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Internal Consistency in Double Bounded Dichotomous Choice Contingent Valuation: Can Advanced Information to Respondents add to the Effects of Sequential Learning?

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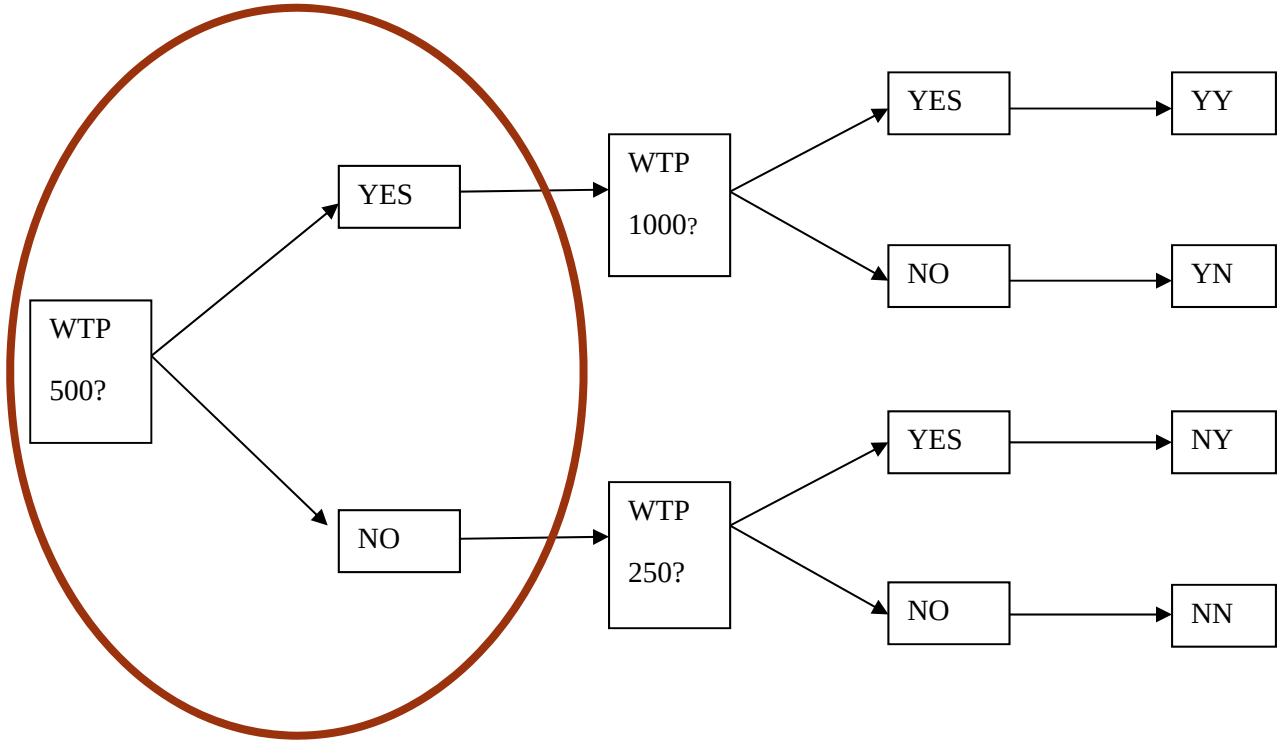
Introduction

- **Selection of elicitation formats in CVM**
  - Double Bounded Referendum (**Efficient estimates**)
    - Hanemann et al., 1991 and Alberini, 1995

- **Anomaly:**
- Inconsistency between estimates from SB and DB responses. **$WTP_{SB} > WTP_{DB}$** (from the same data)
  - Hanemann et al., 1991
  - Carson et al. 2009 describes the $SBDB_{Diff}$. as **stereotypical facts**

DBDC Contingent Valuation: Anomaly

* **Elicitation Format: Double Bounded Referendum**



Anomaly: SB>DB -> Differences between SB – DB estimates of mean WTP in same data set.

DBDC Contingent Valuation: Anomaly & Background

* Overall reason of the inconsistency
  * **Surprise** from the presentation of the second bid
  * People might **not have well-formed preferences** at the onset – preferences are learned by repetition and experience (Plott and Zeiler, 2005; List, 2003; Bjornstad et al., 1997)
* Cooper et al., 2002
  * One and one half bound dichotomous choice CV to remove the surprise.
  * Use of **Advanced Information Learning**
* Bateman et al., 2008
  * Learning Design Contingent Valuation (LDCV).
  * **$SBDB_{Diff}$** reduced by **Repetitive Learning**

DBDC Contingent Valuation: Anomaly & Background

* Bateman et al., 2004 JEEM → Introduce **Advanced Information** to attenuate order effects and insensitivity to scope.

