Anchoring and Cost Vector Design in Discrete Choice Experiments:
Testing Rational Choice, Coherent Arbitrariness, and Discovered Preferences Hypotheses

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Introduction – monetary estimates of WTP

- Stated-preference WTP stands on micro-economic theory
  - Requires well defined, rational preferences + budget constraint
- If those assumptions fail → WTP figures undefined

- Can cost-vector (bids) choice move the WTP dial?
  - If yes, there's a problem with the WTP measures
  - By arbitrarily changing the cost vector we could get any result

Competing behavioral theories

- **Rational Choice (RCT)**: no anchoring, preferences pre-existing
  - Preferences are granite
- **Coherent Arbitrariness (CAH)**: first number sticks, then coherent scaling
  - Preferences are jelly – sticky but shaped by the first mould
- **Discovered Preferences (DPH)**: learning erodes early anchors
  - Preferences are clay – firm up with practice
- Each yields different predictions for cost-vector effects

Past evidence

- **Early CVM work**: bid-range effects already hinted at anchoring
- **Lab markets**: Ariely et al. "SSN anchor" → WTP triple-jumps
- **Recent DCEs**: mixed results, often under-powered, few robustness tests

- **Gap**: large, policy-relevant field sample with multiple vectors
  - Our study steps into that gap – with 5 900+ respondents

Empirical study –
Active vs. Passive protection of forests in Tatra National Park

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Active vs. Passive protection of forests in Tatra National Park

- Natural forest (multi-aged, mixed)

- Managed forest (single-aged, spruce)

- Passive protection (45%)

- Active protection (55%)

DCE – example of a choice task

	Alternative A New forest protection strategy	Alternative B New forest protection strategy	Status quo Continuation of current forest protection strategy
Passive protection % of TNP forests	75%	65%	45%
Active protection % of TNP forests	25%	35%	55%
Annual cost for your household	70 PLN	10 PLN	0 PLN
Your choice	□	□	□

- 2 / 3 alternatives
- 12 choice tasks per respondent

Passive protection (X%)
ranging from 0 to 100
(0, 15, 25, 35, 50,
65, 75, 85, 100%)

Active protection (100-X%)
ranging from 0 to 100
(0, 15, 25, 35, 50,
65, 75, 85, 100%)

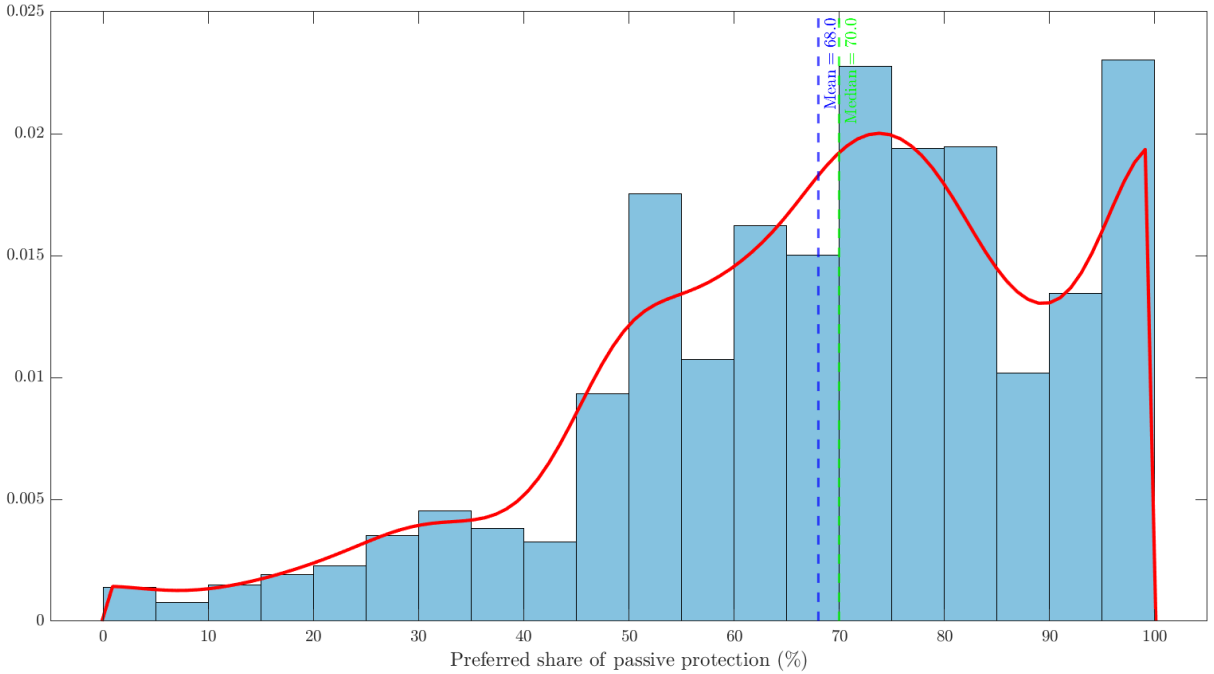
Cost vector levels:

