sum_{j=1}^{J} \exp(\mathbf{x}_{ij}'\boldsymbol{\beta}_j)}, \qquad j = 1, \ldots, J$$

where $\boldsymbol{\beta}_j$ is a vector of the attributes of choice *j* (Greene 2012). A multinomial logit regression was estimated for both the binary-choice (BC) and the multinomial-choice (MC) versions. In the binomial-choice version, the dependent variable (*BC Vote*) was the respondent's choice of yes, no, or opt out. In the multinomial-choice version, the dependent variable (*MC Vote*) was the respondent's choice of project A, project B, no, or opt out. Individual-specific characteristics, including the consequentiality variables, were incorporated into the model by interacting them with the choices. Table 5 provides descriptions and Table 6 reports summary statistics of the variables used in the regression analyses. Consequentiality was modeled nonlinearly; each level was modeled as a binary indicator with those who responded as somewhat likely serving as the (omitted) base level.

Results

Binomial-Choice Treatment

Table 7 presents the results of the multinomial logit regression analysis for the binary-choice version of the survey. The opt-out response is set as the baseline category. Thus, the coefficients for the yes and no responses are relative to an

Table 5. Descriptions of Variables

Variable Name	Type	Description
Vote (dependent variable)	Categorical	Equals 1 when votes for the alternative. Equals 0 otherwise.
Consequentiality: very likely	Binary	Equals 1 if thought the survey was very likely to shape the direction of future policy. Equals 0 otherwise.
Consequentiality: unlikely	Binary	Equals 1 if thought the survey was unlikely to shape the direction of future policy. Equals 0 otherwise.
Consequentiality: don't know	Binary	Equals 1 if did not know how likely the survey was to shape the direction of future policy. Equals 0 otherwise.
Bid	Continuous	Cost to household for proposed project in dollars.
Storm[a]	Ordered categorical	Improved storm-surge protection as percentage increase from base: 1 if 5%, 2 if 30%, 3 if 50%, 0 for no project alternative, –1 for opt-out alternative.
Wildlife[a]	Ordered categorical	Improved wildlife habitat as percentage increase from base: 1 if 25%, 2 if 50%, 3 if 75%, 0 for no project alternative, –1 for opt-out alternative.
Fish[a]	Ordered categorical	Improved wildlife habitat as percentage increase from base: 1 if maintain current harvest level, 2 if 15%, 3 if 30%, 0 for no project alternative, –1 for opt-out alternative.
Not familiar	Binary	Equals 1 if not at all familiar with wetland and barrier-island loss in coastal Louisiana and 0 otherwise.
New Orleans	Binary	Equals 1 if visited New Orleans or another part of coastal Louisiana and 0 otherwise.
Oil spill	Binary	Equals 1 if very closely or somewhat closely followed the BP oil spill accident and 0 otherwise.
Green preference	Binary	Equals 1 if made major changes / minor changes to help protect the environment over last five years and 0 otherwise.
Tax return	Binary	Equals 1 if filed 2010 federal tax return and 0 otherwise.
Age	Continuous	Respondent's age in years.
Education	Binary	Equals 1 if had bachelor's degree or higher and 0 otherwise.
White	Binary	Equals 1 if white and 0 otherwise.
Male	Binary	Equals 1 if male and 0 if female.
Income	Ordered categorical	Household income as nineteen categories that ranged from 1 (less than $5,000) to 19 ($175,000 or more).
Married	Binary	Equals 1 if married and 0 otherwise.
Gulf resident	Binary	Equals 1 if lives in Mississippi, Alabama, Florida, Texas, or Louisiana and 0 otherwise.

[a] Alternative-specific attributes were included in the multinomial-choice version only.