* Carson et al., 2009 JEEM → in a lab experiment used a **Decision Rule** to clarify outcomes of the second referendum vote and potentially removed $SBDB_{Diff}$.

* This study combines **Advanced Information** of the Institution and Decision Rule with **Repetitive Valuation** affecting further **reduction in $SBDB_{Diff}$**

Objective

* To investigate the effect of the **Advanced Information Learning** (Institution and Decision Rules) and **Repetitive Learning** on the **internal consistency** between single and double bounded dichotomous choice estimates.

* To study the **effect of learning on the efficiency** of the SB and DB welfare measures across different designed treatments.

* To study the **effect of learning on the distributions** of the SB and DB welfare measures across different designed treatments.

Design of this Study

* WTP for **Renewable Energy sources in Chile**
* **3 Split Samples Treatments**: (1100 interviews)
  * Sample 1: Uninformed Respondents (Control Treatment)
  * Sample 2: Informed Respondents of DBDC Institution.
  * Sample 3: Informed Respondents of DBDC Institution and Decision Rules.
* **Each Treatment valued 2 goods Sequentially**:
  * Renewable Energy instead of Hydropower
  * Renewable Energy instead of Thermoelectric.

Advanced Information and Sequential Learning Design

	RE instead of HE (1st Valuation)			RE instead of TE (2nd Valuation)		
TREATMENT	SB	DB	SBDB $_{Diff}$	SB	DB	SBDB $_{Diff}$
Uninformed			L1			L2
Informed DBDC			L3			L4
Informed DBDC + DR			L5			L6

SBDB $_{Diff}$  L1 > L3 > L5

Advanced Information of DB Institution

- **Because the exact cost of the projects is not known today, we will ask you to vote on 2 different costs for each project. These costs represent the range into which the actual cost should fall.**

- **In what follows, you will vote for or against each alternative. You are asked how you would vote if the good could be provided at one of the two cost. This is followed directly by a second vote on how you would vote if the good could be provided at the second of the two costs.**

Advanced Information of Decision Rule

- Now imagine that the cost to you was $_____ (Higher/Lower price) **and the outcome of this second vote replaces that of the first vote, so that if a majority vote "Yes" in favour of the proposal the renewable energy projects are developed and if a majority vote "No" the Patagonian dams project will go ahead. We will not ask you to vote again at another cost on this proposal.**

  Would you vote Yes or No?

Methodology

- Contingent Valuation Method
- Linear Utility function
- Bid as only explanatory variable
- Logit Models
- **Bootstrap of SB-DB Differences – (Non independence between SB/DB)**
- Confidence intervals using percentile method

Results: Estimates First Good in Sequence

RE instead of HYDROPOWER – HE (1st Valuation)						
	Uninformed		**Informed DBDC**		**Informed DBDC+DR**	
	SB	**DB**	**SB**	**DB**	**SB**	**DB**
Constant	2.37 (7.39)	2.35 (11.94)	2.52 (8.00)	2.36 (11.15)	2.47 (8.30)	2.34 (11.54)
Bid	-0.50 (-3.33)	-0.61 (-12.12)	-0.67 (-4.49)	-0.70 (-12.44)	-0.72 (-5.16)	-0.70 (-13.08)
WTP	4776.54	3878.09	3787.32	3343.65	3425.03	3349.73
SE-wtp	901.99	191.04	474.09	161.44	350.79	160.77
# Obs	340	340	323	323	340	340

Results: Estimates Second Good in Sequence

RE instead of THERMOELECTRIC – TE (2nd Valuation)						
	Uninformed		Informed DBDC		Informed DBDC+DR	
	SB	DB	SB	DB	SB	DB
Constant	2.16 (8.48)	2.31 (12.37)	1.92 (7.69)	1.79 (9.84)	1.88 (7.71)	1.96 (10.63)
Bid	-0.42 (-6.33)	-0.49 (-14.97)	-0.50 (-7.46)	-0.49 (-15.31)	-0.43 (-6.83)	-0.45 (-15.06)
WTP	5121.78	4674.47	3849.77	3631.62	4382.92	4359.09
SE-wtp	413.59	217.31	264.62	226.79	318.32	239.77
# Obs	340	340	323	323	340	340

Results – $SBDB_{Diff}$

	HE (1st Valuation)			TE (2nd Valuation)		
TREATMENT	**SB**	**DB**	**DIF**	**SB**	**DB**	**DIF**
Uninformed	4776.54 (901.53)	3878.09 (191.04)	898.45	5121.78 (413.59)	4674.47 (217.31)	447.31
Informed DBDC	3787.32 (474.09)	3343.64 (161.44)	443.68	3849.77 (264.62)	3631.62 (226.79)	218.15
Informed DBDC+DR	3425.03 (350.79)	3349.73 (160.77)	75.3	4382.92 (318.32)	4359.09 (239.77)	23.83

