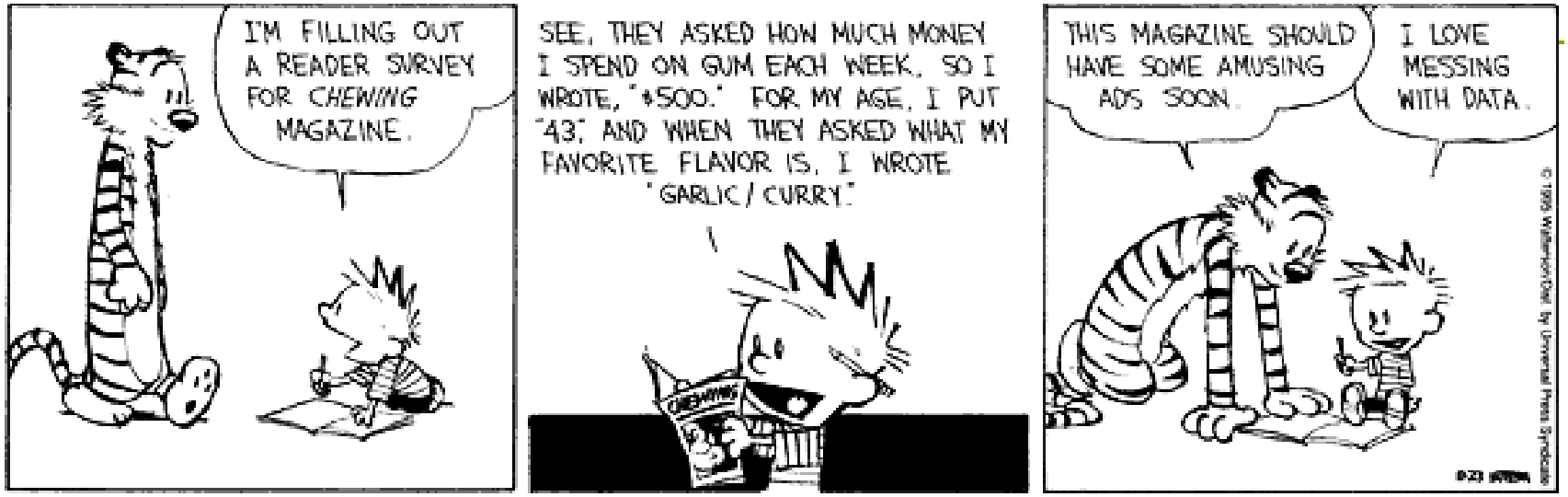
The role of consequentiality in the external validation of stated preference methods through public referenda

Christian Vossler and Sharon Watson,
University of Tennessee



- Not surprising: plenty of controversy surrounding the validity of surveys that elicit values for public goods.

External validity – traditional methods

- Very difficult to undertake tests in representative field settings
- The norm has been to use controlled laboratory experiments. Potential shortcomings have included:
  - Use of private goods.
  - If public good, "real" payment mechanism not incentive compatible.
  - **Stated preference "treatment" is a purely hypothetical, inconsequential decision setting.**
- Typical conclusion: (positive) elicitation bias.

External validity – emerging methods

- **Stated preference setting viewed as (possibly) consequential.**
- Lab/framed field experiment settings:
  - Stated preference "treatment" is consequential with known or unknown probability: Carson, Groves and List (2006); Landry and List (AJAE, 2007); Vossler and Evans (JEEM, 2009)
  - SP treatment is *potentially* consequential: Vossler, Doyon and Rondeau (AEJ, forth.)
- Field survey setting:
  - SP treatment (advisory referendum) *is* consequential: Johnston (JEEM, 2006)
- Typical conclusion: conditional on (perceived) consequences, no elicitation bias.

This study

- In a representative field setting, we take advantage of a unique opportunity to compare surveys with a parallel, binding public referendum.
  - Voters **unaware** of upcoming referendum
  - Respondents **free** to form beliefs
- Examine the role of consequentiality.
- Preview of findings:
  - Evidence for those on either side of validity debate.
  - Failure to control for consequentiality leads to **negative** hypothetical bias and concerns over construct validity.

