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# IDENTIFYING THE AUSTRALIAN PUBLIC'S PREFERENCES FOR ENVIRONMENTAL WATER RECOVERY OPTIONS

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# Background

- Water allocation regimes are under pressure globally:
  - ✓ increasing demands
  - ✓ public expectations around equity of access
  - ✓ climate-driven shortages
  - ✓ societal changes in priorities and values.
- Adjudicating between such needs and preferences is contentious
- Water reallocation is fundamentally a political process
- Understanding public preferences and interests is therefore important



The Darling River  
by [bobarcpics](#)

# Research Aims

We explore the Australian public's preferences for water re-allocation in the Murray-Darling Basin (MDB) and the characteristics associated with different preferences

- ✓ Public's view regarding policy options for both environmental water and water for First Nations stakeholders
- ✓ Preferred approach to achieve such water recovery

We correspondingly model the public's preferences for water reallocation policy options

# Literature Review

- Existing literature on water recovery in the MDB mainly focuses on the views and experiences of farmers and rural communities.
- Irrigators only marginally preferred water infrastructure expenditure to a suite of market-based options (Loch et al. 2014).
- Irrigators command disproportionate power over the water reallocation process (Russenberger et al., 2012), but preferences of the general public – with greater electoral sway and contributions to tax revenue – are also important to policy makers.
- Three discrete groups of values among rural and urban residents of Alberta, Canada, defined as ‘utilitarian’, ‘pro-environmental’ and ‘undecided’ (Bjornlund et al. 2013).

# Literature Review

- The public is willing to support government actions in managing water – but not at the expense of either the environment or agriculture (Stoutenborough and Vedlitz 2004).
- In the western US, most public preferred the reallocation programs aiming at keeping irrigated farms in production, constructing reservoirs, and creating mechanisms to reuse household water (Thorvaldson 2010).
- But climate change risk perception, trust in information sources, and individual limitations have not been carefully examined in the literature for the general public.

# Data collection

- Australian Survey of Social Attitudes (AuSSA) – ongoing survey source for the study of Australians' social attitudes, beliefs, and opinions
  - A special environmentally focussed survey was run in 2020
  - 5000 individuals across Australia were randomly selected from the electoral roll in December 2020, and posted an explanatory letter in February 2021, followed by a questionnaire and a reply paid envelope
  - The final response rate was 25%, with 1162 completed questionnaires
  - We were offered the opportunity to add some questions to this survey
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# MDB Questions

## Section C: Murray-Darling Basin

**C1. The Murray-Darling Basin Plan currently aims to return 27% of consumptive (namely irrigation) water licences in the Murray-Darling Basin to environmental use. As at early 2020, currently one-fifth (around 20%) of water licences have been returned to the environment.**

**To date, the Commonwealth has spent \$2.5 billion on buying around 1,227 gigalitres of water (average cost of \$2,020/megalitre) from willing sellers, and has spent \$3.9 billion to recover 695 gigalitres water through irrigation infrastructure programs (average cost of \$5,453/megalitre).**


**Because of rural community views towards buying water directly back from irrigators, currently the only way water is to be recovered in the future is through irrigation infrastructure and supply projects.**

**A number of stakeholders, such as indigenous groups, are asking for more water to be allocated to them in the Murray-Darling Basin.**


**What do you believe should happen going forward?**

*Please cross one box only*

We should stop recovering water and sell all environmental water licences held by the Commonwealth back to irrigators

 Skip to C3

We have enough environmental water now to be managed by the Commonwealth, and should stop recovering water from this point on

 Skip to C3

We need to keep recovering environmental water - up to current Murray-Darling Basin Plan goals only

We need to recover more environmental water only - beyond the current Murray-Darling Basin Plan goals

We need to recover more water for the environment and also for indigenous stakeholders - beyond the current Murray-Darling Basin Plan goals

# MDB Questions

**C2. Given you believed we need to recover more water for the environment or for indigenous stakeholders, what is the main way this should be achieved?**

*Please cross one box only*

Subsidise irrigation infrastructure and other supply projects to transfer water licences from willing owners

Buy water licences directly back from willing sellers at prevailing market prices

Cut all irrigation water licences by the same percentage, which is compensated through compulsory acquisition at prevailing market prices

Cut all irrigation water licences by the same percentage, which is uncompensated

**A12. On a scale from 0 to 10, how bad or good do you think the impacts of climate change will be for Australia? 0 means extremely bad, 10 means extremely good.**

*Please cross one box only*

Extrem ely bad												Extrem ely good	Can't choos e
0	1	2	3	4	5	6	7	8	9	10			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

# Other survey questions of interest

**A7.** On a scale of 0 to 10, how much do you personally trust each of the following institutions? 0 means you do not trust an institution at all, and 10 means you trust it completely.