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Results $SBDB_{Diff}$ $H_o = 0$

	HE (1st Valuation)			TE (2nd Valuation)		
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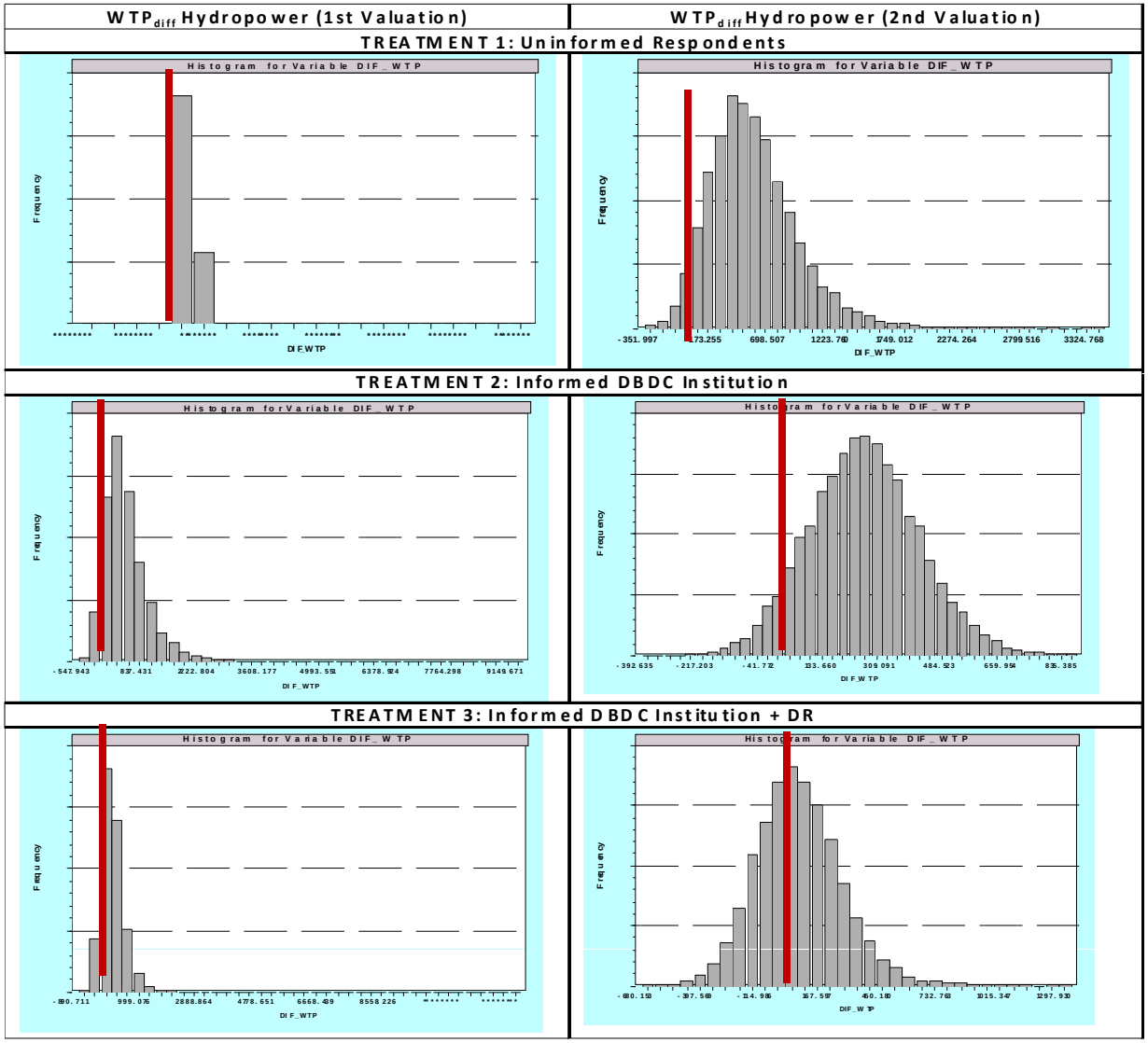
Results – SB-DB Internal Consistency Test

Hypothesis Test Ho	90% Confidence Interval		Test Result
	Lower	Upper	
Treatment 1: Uninformed			
$WTP_{SB1} - WTP_{DB1} = 0$	-35.95	3885.92	Accept
$WTP_{SB2} - WTP_{DB2} = 0$	27.99	1149.12	Reject
Treatment 2: Informed DBDC			
$WTP_{SB1} - WTP_{DB1} = 0$	-92.01	1417.45	Accept
$WTP_{SB2} - WTP_{DB2} = 0$	-18.64	498.78	Accept
Treatment 3: Informed DBDC + DR			
$WTP_{SB1} - WTP_{DB1} = 0$	-320.98	782.64	Accept
$WTP_{SB2} - WTP_{DB2} = 0$	-258.18	377.32	Accept