Some advantages of public referenda

- Similar elicitation format to one that is commonly used in surveys: "advisory" referendum.
- Unique opportunity to compare stated preferences with a parallel, naturally-occurring setting.
- Some public referenda involve environmental goods and binding financial commitments.

Incentive compatibility of (advisory) referenda

- Sufficient conditions (Carson and Groves, 2007; Vossler, Doyon, Rondeau, *forthcoming*):

  (i) the participant cares about the outcome;

  (ii) the authority can enforce payment;

  (iii) the elicitation involves a yes or no vote on a single project; and

  (iv) the probability that the proposed project is implemented is monotonically increasing with the proportion of yes votes.

- The incentive compatibility of a binding referendum is well-known (Farquharson, 1969).

Study Design – Proposal

- November 2010 referendum in the Town of Middleborough, MA.
- Proposal to adopt provisions of MA Community Preservation Act, and authorize property tax increase to fund local public goods (open space; recreation; protect water supply).
- Similar referendum held in 2002, but did not pass.
- Proponents of proposal kept it quiet to avoid opposition!

Exogenous Treatments

- Survey wave 1 ("No Information"): no media coverage of referendum has taken place. 1250 surveys.
- Survey wave 2 ("Information"): light newspaper coverage, a few editorials, flyers. 750 surveys.
- Check on credibility of treatments: ask respondents via email.

Endogenous Treatments

- Question used to elicit beliefs regarding policy consequences:

A8. To what extent do you believe that the indicated votes on the Proposal from you and other survey participants will be taken into consideration by policy makers?

Not taken into account	1	2	3	4	5	Definitely taken into account

- Suggested by theory: "1" – "Inconsequential".
  Else – "Consequential"

Study Design - Implementation

- Maximize usable surveys
  - Sample frame: registered voters
  - Stratified random sampling
- Mail surveys, with Internet option
- "Dillman" method
- Received 508 returns from verified voters (35% RR)

Participant information and beliefs

- In "no information" treatment, 6% indicated knowledge of referendum.
- Distribution of consequentiality question responses:
  - 1 - "Not taken into account": n=94 (19%)
  - 2 - : n= 130 (27%)
  - 3 - : n = 171 (35%)
  - 4 - : n = 50 (10%)
  - 5 – "Definitely taken into account": n= 40 (8%)

Table 1. Advisory Survey and Public Referendum Voting results

	Public Referendum		Advisory Survey, Full Sample	
	N	**% Yes**	***N***	**% Yes**
Overall	8,166	53.53	478	50.68 (2.29)
Precinct 1	2,153	59.78	85	63.29 (5.26)
Precinct 2	1,069	52.39	83	41.51** (5.44)
Precinct 3	1,492	47.19	98	38.01* (4.93)
Precinct 4	872	56.88	71	46.22* (5.96)
Precinct 5	1,426	53.65	74	54.78 (5.83)
Precinct 6	1,154	48.44	67	47.58 (6.15)

Table 1. Advisory Survey and Public Referendum Voting results

	Public Referendum		Advisory Survey, Consequential Sample	
	N	**% Yes**	***N***	**% Yes**
Overall	8,166	53.53	370	57.41 (2.57)
Precinct 1	2,153	59.78	67	66.15 (5.82)
Precinct 2	1,069	52.39	67	53.58 (6.14)
Precinct 3	1,492	47.19	68	46.91 (6.10)
Precinct 4	872	56.88	56	54.57 (6.71)
Precinct 5	1,426	53.65	61	62.39 (6.25)
Precinct 6	1,154	48.44	51	52.71 (7.06)

Table 1. Advisory Survey and Public Referendum Voting results

	Public Referendum		Advisory Survey, Inconsequential Sample	
	N	**% Yes**	***N***	**% Yes**
Overall	8,166	53.53	91	25.60** (4.60)
Precinct 1	2,153	59.78	11	33.30 (14.90)
Precinct 2	1,069	52.39	14	5.16** (6.13)
Precinct 3	1,492	47.19	24	13.44** (7.11)
Precinct 4	872	56.88	15	14.98** (9.54)
Precinct 5	1,426	53.65	12	36.38 (14.51)
Precinct 6	1,154	48.44	15	37.31 (12.93)

Analysis

- Censored regression model of WTP (Cameron and James, 1987)

$$WTP_i^* = x_i \beta + \varepsilon_i$$

If vote "yes" to tax t_i, then $WTP_i \geq t_i$

Otherwise, if vote "no" $WTP_i < t_i$.