Table 6. Summary Statistics of Individual-specific Characteristics

Variable	Binomial-Choice Mean	Multinomial-Choice Mean
Consequentiality: very likely	0.066	0.051
Consequentiality: unlikely	0.323	0.309
Consequentiality: don't know	0.222	0.235
Not familiar	0.673	0.654
New Orleans	0.328	0.316
Oil spill	0.826	0.838
Green preference	0.771	0.783
Tax return	0.858	0.854
Age	48.702 (16.816)	49.037 (16.845)
Education	0.330	0.328
White	0.744	0.756
Male	0.486	0.487
Income	11.834 (4.370)	12.011 (4.386)
Married	0.563 (0.496)	0.583 (0.493)
Gulf resident	0.161	0.171
N	1,388	2,049

Note: Standard deviation is reported in parentheses for nonbinary variables.

opt-out response. Carson and Groves (2007, 2011) argued that the incentive structure for respondents who have at least some strictly positive perception of consequentiality is the same as the incentive structure for respondents who have a strongly positive perception of consequentiality. Thus, if the incentive structure is the same for respondents who choose very consequential and respondents who choose somewhat consequential, we should not detect any statistical difference between the two.

We find that the coefficient on the very likely (very consequential) variable is not significant for yes votes. Thus, respondents who perceived the survey as very likely to affect policy were neither more nor less likely to vote for the project than to opt out relative to respondents who perceived the survey as only somewhat likely to affect policy. Similarly, they were neither more nor less likely to vote no than to opt out. However, a Wald test of the equality of coefficients between the two equations indicates that respondents who chose very likely consequentiality were significantly more likely to vote yes than to vote no relative to respondents who chose somewhat likely consequentiality. This result is more consistent with Vossler, Doyon, and Rondeau (2012), which found behavioral differences across degrees of consequentiality, than with the knife-edge behavior predicted in Carson and Groves (2007, 2011) and found empirically in Herriges et al. (2010).

The coefficient on the unlikely (inconsequential) variable is significant and negative for yes votes. Respondents who viewed the survey as unlikely to be consequential were less likely to vote yes than to opt out relative to respondents who perceived the survey as somewhat consequential. No such difference was found for these respondents in terms of the likelihood of voting no versus

opting out. However, a Wald test of the equality of coefficients between the two equations indicates that respondents who chose unlikely consequentiality were significantly less likely to vote yes than to vote no relative to respondents who chose somewhat likely consequentiality. This result is consistent with Herriges et al. (2010), Vossler, Doyon, and Rondeau (2012), and Vossler and Watson (2013); respondents who believed that a survey was inconsequential behaved differently from other respondents.

The coefficient on the don't know (uncertain about consequentiality) variable is negative and significant for both yes and no votes, which indicates that these respondents were significantly less likely to vote either yes or no than to opt out relative to respondents who chose somewhat likely consequentiality. Furthermore, based on a Wald test of the equality of coefficients between the two equations, respondents who chose "I don't know" were significantly less likely to vote yes than to vote no relative to respondents who chose somewhat likely consequentiality.

From the binary-choice version, we can identify the impact of bid on the probability of respondents choosing to opt out of voting. Our analysis reveals that the coefficient on bid is significant and negative for yes votes; as the amount of the offered bid increased, respondents were less likely to vote yes than to opt out. However, the bid variable is not significant for the no vote, indicating that respondents were neither more nor less likely to vote no than to opt out

Table 7. Multinomial Logit Regression Results of the Binary-Choice Version

Dependent Variable: Vote Baseline Category: Opt Out	Project (Yes)		No Action (No)	
	Coefficient	Std. Err.	Coefficient	Std. Err.
Consequentiality: very likely	0.528	0.341	–0.308	0.430
Consequentiality: unlikely	–0.910***	0.185	0.076	0.188
Consequentiality: don't know	–1.293***	0.196	–0.874***	0.212
Not familiar	–0.481***	0.171	–0.249	0.180
New Orleans	0.522***	0.179	0.167	0.190
Oil spill	0.838***	0.208	0.779***	0.208
Green preference	0.652***	0.186	–0.105	0.178
Tax	0.263	0.222	0.530**	0.244
Age	–0.014***	0.005	–0.020***	0.005
Education	0.423**	0.184	0.438**	0.190
White	0.432**	0.171	0.762***	0.186
Male	0.213	0.152	0.250	0.157
Income	0.049**	0.020	0.036*	0.021
Married	–0.277*	0.165	0.230	0.173
Gulf resident	–0.305	0.206	–0.245	0.217
Bid	–0.0005***	0.0001	0.0001	0.0001
Constant	–0.060	0.421	–0.910**	0.442
N	1,388			
Log Likelihood	–1,287.631			

Notes: *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent level respectively.

as the bid amount increased. Finally, based on a Wald test of the equality of coefficients between the two equations, respondents were significantly less likely to vote yes than to vote no as the bid amount increased. While predicted by theory, this result is at odds with Alberini, Boyle, and Welsh (2003), which found that the percentage of respondents choosing to opt out was generally smaller for the lowest and highest bids.