- Low Cost Vector (LC):
  10, 20, 40, 70 PLN
- Medium Cost Vector (MC):
  10, 40, 70, 130 PLN
- High Cost Vector (HC):
  10, 70, 130, 170 PLN

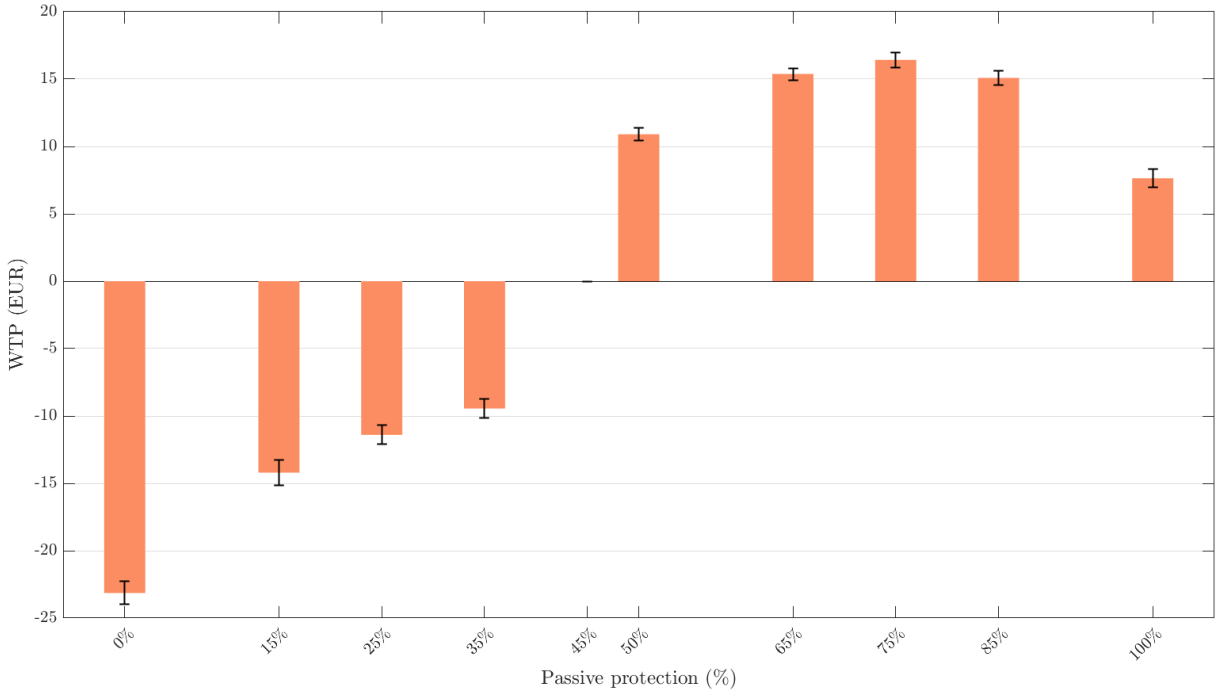
Treatments + sample

- Cost vectors:
  - Low: 10, 20, 40, 70 PLN
  - Medium: 10, 40, 70, 130 PLN
  - High: 10, 70, 130, 170 PLN
- 2 vs. 3 alternatives
- Open-ended WTP question asked before vs. after DCE
- Sample: 5 917 Polish adults, census-matched quotas

