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Water redistribution: explaining rankings, protests and willingness to pay

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Water allocation in Australia is conditioned by historical rights of access and usage patterns that did not recognise or respect Aboriginal water rights.

Reallocating water resources is met with stiff opposition, from the irrigation sector, but also from other sectors of society.

How do we redress the inequities of the past?

Decision-makers will have to evaluate and weigh various perspectives, interests and outcomes.

Motivation:

In this presentation we take up datasets underpinning Jackson et al, 2019 and expand the analysis to answer some questions about what is driving WTP and what drives supporting or not supporting reallocation.

We think there is a more nuanced story.



The Case Study Site: the Murray-Darling Basin

- Over 40 Aboriginal nations seek to gain water rights in the Murray-Darling Basin.
- Irrigated agriculture has, typically, accounted for approximately 70% of water diversions;
- Irrigated Agriculture is responsible for ~90% of the water consumed in the basin (Grafton & Wheeler, 2018)
- Colonial law did not originally recognise Aboriginal occupation
- Aboriginal communities were not entitled to exercise riparian rights or to access water licences under state systems of administration (Berry & Jackson, 2018).



Map of the Murray-Darling Basin

Cultural Flows

Cultural flows are defined by a representative Aboriginal organisation as ‘water entitlements that are legally and beneficially owned by Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations’.

In response to Aboriginal claims for ‘cultural flows’, Commonwealth and State governments have shown interest in mechanisms to improve Aboriginal access to water.

Some funds to buy water have been provided but it is small potatoes



Fish Trap Photo credit: Sue Jackson

Methods

Designed a Questionnaire

Took the case Study to a couple of focus groups, pilot study

Warm-up Questions on the importance of different public policy issues in Australia,

- familiarity with the MDB,
- the Millennium Drought (1997-2009).

Best-Worst Questions

Respondents were randomly assigned to six different experimental treatment conditions (Condition 1, 2, ..., 6, hereafter) to explore stated preferences for water reallocation.

We will use conditions 3 and 6

Attitudes to procedural fairness,

Proximity to different water using groups, and

General socio-demographic questions.



Image: Members of the Waywurru Nation, with others, at the junction of the Ovens and King rivers, Victoria. Photo credit: Ipshita Mondal, Murray-Darling Basin Authority



Contingent Valuation question format

Condition 3:

If you had to vote in a referendum today, would you support 5% of the average amount of water used by irrigators in the Murray-Darling Basin in a year (about 300 Gigalitres) being bought from willing sellers in the water market and then allocated to Aboriginal people? The cost would be paid by a one-off levy of \$xxx on one water bill of every Australian households in 2018. If you rent, the levy will be passed along in the form of increased rent.

- The levy \$xxx - \$25, \$30, \$35, \$40, \$45, \$50, \$55, \$60, \$65, \$70, \$75, \$80, \$85, \$90, \$95, \$100

<input type="checkbox"/>	I would vote YES to the proposal of paying a one-off levy of \$xx on water bills to buy 300 Gigalitres of water for Aboriginal people
<input type="checkbox"/>	I support the goal of allocating water to Aboriginal people, but it is not worth \$xx to me and thus vote NO
<input type="checkbox"/>	I support the goal of allocating water to Aboriginal people, but I cannot afford a one-off levy of \$xx and thus vote NO
<input type="checkbox"/>	I support the goal of allocating water to Aboriginal people, but I would prefer to save my money and give to another cause and thus vote NO
<input type="checkbox"/>	I support the goal of allocating water to Aboriginal people, but I object to any increase in levies and thus vote NO
<input type="checkbox"/>	I would vote NO because I am opposed to this proposal

Condition 6 – More information

In Condition 6, we provided more Information on what the water means for Aboriginal people in the MDB

Restoring access to water is important for the social and cultural well-being of Aboriginal people in the Murray-Darling Basin. Aboriginal people have said that:

“Watering the environment maintains our cultural practices. For example, when there is water at the Fish Traps in Brewarrina our people gather there — old people, families and children — to swim, to catch fish and walk in the footsteps of ancestors at the traps. This is all a part of our cultural education which is about connectivity between all things in Country and our people. It is a holistic way of understanding waterways and all life. When there is water in the environment this way of understanding is clear to us”.