*Please cross one box on each line*

	No trust at all 0	1	2	3	4	5	6	7	8	9	Complete trust 10	Can't choose
University research centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The news media	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business and industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The federal parliament	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly
It is just too difficult for someone like me to do much about the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is no point in doing what I can for the environment unless others do the same	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

# Empirical Strategy

- **Multinomial logit regression for water recovery preference as the dependent variable**
- **Climate change risk perception may be endogenous**
- **Neighborhood extreme weather events in the last 12 months, 30 year trend in annual max temperature and rainfall as instruments**

**A29. Thinking about your neighbourhood, to what extent, if at all, was it affected by the following things over the last twelve months?**

*Please cross one box each line*

Not at all      To a small extent      To some extent      To a great extent      To a very great extent      Can't choose

Extreme weather events (such as severe storms, droughts, floods, heat waves, cold snaps, etc.)

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# Empirical Strategy

- We used Wooldridge (2014)'s method of quasi-maximum likelihood estimation and testing for nonlinear models with endogenous explanatory variable.
- Essentially it is a two-step control function approach that is computationally simple and leads to straightforward tests of endogeneity.
- Sample weights and bootstrapping in the second step were used to obtain robust standard errors.
- Diagnostic tests were used after mlogit.

# Results on water recovery preference

	Stop recovery	Recover more water to current MDB Plan goals	Recover more water for env. water only beyond current goals	Recover more water for env. and indigenous stakeholders beyond current goals
Climate change risk perception	<b>-0.03<sup>***</sup></b>	-0.01	0.00	<b>0.04<sup>***</sup></b>
Trust in uni research	<b>-0.01<sup>**</sup></b>	0.00	<b>0.01<sup>*</sup></b>	0.01
Trust in news media	0.00	<b>-0.02<sup>**</sup></b>	0.01	0.00
Trust in industry	<b>0.02<sup>*</sup></b>	<b>-0.02<sup>*</sup></b>	0.01	-0.01
Trust in fed gov	0.00	<b>0.03<sup>***</sup></b>	-0.01	<b>-0.02<sup>***</sup></b>
Limitations in individual efforts	<b>0.05<sup>***</sup></b>	<b>0.04<sup>**</sup></b>	<b>0.04<sup>*</sup></b>	<b>-0.12<sup>***</sup></b>
Inner Regional	0.06	<b>-0.06<sup>*</sup></b>	0.02	-0.02
Outer, remote and very remote	0.05	-0.05	<b>0.11<sup>**</sup></b>	<b>-0.12<sup>**</sup></b>
IntheMDB	<b>0.11<sup>***</sup></b>	0.04	-0.05	<b>-0.10<sup>*</sup></b>
Bachelor	0.06	<b>-0.12<sup>**</sup></b>	0.05	0.01
Cert and Dip	<b>0.14<sup>***</sup></b>	-0.06	-0.01	-0.07
No post school qualification	<b>0.13<sup>***</sup></b>	<b>-0.10<sup>*</sup></b>	-0.01	-0.03

# Conclusions

- **Climate change risk perception is not endogenous to the general public's water recovery options**, unlike the case in irrigators' climate change adaptations
- The general public's **water recovery preference** is mainly associated with their **perception on climate change risk to Australia, the trust levels of information provided by different sources, their belief in individual's limitation** to solve the environmental problem
- Several **demographic variables** (age, location, education level) are significant in **water recovery preference**