Assume $\varepsilon_i \sim Normal(0, \sigma^2)$.

$$\ln L = \sum_{i=1}^{N} w_i \left\{ y_i \ln \left[1-\Phi\left(\frac{t_i - \boldsymbol{x}_i \boldsymbol{\beta}}{\sigma} \right) \right] + (1-y_i) \ln \left[\Phi\left(\frac{t_i - \boldsymbol{x}_i \boldsymbol{\beta}}{\sigma} \right) \right] \right\}.$$

Table 2. Descriptive Statistics

Variable Name	Description	Sample Mean (Std. Dev.)
Tax	Estimated annual increase in the participant's property taxes, in $	20.71 (12.94)
College	= 1 if participant has a college degree or higher	0.52 (0.50)
Income	Participant's household income, in $1000s; the midpoint of the category chosen by the participant is used	85.69 (53.38)
Age	Participant's age, in years	58.63 (14.23)
Female	= 1 if participant is female	0.52 (0.50)
Environmental	= 1 if participant is currently a member of an environmental organization	0.14 (0.34)
Historical	= 1 if participant is currently a member of an historical society	0.11 (0.31)
Information	= 1 if participant is in the post-information survey sample	0.41 (0.49)
Internet	= 1 if participant completed the Internet version of the survey	0.10 (0.30)
Inconsequential	= 1 if participant indicated the survey would have no influence on policy	0.19 (0.40)

Note: Summary statistics are based on the entire sample of respondents verified to have voted in the election.

WTP Regressions: Model 1 (Full sample)

	Coefficient (std. err.)
College	7.20 (5.13)
Income	0.07 (0.05)
Age	0.25 (0.19)
Female	7.18 (4.82)
Environmental	**19.43** (7.57)
Historical	3.77 (8.37)
Information	-1.53 (4.74)
Internet	3.81 (7.46)
Constant	-9.10 (14.26)
σ	**35.27** (6.91)
Pseudo R^2	0.075
Log-L	-256.65
N	401

WTP Regressions: Model 2 (Full sample)

	Coefficient (std. err.)
College	**11.84** (5.83)
Income	0.07 (0.05)
Age	0.37 (0.21)
Female	6.49 (5.03)
Environmental	**24.44** (8.59)
Historical	3.21 (8.89)
Information	-2.76 (5.01)
Internet	-1.17 (7.92)
Inconsequential	**-37.02** (10.32)
Constant	-11.28 (15.01)
σ	**36.04** (7.47)
Pseudo R^2	0.131
Log-L	-241.19
N	401

WTP Regression: Model 3 (Consequential sample)

	Coefficient (std. err.)
College	**10.56** (4.31)
Income	**0.10** (0.04)
Age	**0.35** (0.16)
Female	3.14 (3.79)
Environmental	**19.22** (6.49)
Historical	5.28 (7.00)
Information	0.91 (3.79)
Internet	0.69 (5.90)
Constant	-13.72 (11.45)
σ	**24.78** (4.33)
Pseudo R^2	0.134
Log-L	-192.19
N	326

WTP Regressions

	Mean WTP (std. err.)
Model 1 - Pooled	**$21.86** (2.35)
Model 2 – Inconsequential	-$8.71 (8.58)
Model 2 – Consequential	**$28.31** (3.22)
Model 3 - Consequential	**$26.02** (2.18)

Robustness checks

- Consequentiality definition.
  - Comparison of votes: alternative groupings lead to statistical equivalence.
  - WTP estimation: consequentiality level-specific regressions
  - Finding: clear division between "inconsequential" group and everyone else.
- Sample self-selection.
  - Estimated two-equation models.
  - Insignificant correlation in underlying unobservables.

Discussion

- We have provided an arguably strong field validity test of stated preference surveys
- Main findings mirror those of more controlled external validity studies that control for consequentiality.
- Results suggest that conditioning on consequentiality can mitigate **negative** hypothetical bias as well as avoid misleading conclusions regarding construct validity.
- Unanswered research questions