Restoring access to water to Aboriginal traditional owners can increase employment opportunities in Aboriginal communities, especially for young people. Aboriginal leaders have said:

“... little progress has been made in the allocation or licensing of water for Indigenous economic purposes. The challenges faced by Indigenous people in seeking to develop water-dependent businesses and enterprises is illustrated by the fact that while Indigenous people own almost 20% of the country's land mass, Indigenous-specific water entitlements are estimated at less than 0.01 per cent of Australian water diversions.”

Best Worst Case 1

- Thinking about the Murray-Darling Basin, we would like you to think about how water should be used over the next ten years.
- We will show 3 different statements relating to water use and ask you to choose the most favourable water use and the least favourable water use from your point of view.

Which is the MOST favourable and LEAST favourable use of water?

MOST		LEAST
click below on the option you like MOST		click below on the option you like the LEAST
	Water for mining	✓
	Water for towns and cities	
✓	Water for irrigated agriculture	

Experimental Design: BIBD
Order of Items Randomised

Uses of Water

1=Water for the environment

2=Water for irrigated agriculture

3=Water for stock animals

4=Water for mining

5=Water for Aboriginal cultural use

6=Water for towns and cities

7=Water for businesses and factories

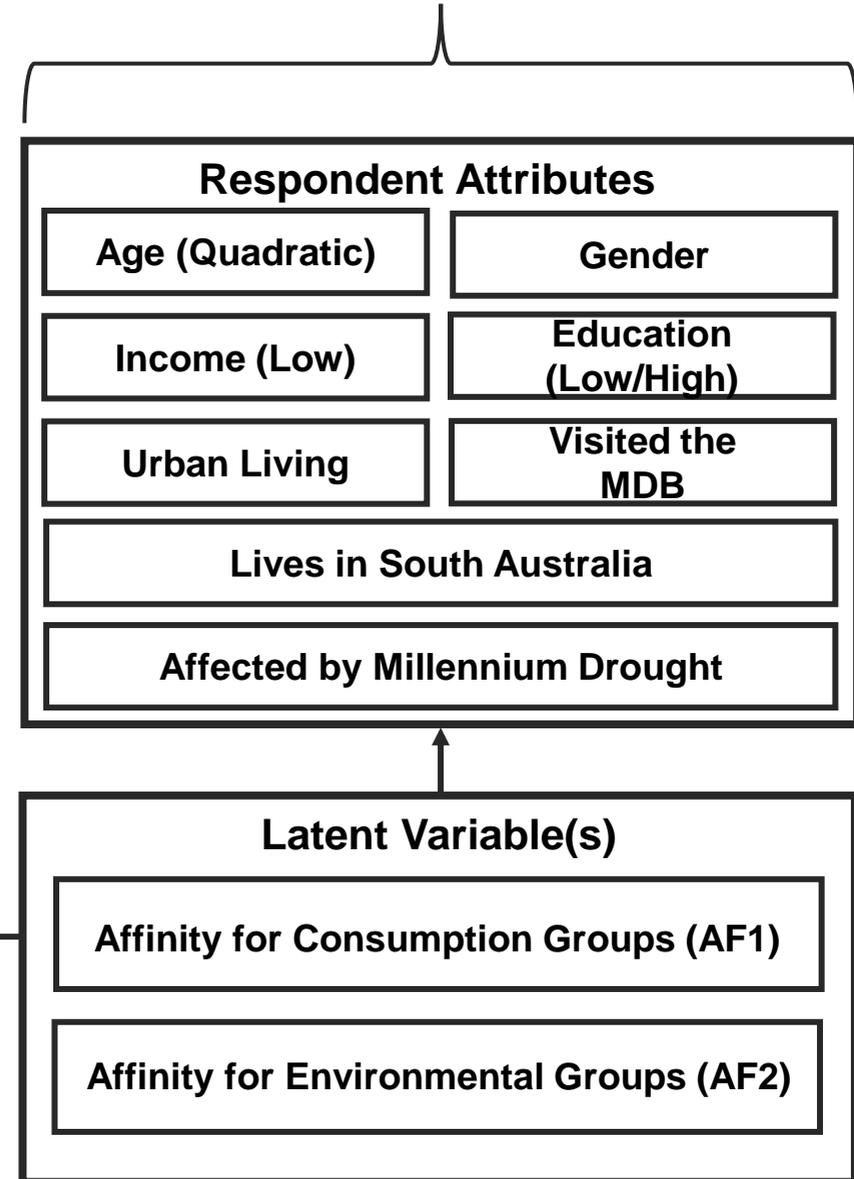
Methods: Value Elicitation Contingent Valuation

