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Putting Your Money Where Your Month Is

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Paul Raschky

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Putting Your Money Where Your Mouth Is

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Motivation

- Incentives are key drivers of human behaviour in market and non-market settings (Becker)
- This insight has shaped economic theory and empirical research methods, e.g. role of incentives in laboratory experiments
- Yet, incentives have been largely missing from stated preference non-market valuation methods

Existing Literature

Stated Preferences:

- Diamond & Hausman, 1994; Hanemann, 1994; Kling et al., 2012; Hausman, 2012

Hypothetical Bias and Bias Mitigation

- In the lab: Harrison 2006a,b; Anderson et al., 2006
- In the field: List, 2001; Vossler & Kirkvliet, 2003
- Ex ante mitigation: Cummings & Taylor, 1999; List, 2001; Ajzen et al., 2004; List, Sinha & Taylor, 2006

Incentive Compatibility and Consequentiality

- Consequentiality matters: Carson and Groves, 2007; Carson et al., 2014
- Field experiments: Landry and List, 2007; Vossler and Evans, 2009; Vossler et al., 2012; Vossler and Watson, 2013; Carson, Groves & List, 2014

Research Objectives

We combine a discrete choice experiment with a field experiment to test the effect of incentivizing choices on the non-market valuation of a quasi-public good

Two hypotheses:

- ① Test if respondents are more sensitive to cost and contribute less to the good when faced with direct financial incentives
- ② Test if the treatment differentially affects the preferences for the public and private benefits of the good.

Preview of the Results

- ① We find significant aggregate treatment effects - treatment increases the marginal utility of income
- ② Making choices salient for the respondent has a greater effect on attributes with more features of a public good
- ③ The treatment has the greatest effect on the MU of these attributes for people who self-report to have green (public good) preferences

Sample

- Stated preference elicitation for urban water management in 4 urban communities in Australia
- 980 households randomly selected and interviewed in a door-to-door survey (Feb - Oct 2013)

Selection criteria (Councils):

- ① CRC Partner council (access to data)
- ② Comparable demographic characteristics (HH income, % home owners)
- ③ Comparable precipitation mean and variance (based on BOM rainfall data from the past 100 years)

Selection criteria (Respondents):

- ① Homeowner - must pay water bill
- ② Over 18

Sequence

- ① Interviewer knocks on doors and checks eligibility requirements (over 18 & homeowner)
- ② Software randomly assigns participant to treatment ('Salient') or control group
- ③
 - If control, completes choice experiment followed by demographic survey
 - If treated, randomly assigns to one of two groups with equal probability
- ④
 - If 'Endowed Salient', participant receives A\$30.60, A\$39.60, A\$42.00 or A\$53.10 with probability 0.25
 - If 'Earned Salient' receive A\$30.00 and play a Holt and Laury (2002) risk task that yields payoffs of A\$0.60, A\$9.60, A\$12.00, or A\$23.10; payoffs designed to be equal across both treatment groups [▶ Holt and Laury](#)
- ⑤ Treatment group completes choice experiment followed by demographic survey

Salient Treatment

- For each respondent 1/10 decisions is randomly selected and the cost associated with that choice is deducted from their earnings [▶ Instructions](#)
- Payments benefited a local council water management project

Channels

- Makes the cost of their survey answers real
- Produces an actual project in their council

Value Elicitation

Discrete choice experiment to elicit values for most important attributes associated with stormwater management

Respondents presented with 10 choice sets, each involving 3 options that vary in their attributes:

- Water restrictions
- Stream health
- Frequency of flash floods
- Recreational and Amenity
- Summer Temperatures
- Price/Cost

Choice Set (Screenshot from iPad)

28%

	Status Quo	Option A	Option B
Water Restrictions achieved with probability	All Apply 100% 	Level 3 applies 40% 40% 20% 	None Apply 100%
Frequency of Flash Flood	No Change 	Half as often 	Almost never
Stream Health achieved with probability	100% 	40% 60% 	40% 20% 40%
Recreational & Amenity			
Summer Temperatures	No Change 	2 deg Cooler 	No Change
Cost	\$0 	\$10 	\$25

For the following conditions, which would you choose?