We also identify individual-specific characteristics that affect the probability of respondents choosing to opt out. Respondents who had not made environmentally motivated lifestyle changes or who had never visited or were not familiar with the study area were more likely to opt out than to vote yes, and respondents who had not followed the 2010 Deepwater Horizon oil spill were more likely to opt out than to vote either yes or no. This is consistent with the results of previous studies in which respondents who had greater knowledge about or experience with the topic were less likely to opt out (Converse 1976, Durand and Lambert 1988, Faulkenbeny and Mason 1978, Krosnick and Milbum 1990, Rapoport 1981, 1982, Wright and Niemi 1983). We also find that respondents who were older, less educated, nonwhite, and lower-income were more likely to opt out than to vote yes or no. This too is consistent with results of previous studies (Bishop, Oldendick, and Tuchfarber 1980, Converse 1976, Francis and Busch 1975, Rapoport 1982, Schuman and Presser 1981). Additionally, we find that married respondents were more likely to opt out than to vote yes, and those who had not filed a 2010 federal tax return were more likely to opt out than to vote yes or no. These last two characteristics have not been addressed in previous work.

Multinomial-Choice Treatment

Table 8 shows the results of the multinomial logit regression for the multinomial-choice version of the survey. In this treatment, the dependent variable is the respondent's choice of project A, project B, no action, or opt out. The individual-specific characteristics that are interacted with respondent choice are shown in the top half of the table and the alternative-specific attributes are shown in the bottom of the table.[6] The coefficient sign and significance for project A and project B are similar; the only exception is the variable indicating whether the respondent lived near the Gulf Coast. This result provides fairly strong evidence against any preference difference based on the order in which the alternatives were presented (order bias) and allows us to simplify the discussion, at least for the present purpose. Thus, we discuss responses for project A and project B collectively as yes votes.

The coefficient on the very likely (very consequential) variable is not significant for any of the choices. Respondents who perceived the survey as very likely to affect policy were neither more nor less likely to vote yes or no than to opt out of voting relative to respondents who perceived the survey as only somewhat likely to affect policy. Furthermore, a Wald test of the equality of coefficients between the two equations indicates no significant differences between yes and no votes. These results are fully consistent with the knife-edge property of Carson and Groves (2007, 2011) and Herriges et al. (2010) and

[6] Because our focus is not on the effect of nonprice alternative-specific attributes on opting out, we do not discuss them in any detail. They are included in the regression to control for their effects. All of the attribute signs are as expected and are significant.

Table 8. Multinomial Logit Regression Results of the Multinomial-Choice Version

Dependent Variable: Vote Baseline Category: Opt Out	Project A		Project B		No Action (No)	
	Coefficient	Std. Err.	Coefficient	Std. Err.	Coefficient	Std. Err.
Individual-specific Attributes						
Consequentiality: very likely	0.340	0.343	−0.061	0.347	−0.042	0.443
Consequentiality: unlikely	−0.705 ***	0.180	−0.810 ***	0.174	0.332 *	0.194
Consequentiality: don't know	−1.535 ***	0.188	−1.494 ***	0.177	−0.633 ***	0.202
Not familiar	−0.766 ***	0.166	−0.656 ***	0.161	−0.397 **	0.183
New Orleans	0.322 *	0.174	0.376 **	0.168	0.274	0.188
Oil spill	0.839 ***	0.202	0.816 ***	0.190	0.494 **	0.198
Green preference	0.591 ***	0.179	0.667 ***	0.171	−0.206	0.170
Tax	0.333	0.214	0.267	0.202	0.302	0.227
Age	−0.008 *	0.005	−0.008 **	0.004	−0.014 ***	0.005
Education	0.873 ***	0.180	0.683 ***	0.176	0.420 **	0.193
White	0.672 ***	0.166	0.674 ***	0.159	0.507 ***	0.176
Male	−0.001	0.145	0.104	0.139	0.410 ***	0.154
Income	0.069 ***	0.019	0.066 ***	0.019	0.038 *	0.021
Married	−0.206	0.157	−0.090	0.151	0.233	0.169
Gulf resident	−0.281	0.186	−0.418 **	0.180	−0.453 **	0.206
Constant	−2.349 ***	0.470	−2.525 ***	0.483	−1.614 ***	0.415
Alternative-specific Attributes						
Bid			−0.002 ***	0.0002		
Fish			0.324 ***	0.053		
Wildlife			0.154 ***	0.048		
Storm			0.235 ***	0.051		
N	2,049					
Log likelihood	−2,431.317					