- Generally to estimate WTP values the average number of respondents agreeing to the CV question must be greater than 50% at some cost level.
- If this is not the case the median or mean WTP can be negative, implying compensation would be required
 - This can be a consequence of attempting to address yea-saying by utilising methods such as dissonance minimisation (Blamey et al., 1999)
- To address this issue a Turnbull estimator can be utilised to obtain a lower-bound value estimate (Haab and McConnell, 1997).
- Instead of using the probabilities implied by the raw data we use the following regression results to calculate the probability of acceptance/rejection at varying bid levels
 - Allows us to show how varying affinities influence WTP

Contingent Valuation Question



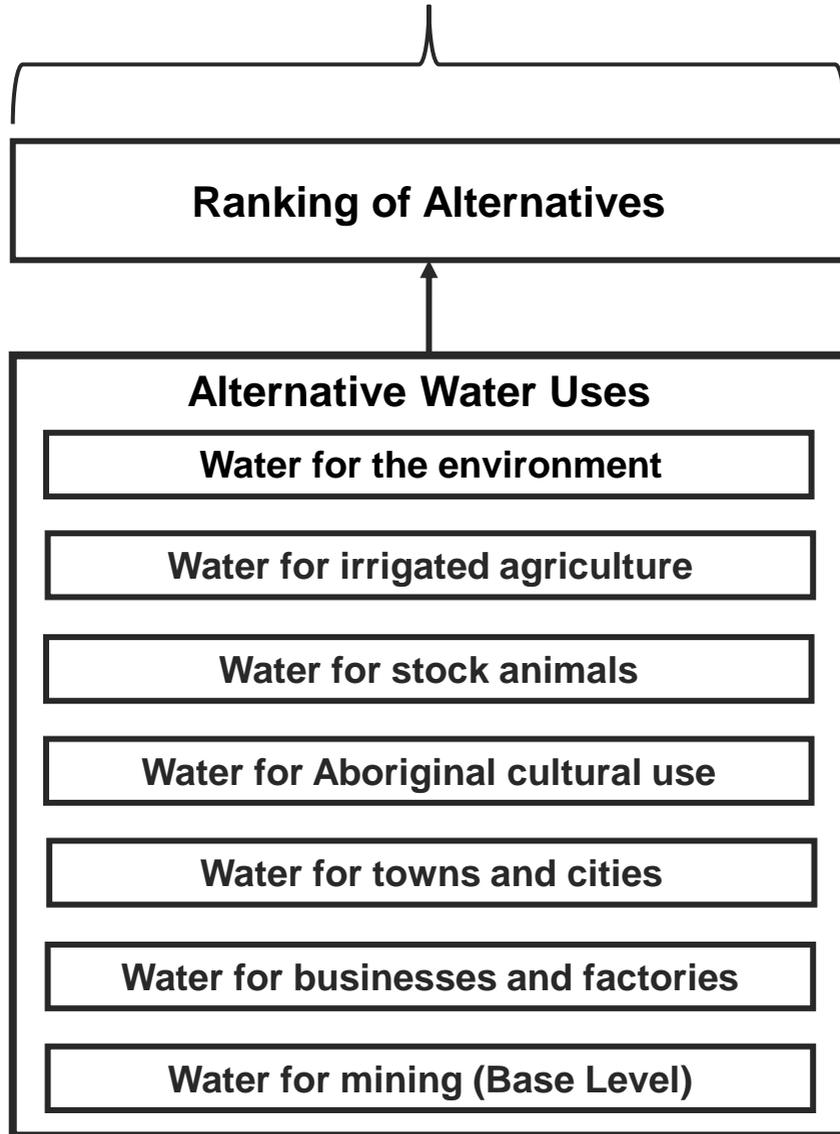
Latent Variable Model



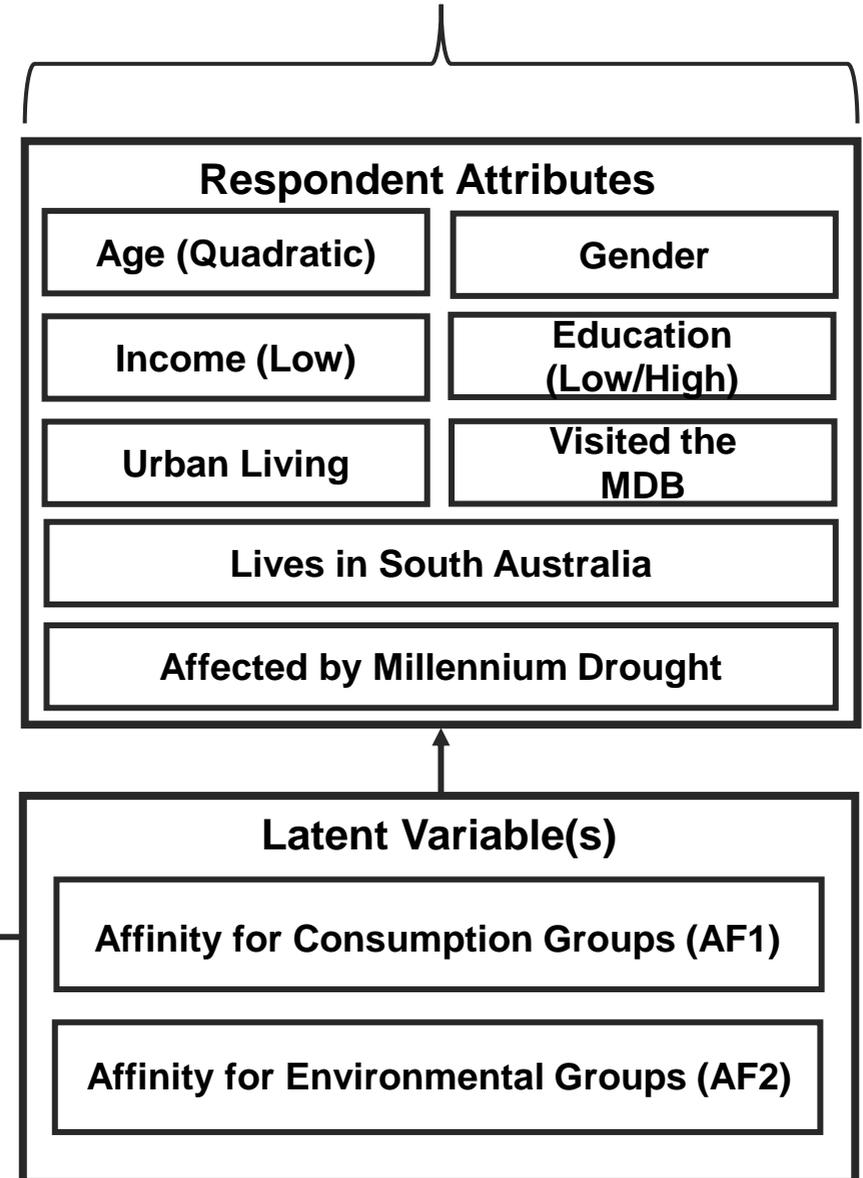
Hybrid Contingent Valuation Model – Summary Slide