Please select one answer

Status Quo

Option A

Option B

Next →

Regression Framework

- Mixed logit
 - Allows for individual level heterogeneity
 - Can recover marginal WTP for each attribute; focus of analysis presented is on raw coefficients
- All attributes and cost modeled as random parameters
- Control for council fixed effects (not shown)
- Interact salient treatment with cost variable

Cost and Salient Interactions

	(1)	(2)	(3)	(4)
	Base	Cost	Cost*Income	Attributes
<i>Random Coefficients</i>				
Cost	-0.0283*** (0.0044)	-0.0214*** (0.0052)	-0.0178*** (0.0067)	-0.0260*** (0.0042)
<i>Fixed Coefficients</i>				
Low Income*Cost			-0.0330*** (0.0109)	
High Income*Cost			0.0148 (0.0133)	
<i>Treatment Interactions (Fixed)</i>				
Cost*Salient		-0.0182** (0.0076)		
Cost*Salient*Low Income			-0.0226 (0.0175)	
Cost*Salient*High Income			0.0182 (0.0145)	
<i>Standard Deviations</i>				
Cost	0.0980*** (0.0056)	0.0980*** (0.0058)	0.0968*** (0.0058)	0.0973*** (0.0058)
Observations	9,774	9,774	9,110	9,774
Individuals	981	981	912	981

Treatment Effects and Intrinsic Attitudes

- Some respondents are predisposed towards taking the survey seriously
- Attitudinal questions identify which respondents are likely to have strong preferences for specific attributes
- These are fixed and cannot be manipulated by the analyst

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Interactions of Attitudinal variables and Attributes

Variable	Attribute
Restrictions	Restrictions 3,4 & Restrictions None
Aggregate Concern for WQ	Stream Medium & Stream High
Aggregate Flood Experience	Flood (Both)
Summer Heat	Temp -2

Treatment effect on those concerned for water quality

	No Concern		Concern	
	Control	Treatment	Control	Treatment
(a) Stream Health Medium				
Linear Combinations	-0.005 (0.103)	-0.189 (0.145)	0.782*** (0.146)	0.368* (0.167)
χ^2 Test	1.17		3.85	
p-value	0.28		0.05	
(b) Stream Health High				
Linear Combinations	0.098 (0.097)	0.044 (0.129)	0.647*** (0.134)	0.441** (0.164)
χ^2 Test	0.13		1.02	
p-value	0.72		0.31	

Notes: The estimates are linear combinations of interactions and base effects for coefficients from regressions with both natural and experimental salient interactions. The χ^2 (and accompanying p-value) is the test statistic for the hypothesis of equality for the total effect of stream health across the treatment groups in both the concerned and non-concerned subsamples. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

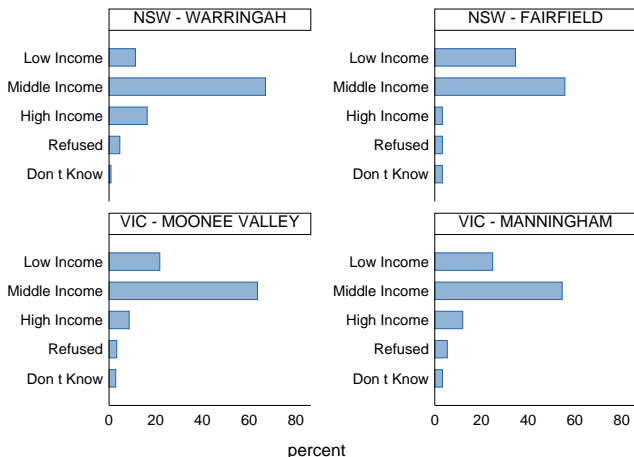
Conclusion

Asking respondents to pay for their choices in a DCE

- significantly increases the marginal utility of income across the sample by 85 per cent
- reduces the marginal utility of public-good like attributes
 - Reduction in stream health preferences primarily driven by those with self-reported concerns for water quality in streams, i.e. those predisposed to valuing public goods most likely to overstate preferences in attribute space
- The presence of hypothetical bias provides a compelling explanation for the observed treatment effect
- Other channels, such as free-riding and changes in strategic behaviour cannot formally be tested for but are less plausible

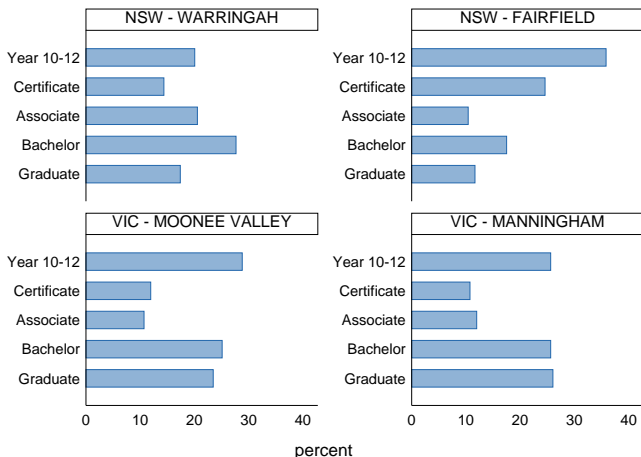
Appendix

Income by Council



[Return to Councils](#)