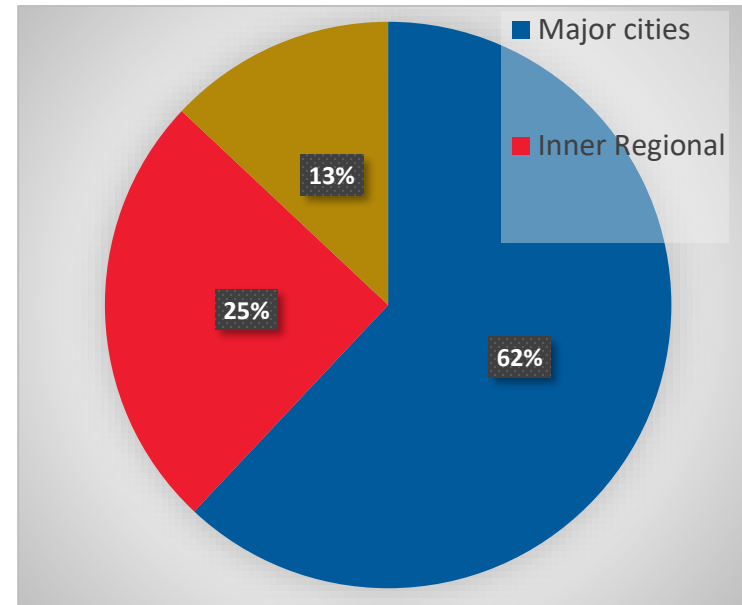
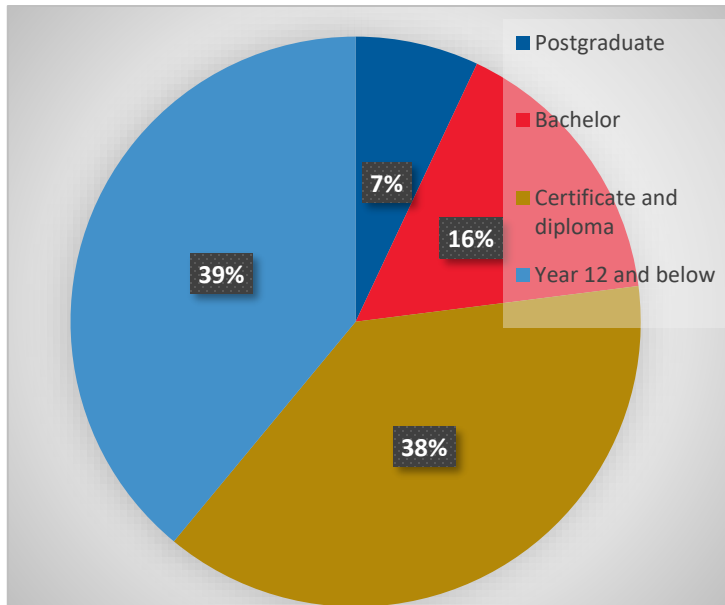
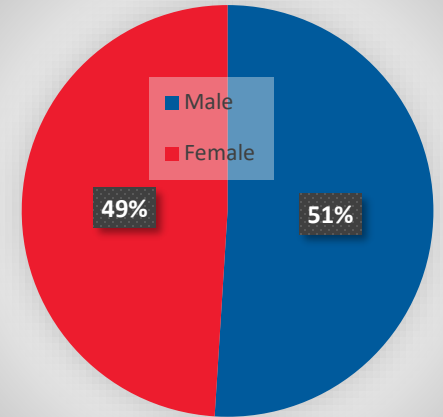
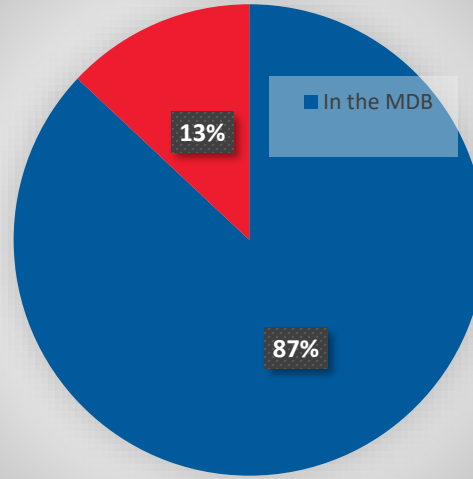
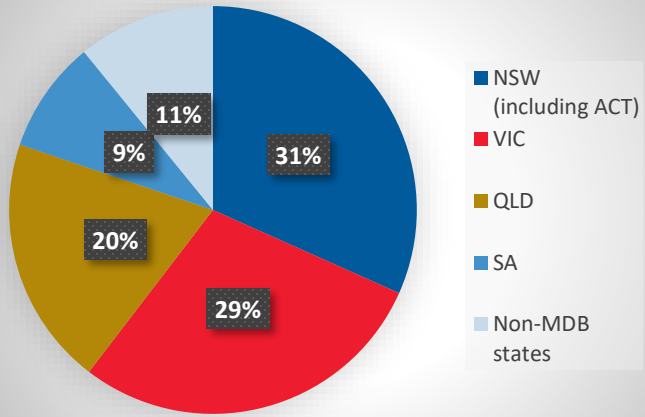
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*Thank you*