Results – preferred protection level

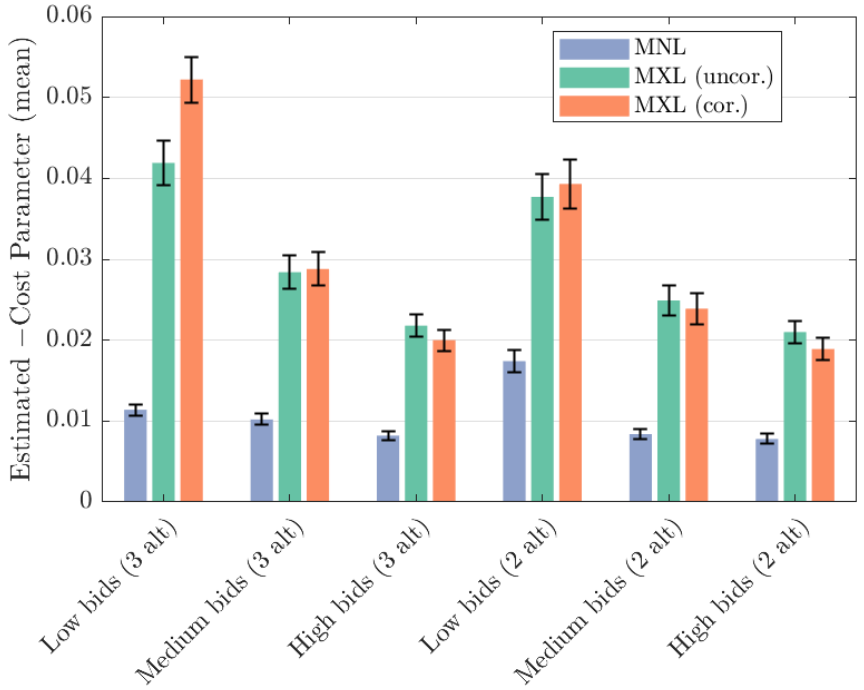


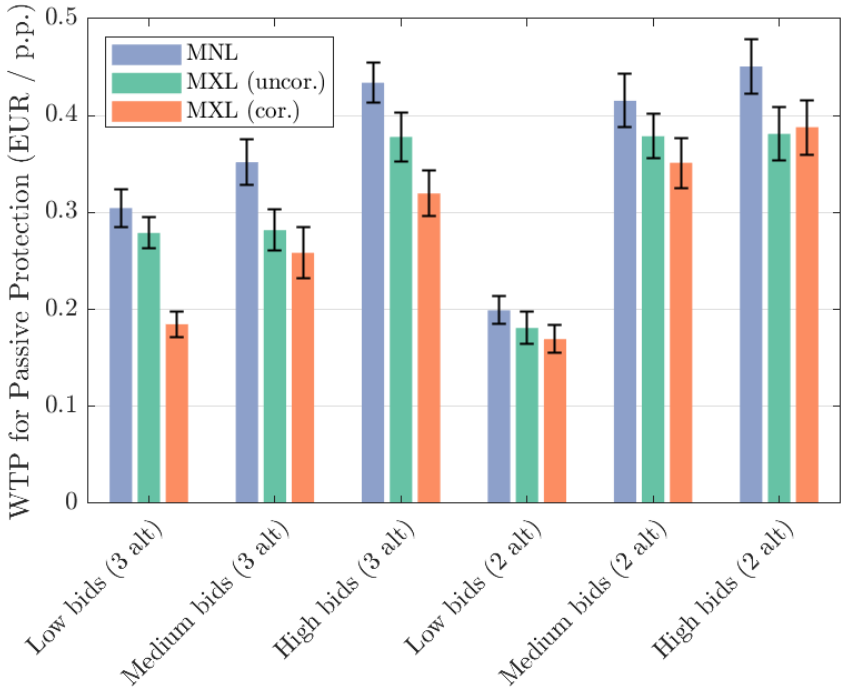
- Substantial variation in the shares of preferred passive protection
- Hardly any 0s, 2% in favor of 45% (sq), 80% for passive protection above 45%, 7% indicate 100%