Note: *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent level respectively.

thus are somewhat at odds with the results of our binary-choice analysis in which the relative probabilities of yes and no votes for respondents who chose very likely and somewhat likely consequentiality differed.

The coefficients on the unlikely (inconsequential) variable are significant and negative for yes votes. Respondents who believed that the survey was inconsequential were less likely to vote yes than to opt out relative to respondents who perceived the survey as somewhat consequential. No such difference is found for the likelihood of voting no versus opting out. However, a Wald test of the equality of coefficients between the two equations indicates that respondents who chose unlikely consequentiality were significantly less likely to vote yes than to vote no relative to respondents who chose somewhat likely consequentiality.

The coefficients on the don't know (uncertain about consequentiality) variables are negative and significant for both yes and no votes, indicating that these respondents were significantly less likely to vote either yes or no than to opt out relative to respondents who chose somewhat likely consequentiality. Furthermore, based on a Wald test of the equality of coefficients between the two equations, they were significantly less likely to vote yes than no relative to respondents who chose somewhat likely consequentiality.

The results for other individual-specific characteristics in the multinomial analysis generally are consistent with the results of the binomial analysis in terms of signs and significance. There are some exceptions. Being married is significant for yes votes in the binomial version but not in the multinomial version while Gulf residency is significant for yes votes in the multinomial-choice version but not in the binomial-choice version. Being a taxpayer is significant for a no vote in the binomial-choice version but not in the multinomial-choice version while lack of familiarity with the study area, male gender, and Gulf residency are significant for no votes in the multinomial-choice version but not the binomial-choice version. Nevertheless, for all of these results, the signs remain consistent across versions.

Conclusion

Opt-out responses contain no clear preference information that can be used in welfare estimations. When a respondent has a preference about a project proposed in a survey but chooses to opt out of the referendum vote simply to minimize effort, the answers the respondent does provide in the survey are of limited use. This results in a waste of the participant's time and effort and the researcher's time and budget. Thus it is important to develop methods and survey instruments that discourage respondents from opting out when they do in fact have preferences regarding proposed goods or services. A first step is to better understand *why* respondents choose to opt out.

This study examines the effect of respondents' perceptions of a survey's consequentiality on decisions to opt out. Our results show that, compared to respondents who viewed the survey as consequential, respondents who viewed the survey as inconsequential were more likely to opt out than to choose yes. This finding is robust for both the binomial-choice and the multinomial-choice versions. Respondents who viewed the survey as inconsequential were also more likely to vote no than to opt out under the multinomial-choice version. Uncertainty about the consequentiality of the survey may be considered to fall between consequential and inconsequential beliefs (similar to Wang's (1997) argument that an opt-out response represents a middle point between

yes and no). We find that the majority of the opt-out responses came from respondents who were uncertain about the consequentiality of the survey (by selecting "I don't know").

Thus, participants who are uncertain about the survey's consequentiality tend to abstain from voting while participants who see the survey as inconsequential tend to vote and, consistent with previous studies of consequentiality, they tend to vote no. It seems that the exact opposite is desirable—that a survey would generate more accurate results if participants who did not take it seriously abstained from voting while those for whom the survey was *at least potentially consequential* cast votes. An alternative interpretation, however, is that the "I don't know" response may have been the most convenient one for individuals who simply were not interested in the survey, and in that case, it would be appropriate to dismiss them from the estimation sample. Similarly, our measure (and measures by others) of consequentiality may not capture the intended information. It may instead be a proxy for something else that implicitly reflects respondents' preferences. If that is the case, consequential respondents would tend to vote yes, inconsequential respondents would tend to vote no, and "I don't know" respondents would tend to opt out. Unfortunately, we cannot determine which interpretation is more likely.