Variable	Mean (Std. Error)		
Alternative Specific Constant	-1.3958*** (0.2438)		
Bid	-0.0075*** (0.0024)		
Affinity for Consumption Groups Interaction (LV+)	-0.7215*** (0.1010)		
Affinity for Environmental Groups Interaction (LV+)	0.8524*** (0.1136)		
N	2,280		
Final Log-Likelihood	-1,217.78		
Rho-Square	0.229		
Willingness-to-Pay Simulations	Min	Average	Max
Affinity for Consumption Groups Interaction (LV+)	\$2.57	\$3.80	\$7.21
Affinity for Environmental Groups Interaction (LV+)	\$29.73	\$49.54	\$61.07
Net Effect		\$20.34	

Best-Worst Model



Latent Variable Model



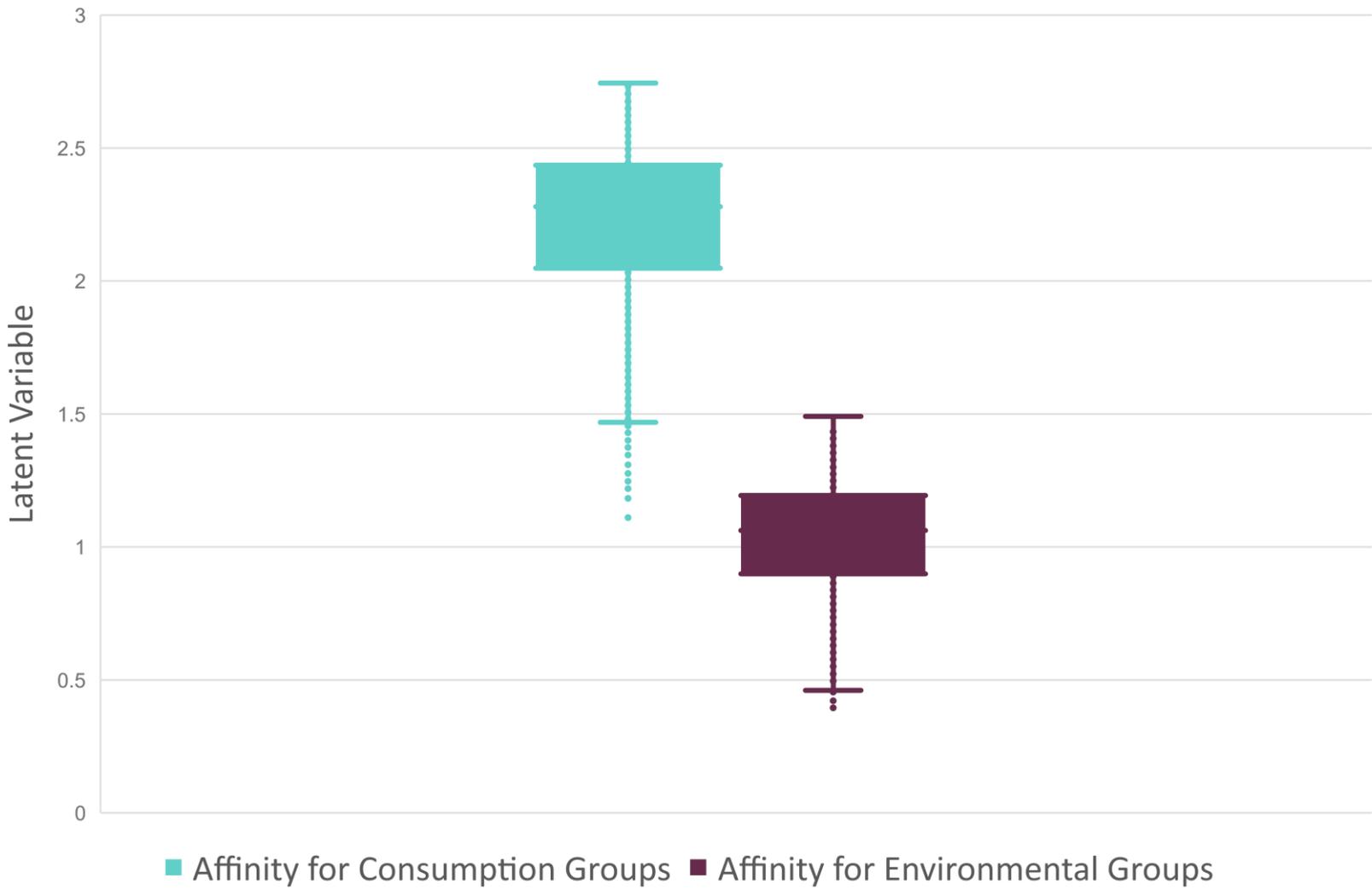
Hybrid Best-Worst Model (Structural Equation)