- Highest WTP for 65-85% of passive protection

Results – cost sensitivity and WTP

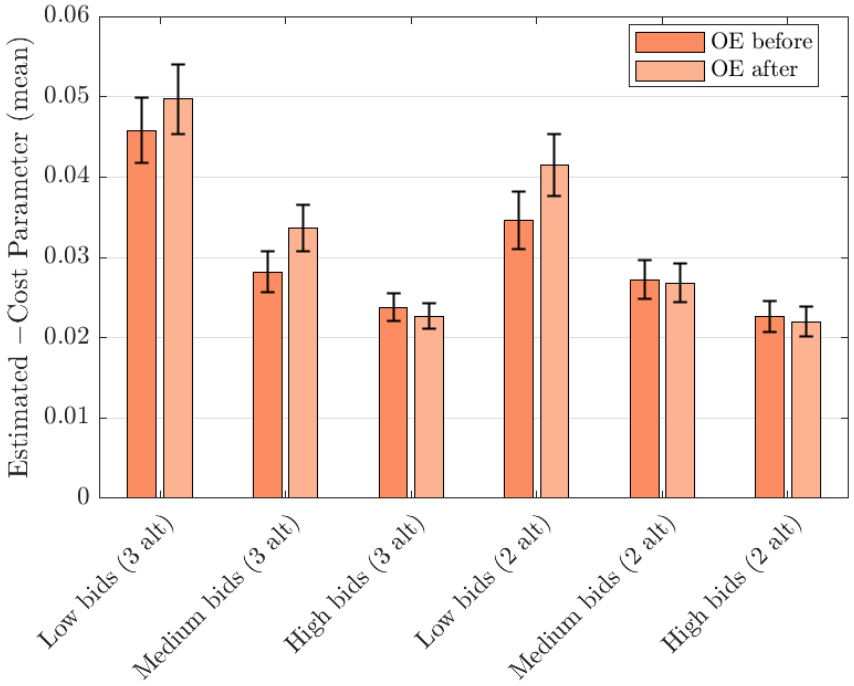


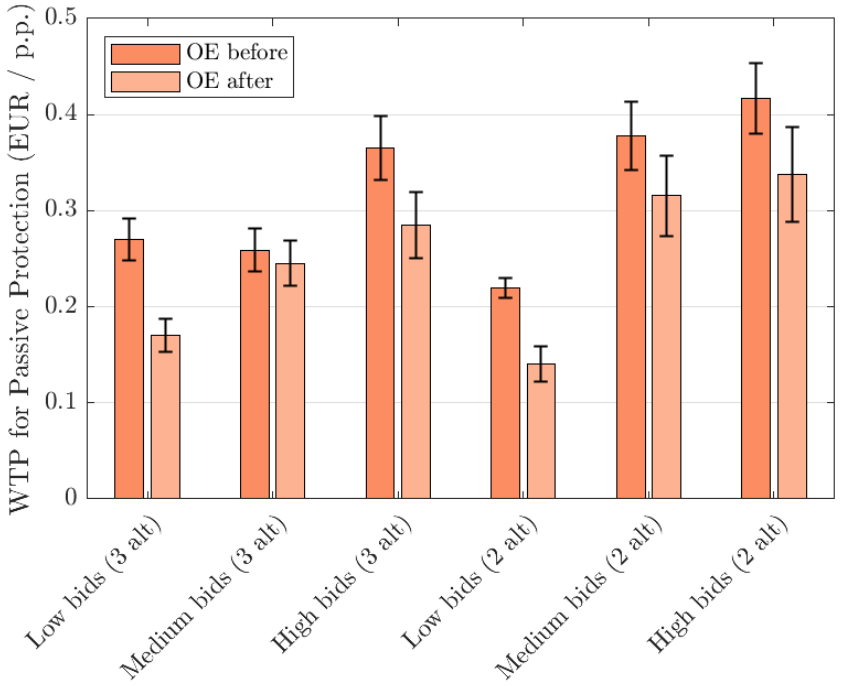


- Higher costs → lower sensitivity
- Effect consistent across tasks (no de-anchoring)
- Supports CAH prediction, contradicts RCT & DPH

- Higher cost → higher WTP
- Effect consistent across 2/3-alternative settings
- Same benefit looks cheaper when numbers are big?