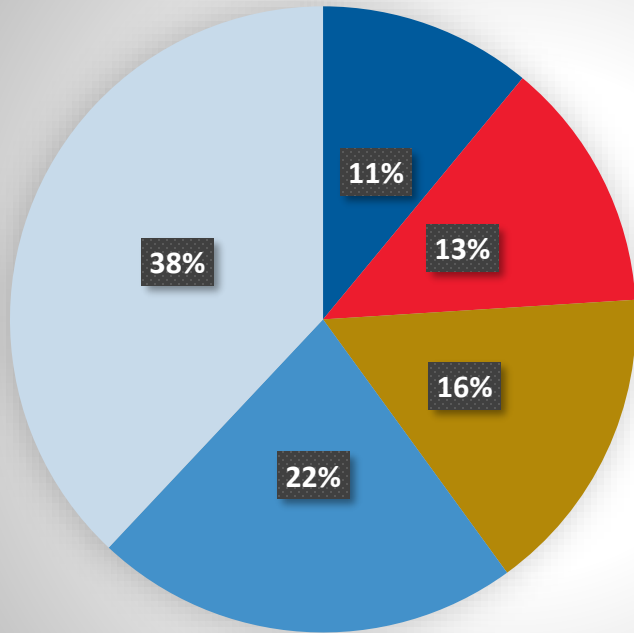
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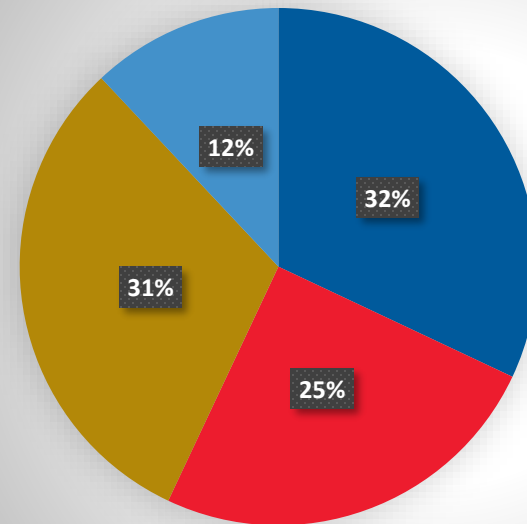
# Data summary



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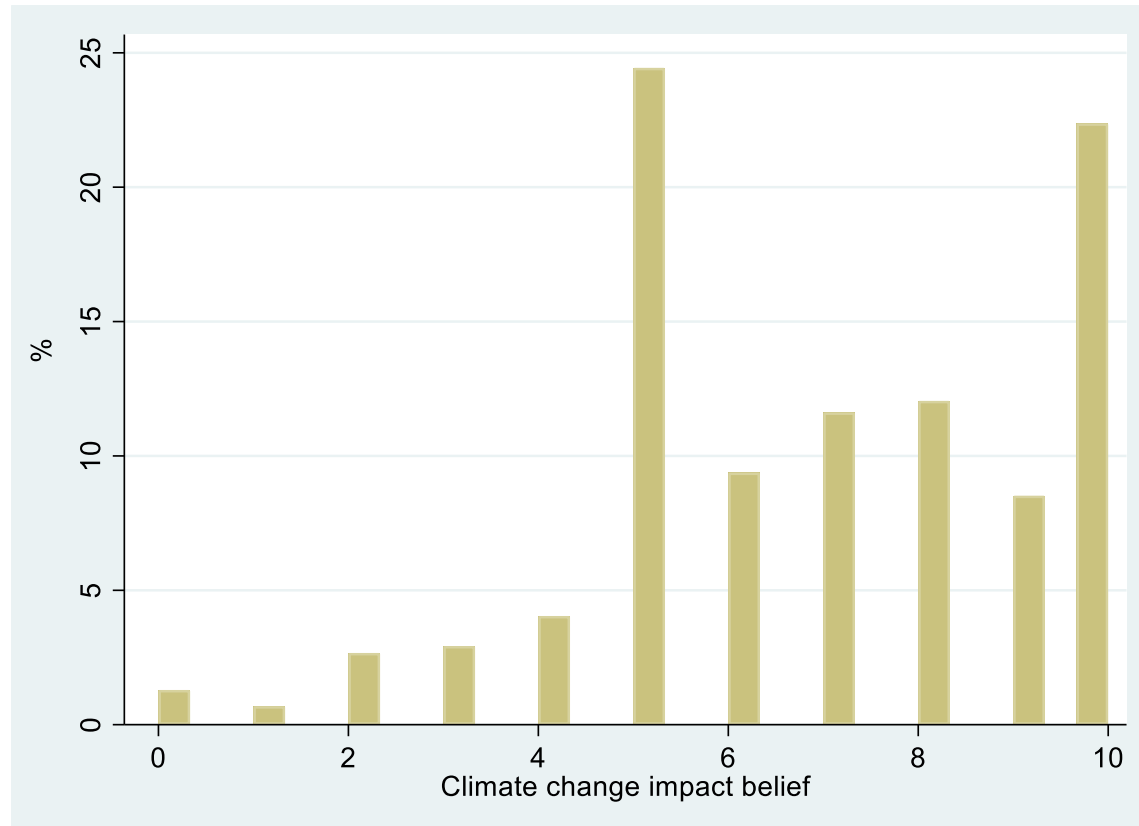