Variable	Affinity for Consumption Groups (AF1) Mean (Std. Error)	Affinity for Environmental Groups (AF2) Mean (Std. Error)
Age	0.0869*** (0.0057)	0.0385*** (0.0068)
Age (Squared)	-0.0008*** (0.0001)	-0.0003*** (0.0001)
Gender	-0.1959*** (0.0552)	0.0412 (0.0499)
Lives in Urban Centre	-0.0247 (0.0317)	-0.0770*** (0.0288)
South Australian	0.1112*** (0.0317)	0.0024 (0.0288)
Visited the Murray-Darling Basin	-0.0053 (0.0380)	0.0529 (0.0322)
Affected by the Millennium Drought	-0.0111 (0.0275)	0.0230 (0.0257)
Low income	0.0330 (0.0319)	0.0725** (0.0306)
Low Education	-0.0544 (0.0416)	-0.0197 (0.0429)
High Education	-0.0672 (0.0418)	0.0383 (0.0373)

Hybrid Best-Worst Model (Structural Equation)

Variable	Affinity for Consumption Groups (AF1) Mean (Std. Error)	Affinity for Environmental Groups (AF2) Mean (Std. Error)
τ_1	-8.0027*** (0.2792)	-6.3656*** (0.2888)
τ_2	-5.1653*** (0.3435)	-3.5085*** (0.3005)
τ_3	-2.8730*** (0.1028)	-1.1795*** (0.1033)
τ_4	-0.8549*** (0.0669)	0.9379*** (0.0725)
Irrigators – farmers who pump water for crops	-1.7461*** (0.0715)	
Environmental or conservation groups – organisations that take action to protect or improve the environment		-1.8628*** (0.0984)
Aboriginal water users – Aboriginal groups who want to use water to restore wetlands, strengthen their culture, and develop businesses that use water		-1.1512*** (0.0966)
Mining – water is used in mining in processing and dust suppression	-1.0159*** (0.0700)	
Business water users – firms and factories that use water to produce goods and services	-1.5708*** (0.0712)	
Rural dryland farmers – farmers who grow grain, run cattle and sheep without irrigation infrastructure	-2.4308*** (0.0980)	

Hybrid Best-Worst Model (Distribution of Latent Variables)



Hybrid Best-Worst Model

Variable	Mean (Std. Error)	Std. Dev. (Std. Error)	AF1 Interactions (Std. Error)	AF2 Interactions (Std. Error)
Water for towns and cities	4.685*** (0.093)	2.149*** (0.077)		
Water for the environment	3.338*** (0.131)	1.952*** (0.054)		0.196** (0.089)
Water for stock animals	2.935*** (0.324)	2.044*** (0.063)	0.109 (0.168)	0.266** (0.106)
Water for irrigated agriculture	2.221*** (0.323)	2.062*** (0.062)	0.652*** (0.15)	
Water for Aboriginal cultural use	0.901*** (0.158)	2.419*** (0.067)		0.133 (0.117)
Water for businesses and factories	0.708*** (0.138)	1.130*** (0.056)	0.356*** (0.062)	
N				2,699
Final Log-Likelihood				-28,249.700
Rho-Square				0.319

Conclusions

- There is support for reallocating water for cultural flows
- There are some distinct preferences for water uses which are important to understand
- Preferences for Water for Towns and cities and other economic water uses is large and essentially overwhelms environmental and cultural flows.

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Thank You for listening