Results – open ended question before/after DCE





- OE WTP question first makes differences lower but still evident

Results – open ended WTPs

	OE WTP before DCE	OE WTP after DCE	OE WTP after DCE: Low cost vector	OE WTP after DCE: Medium cost vector	OE WTP after DCE: High cost vector	OE WTP after DCE: 3 alternatives	OE WTP after DCE: 2 alternatives
Total sample							
Mean	30.46	17.89	15.16	18.09	20.33	17.49	18.29
Median	12.50	10.00	7.50	10.00	12.50	10.00	10.00
Std. Dev.	53.69	30.26	31.02	28.89	30.59	29.05	31.43
N	2873	2882	949	947	986	1443	1439
Excluding respondents who stated 0 in WTP OE							
Mean	36.37	20.81	17.81	20.92	23.56	20.41	21.21
Median	25.00	12.50	10.00	12.50	15.00	12.50	12.50
Std. Dev.	56.80	31.69	32.91	30.10	31.76	30.41	32.91
N	2406	2478	808	819	851	1237	1241

- OE WTP responses lower when asked after DCE → consistent with DPH
- OE WTP moderately influenced by DCE cost vector design → consistent with CAH

Results – internal consistency

- We know respondents' preferred passive protection levels and the associated (OE) WTPs – are DCE choices internally consistent?

Share of respondents (%)	Number of violations												
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Total sample	60.92%	10.96%	7.94%	6.05%	4.03%	3.01%	2.17%	1.44%	1.16%	1.01%	0.56%	0.32%	0.43%
WTP OE before DCE	62.03%	9.23%	7.92%	6.00%	4.05%	3.04%	2.36%	1.61%	1.43%	0.83%	0.60%	0.41%	0.49%
WTP OE after DCE	59.81%	12.67%	7.96%	6.09%	4.00%	2.99%	1.98%	1.27%	0.90%	1.20%	0.52%	0.22%	0.37%

- 39% violate WARP/SARP at least once; violators evenly spread across treatments
- What if we remove irrational respondents?

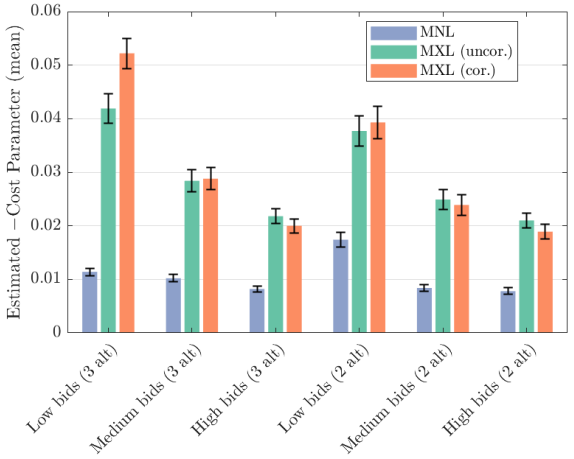
Results – open ended WTPs by the frequency of WARP and SARP violations

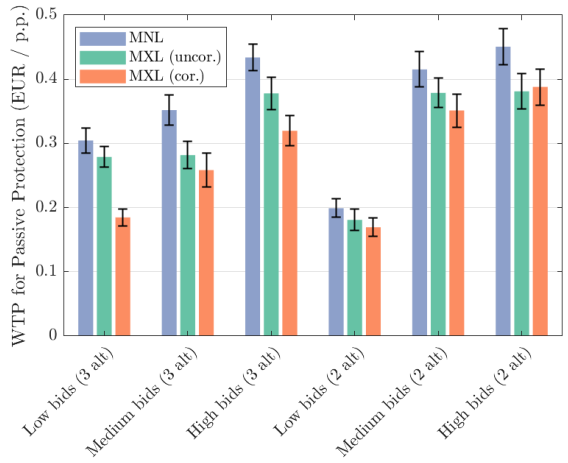
Number of violations	OE WTP before DCE	OE WTP after DCE	OE WTP after DCE: Low cost vector	OE WTP after DCE: Medium cost vector	OE WTP after DCE: High cost vector
0	51.24	25.48	23.68	25.13	28.01
1-3	15.48	14.48	8.42	15.49	18.32
4-6	13.20	13.68	6.28	12.38	19.39
7-9	8.53	10.89	4.38	6.43	15.38
10-12	5.19	5.67	2.21	4.35	8.67