- Stop recovery and sell recovered licence
- Stop recovery
- Recover more water to current MDB Plan goals
- Recover more water for env. water only beyond current goals
- Recover more water for env. and indigenous stakeholders beyond current goals



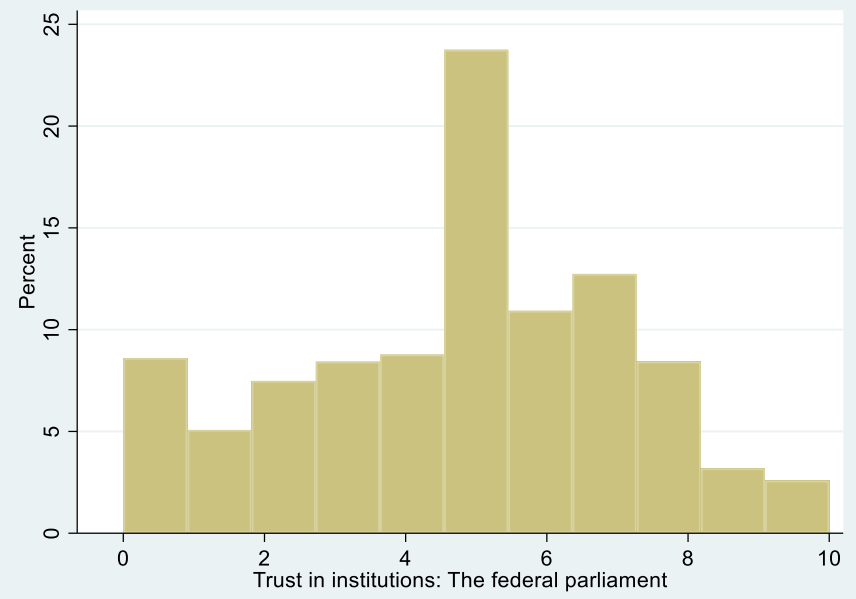
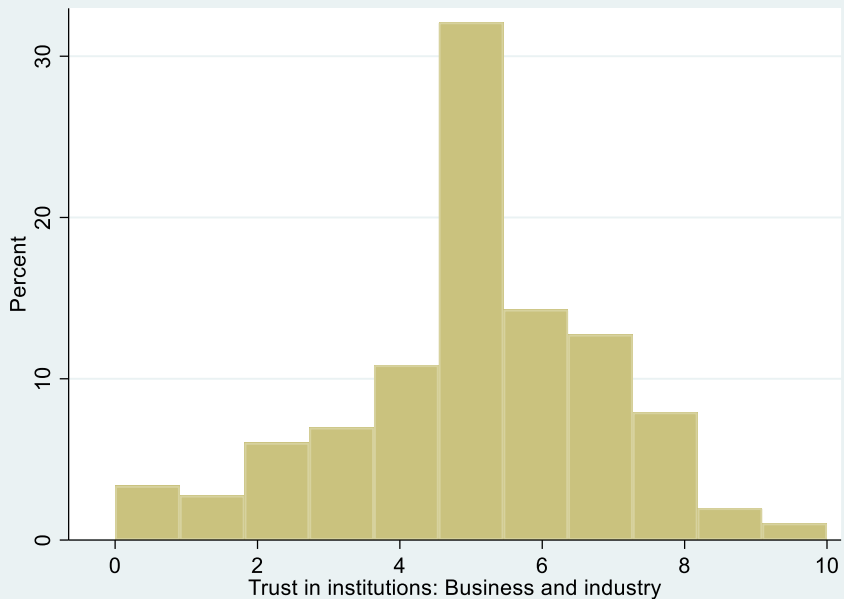
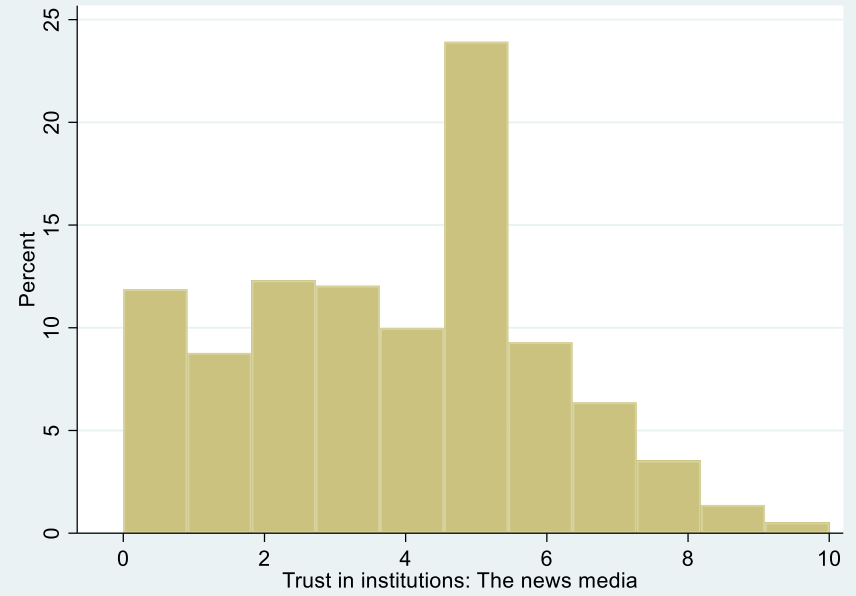
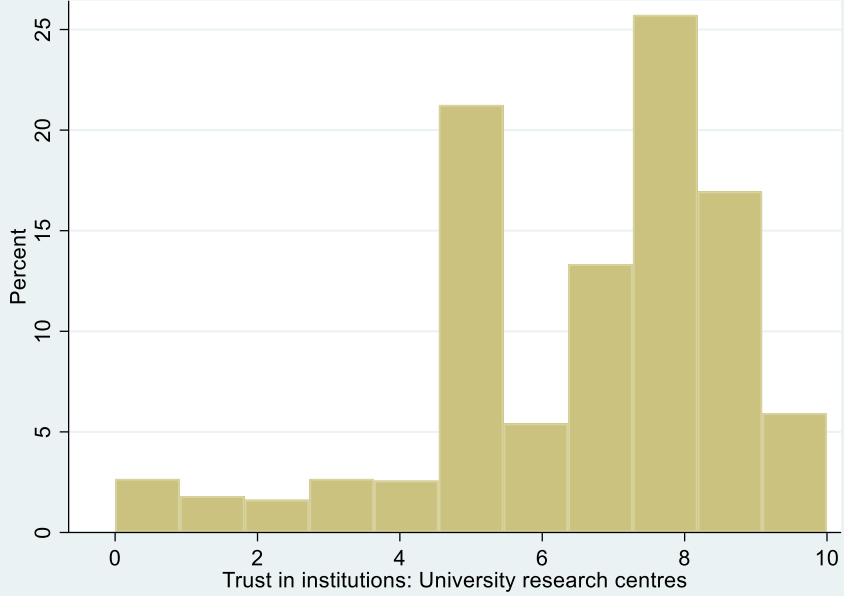
- Subsidise irrigation infrastructure
- Buyback
- Cut licences and compensate
- Cut licences without compensation

# Data summary



	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Average score
It is just too difficult for someone like me to do much about the environment.	3%	16%	25%	45%	11%	3.5
There is no point in doing what I can for the environment unless others do the same.	5%	21%	19%	41%	14%	3.4

# Data summary



# Results on water recovery approach

	Voluntary (infrastructure subsidy or buyback)	Compulsory cut with compensation	Compulsory cut without compensation
Climate change risk perception	-0.01	0.00	0.01
Trust in uni research	0.00	0.01	-0.01
Trust in news media	-0.02	0.00	<b>0.02**</b>
Trust in industry	<b>0.03**</b>	<b>-0.04***</b>	0.01
Trust in fed gov	<b>0.03***</b>	0.00	<b>-0.03***</b>
Limitations in individual efforts	<b>0.06**</b>	<b>-0.08***</b>	0.02