WTP_{SB} - WTP_{DB} (WTP_{diff}) Distributions

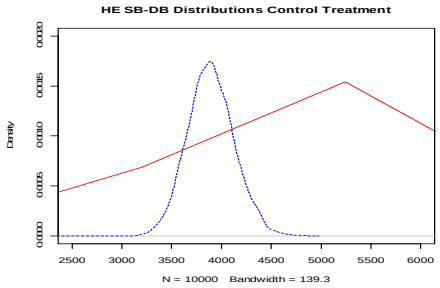
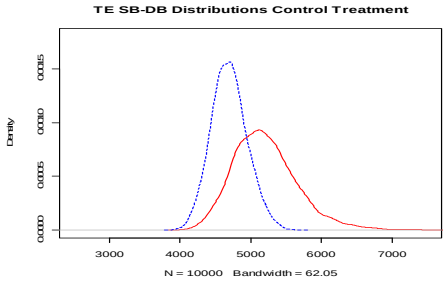


Results – Coefficients of Variation

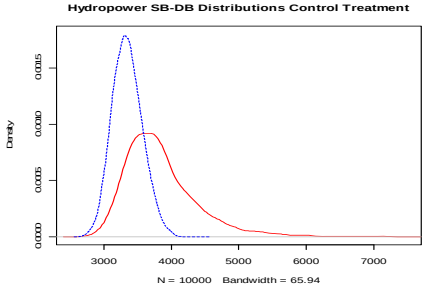
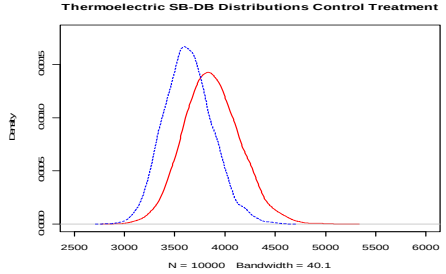
	Hydropower Baseline (1st Valuation)		Thermoelectric Baseline (2nd Valuation)	
TREATMENT	**SB**	**DB**	**SB**	**DB**
Treatment 1: Uninformed	**0.19**	0.05	0.08	0.05
Treatment 2: Informed DBDC	**0.13**	0.05	0.07	0.06
Treatment 3: Informed DBDC +DR	**0.10**	0.05	0.07	0.06

SB and DB mean WTP Distributions

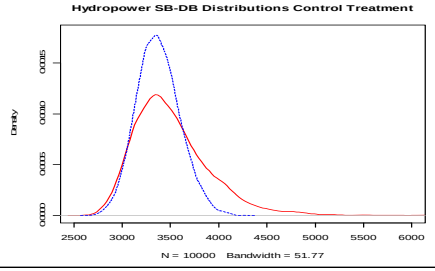
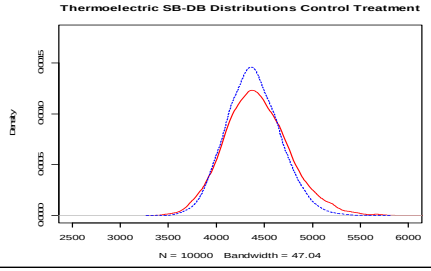
TREATMENT 1: UNINFORMED TREATMENT

Hydro SB and DB	Thermo SB and DB
	

TREATMENT 2: ADVANCED INFORMATION OF THE DBDC INSTITUTION

Hydro SB and DB	Thermo SB and DB
	

TREATMENT 3: ADVANCED INFORMATION OF THE DBDC INSTITUTION AND DECISION RULES

Hydro SB and DB	Thermo SB and DB
	

Conclusions

- Advanced information to respondents and repetitive learning significantly **reduces SB-DB anomaly** producing internally consistent welfare estimates

- Advanced Information of the Institution and Decision Rule greatly reduces the $SBDB_{DIFF}$ in the first valuation but **even more in the second valuation**

- Furthermore, the resulting estimates also present significantly **lower standard errors** showing higher statistical efficiency

- We find as in Bateman et al., 2008, the SE on first SB valuation is **several magnitudes greater than other SEs**.

Conclusions

- The Advanced Information of the Institution appears to bring almost the same reduction in SBDBDiff as a repeated valuation in LDCV.
- Sequential learning on its own failed to produce internal consistency between SB-DB estimates.
- Advanced Disclosure of the Institution and Decision Rule **produce convergence in SB-DB mean WTP distributions**.

Thanks for your attention

Questions

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