- Highest cost vector effects for heavy-violators
- "Rational" subsample can still be anchored; result not solely driven by sloppy choices

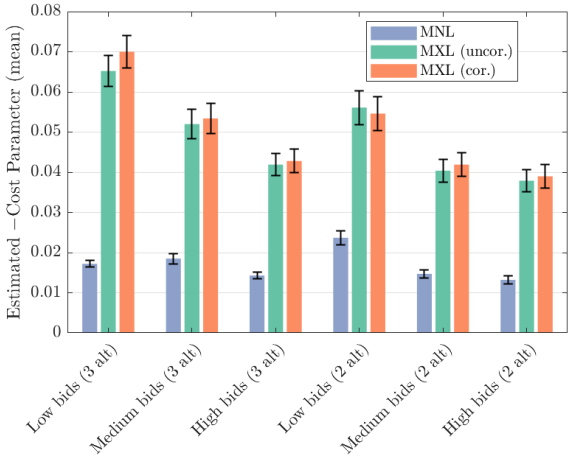
Results – cost sensitivity and WTP with violators removed

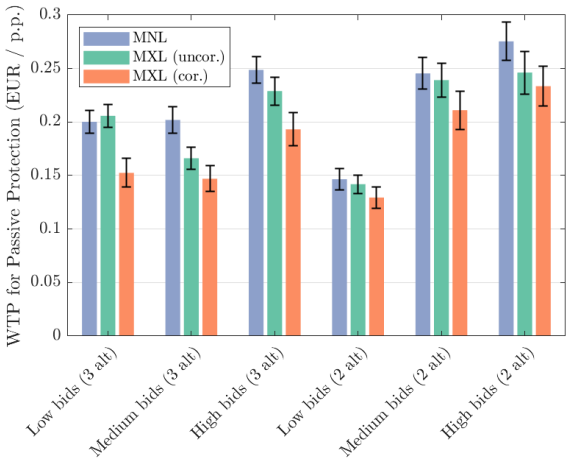
All