Education by Council



[▶ Return to Councils](#)

Holt and Laury



▶ [Return to Experimental Design](#)

Salient Instructions

...you should make your decisions knowing that one of the 10 choice sets will be randomly drawn by you and your final payment from this survey will be your earnings so far minus the cost of the option you have selected. Your final pay-out will always be positive but can range between A\$0.60 and A\$53.10. The money subtracted from your earnings will be donated by the CRC and Monash University towards [INSERT COUNCIL WATER PROJECT] and the total amount collected from all participants will be published in [INSERT LOCAL PUBLICATION AND ISSUE DATE]. After you have completed all activities in this survey, the interviewer will ask you to randomly draw a number between 1 and 10. This number will indicate which choice set is selected for payment and the cost of your chosen option will be deducted from your interview earnings and be put towards [INSERT COUNCIL WATER PROJECT].

[▶ Return to Salient Treatment](#)

Cost and Salient Interactions

	(1) Base	(2) Cost	(3) Cost*Income	(4) Attributes
<i>Salient Interactions (Fixed)</i>				
Cost*Salient		-0.0182** (0.0076)		
Cost*Salient*Low Income			-0.0226 (0.0175)	
Cost*Salient*High Income			0.0182 (0.0145)	
Flood Protection (Both) *Salient				-0.0420 (0.1079)
Restrictions 3,4*Salient				-0.0039 (0.1165)
No Restrictions*Salient				-0.0796 (0.1087)
Stream medium*Salient				-0.2317* (0.1204)
Stream High*Salient				-0.1227 (0.1161)
Recreation (Both)*Salient				0.0395 (0.1129)
Temp -2*Salient				-0.0189 (0.0811)
Observations	9,774	9,774	9,110	9,774
Individuals	981	981	912	981

[Return to Cost & Income Interactions](#)

Attribute Interactions: Natural vs. Salient

	(1) Base	(2) Intrinsic	(3) Treatment	(4) Both
<i>Intrinsic Interactions</i>				
Flood (Both)*Exp		0.1980**	0.2008**	0.1344
Temp-2*Concern		0.0586	0.0882	0.0844
Stream Medium*Concern		0.6935***	0.7047***	0.7870***
Stream High*Concern		0.5229***	0.4931***	0.5487***
Restrictions 3,4*Exp		0.3850**	0.3450**	0.3174*
Restrictions None*Exp		0.1959	0.1582	0.2110
<i>Experimental Interactions</i>				
Flood (Both)*Salient			-0.0283	-0.0914
Restrictions 3,4*Salient			0.1208	0.0989
Restrictions None*Salient			-0.0618	-0.0287
Stream medium*Salient			-0.2698**	-0.1844
Stream High*Salient			-0.1100	-0.0546
Recreation (Both)*Salient			0.0836	0.0820
Temp-2*Salient			0.0135	0.0068
<i>Both Interactions</i>				
Flood (Both)*Exp*Salient				0.1814
Temp-2*Concern*Salient				0.0110
Stream Medium*Concern*Salient				-0.2298
Stream High*Concern*Salient				-0.1514
Restrictions 3,4*Exp*Salient				0.0808
Restrictions None*Exp*Salient				-0.1787
Observations	9,774	8,857	8,857	8,857
Individuals	981	888	888	888

▶ [Return to Natural v Experimental](#)

Willingness to Pay

- $WTP = \frac{\beta_{att}}{\beta_{cost}}; \frac{1}{\beta_{cost}} = MU_{income}$
- When β_{cost} is a random parameter the WTP distribution is not well-behaved in the region $\beta_{cost} \approx 0$
- In our setting there is not a large response to project cost
 - Cost ranges from A\$5-30 (represent an annual cost in the survey)
 - Median household income is A\$80K-100K
- Problematic to estimate WTP in this setting because costs are so low relative to income \Rightarrow focus on raw coefficients
- Survey costs reflect probable implementation cost and there is a tradeoff between remaining true to context and eliciting the marginal utility of income
- Over half of the respondents in the sample chooses to pay for a project in every one of their ten decisions