Acknowledgment of some caveats is in order. First, our experimental design did not include a control group that had no opt-out choice (as was done in Carson et al. (1998) and Krosnick et al. (2002)). That would have allowed us to observe behavioral differences associated with consequentiality in the absence of the opt-out choice. Such a design would have allowed for a more thorough analysis of that issue. Instead, our design is consistent with Groothuis and Whitehead (2002) and Haener and Adamowicz (1998); in those studies, all respondents could opt out. Future research could expand on our design to capture such treatment effects.

Second, our analysis relies on a sample from Knowledge Network's Knowledge Panel®. Participants in such panelists are recruited specifically to complete surveys with an expectation that they will be asked to complete additional surveys in the future. Members of the Knowledge Panel are expected to complete an average of one survey per week. Thus, it is possible that this type of participant, relative to someone asked to complete a single survey without any expectation of future surveys, has greater apathy regarding how consequential any particular survey is. Chang and Krosnick (2009) referred to this as panel conditioning; "accumulating experience at doing surveys makes panel members less and less like the general public they are intended to represent" (p. 648). However, Chang and Krosnick went on to cite studies that found no empirical evidence of this effect, and we can add Binswanger, Schunk, and Toepoel (2013). In addition, Chang and Krosnick's own analysis found that panel-based respondents gave more accurate responses and thus improved the quality of the data. Thus, there appears to be tradeoffs involved in choosing the type of sample to use.

It is possible that our sample included a disproportionately large number of respondents who saw the survey as inconsequential (slightly more than 30 percent in each version). Other studies that have collected field data have found smaller proportions—Herriges et al. (2010) reported 4 percent and Vossler and Watson (2013) reported 18 percent. In Vossler, Doyon, and Rondeau (2012), respondents who saw the survey as inconsequential made up 6–12 percent when "not at all" and "very weakly" consequential responses were included, but the proportions rose to 19–32 percent when "weakly"

consequential responses were included. Vossler and Evans (2009) conducted a laboratory experiment and found that 7 percent of the respondents viewed the experiment as inconsequential. Differences in the responses available to participants also may play a role. Our survey provided fewer choices (very likely, somewhat likely, unlikely, and I don't know) than other studies (e.g., Vossler and Watson (2013) offered six: very strongly, strongly, moderately, weakly, very weakly, and not at all). The reader should take these differences into consideration, and future research could more thoroughly examine the nature of the sample respondents and the number of choices presented for rating consequentiality.

A third caveat relates to the cited studies that found that respondents who were relatively familiar with the topic, who had greater interest in it, or who were more confident in their understanding of it were less likely to opt out. It is reasonable to assume that those respondents were also less likely to be uncertain regarding their preferences for the alternatives presented. One relatively unexplored area of research is the relationship between consequentiality and uncertainty of preferences. Perhaps respondents who view the survey as consequential will expend more effort to resolve their preference uncertainty (e.g., by rereading the details of the hypothetical market scenario or by taking more time to consider their choice responses). Vossler and Watson (2013) found that respondents who were "very uncertain" about their responses to a choice question were more likely to believe that the survey was inconsequential. The authors' discussion focused on the merits of using the uncertainty response as a proxy for consequentiality beliefs, and they found it to be a poor proxy. There was, however, no careful consideration of the direction of causation between uncertainty and consequentiality. The relationship between uncertainty of preference and consequentiality is another potential avenue for future research.

In closing, the take-away message here is that respondents who do not believe that the survey is consequential (they either believe it is inconsequential or are uncertain about its consequentiality) are more likely to opt out. Future researchers thus should put additional effort into establishing the consequentiality of their surveys. For example, Herriges et al.'s (2010) survey was sent with an introductory letter written and signed by the director of the relevant state agency that emphasized how important the results of the survey were for the project's implementation and that results from previous surveys were already being used to make policy decisions. In addition, emphasizing upfront that the results from the survey can affect their taxes may motivate respondents who otherwise are not interested in the proposed environmental project to take the survey seriously. Studies have shown that consequentiality perceptions can influence the incentive structure of a choice question. This study suggests that consequentiality perceptions affect whether a participant will choose to vote in the choice question.

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