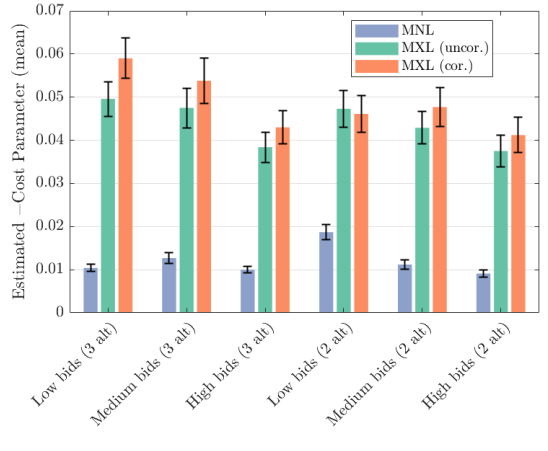


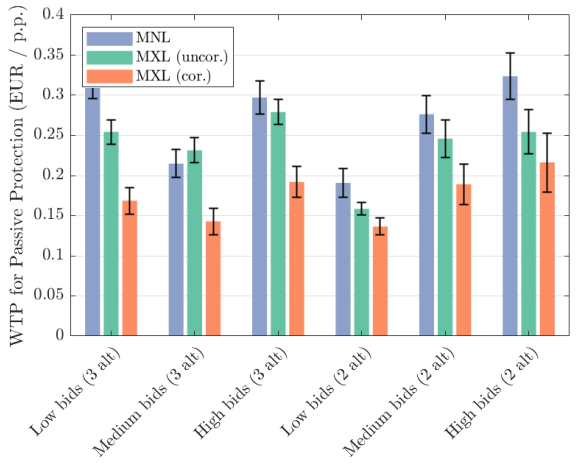
Choices with violations dropped





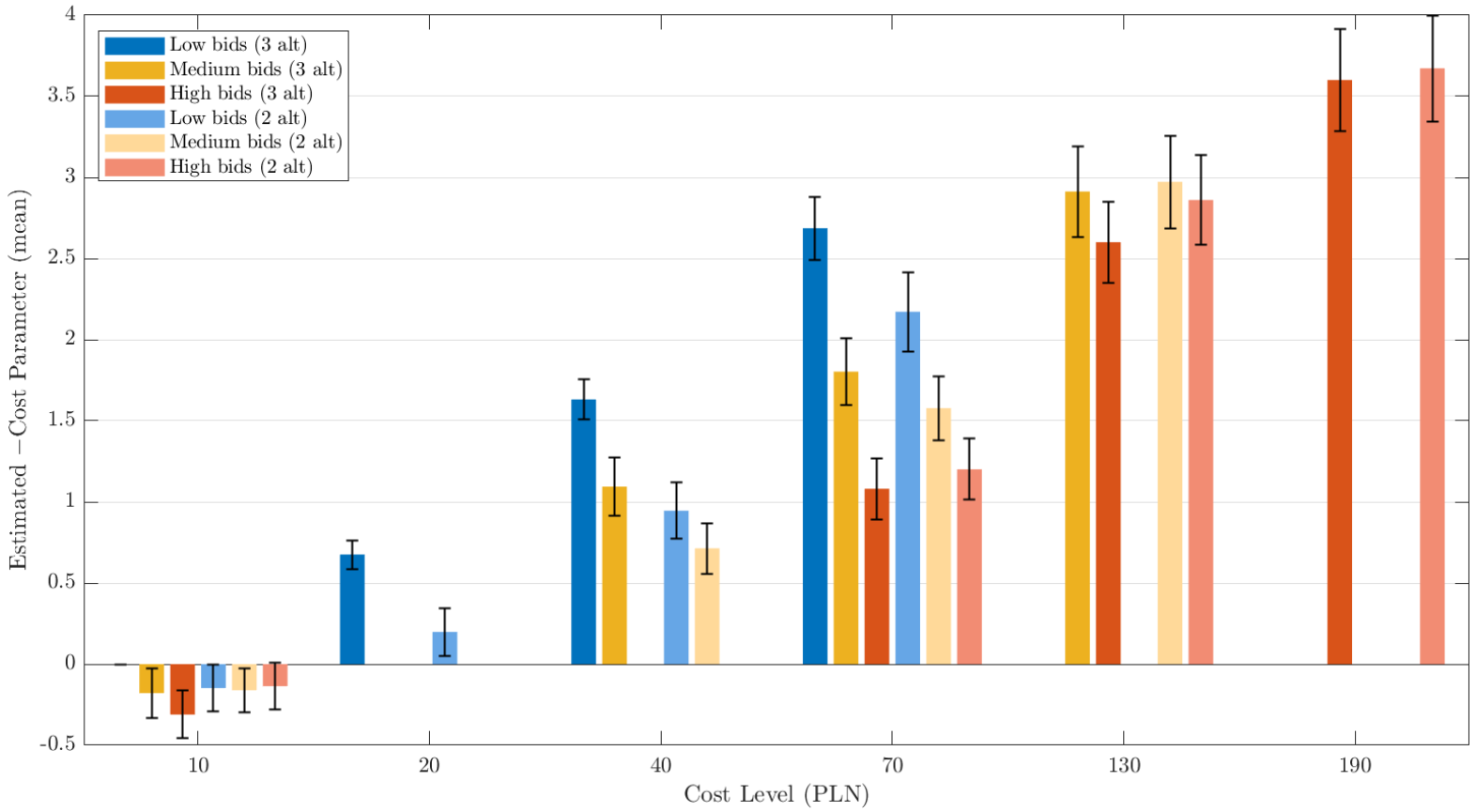
Respondents with violations dropped





- Removing violating choices or respondents helps, but does not make the problem go away

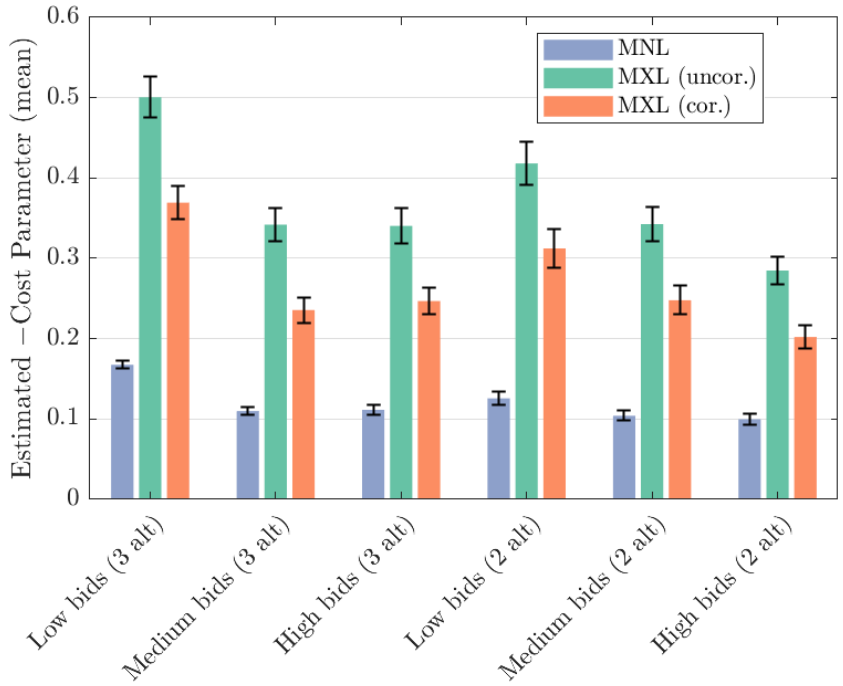
Robustness tests – cost damping

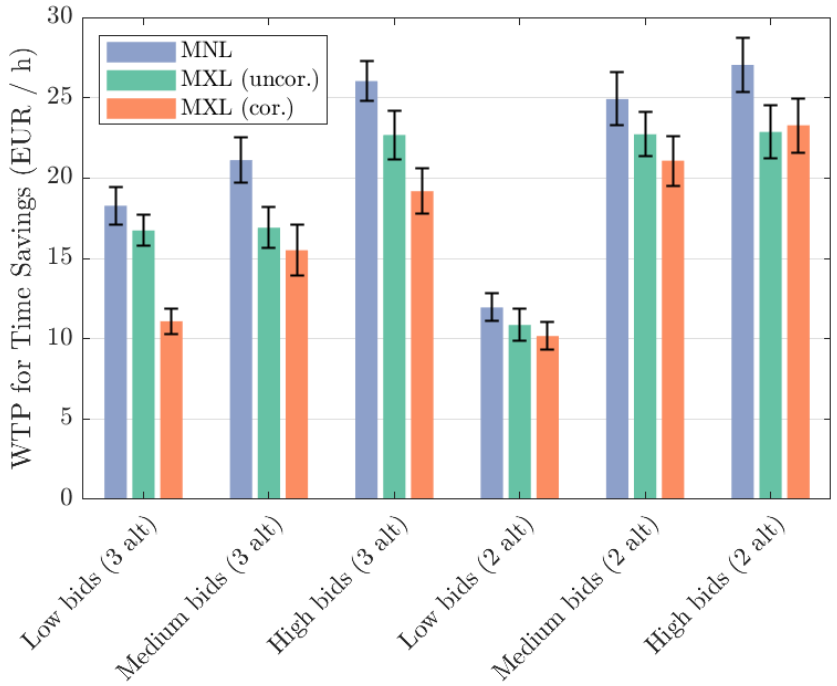


- Cost damping – decreasing marginal utility of money
- Re-specified cost as dummy-coded levels (no linearity)
- Anchoring pattern reproduced

Robustness tests – an unfamiliar vs. familiar good?

- Parallel DCE on travel-time savings (value of time) – a familiar good





- The results mirror the passive protection case
- Anchoring not limited to "exotic" environmental policies – also observed for familiar goods

Conclusions

- Monetary WTP from DCEs sensitive to cost-vector choice
- Assumptions of economic theory (stable prefs) violated
- Evidence crowns Coherent Arbitrariness, RCT/DPH stumble
- Policy CBAs should report ranges & sensitivity, not single point?
- Practical fixes:
  - Apply data cleaning techniques
  - Pilot multiple vectors
  - Pre-register anchor tests

Thank you

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