Training Policy Makers in Econometrics

Sultan Mehmood, Shaheen Naseer, Daniel L. Chen

Causal Effects of "Mastering Metrics"?

The credibility revolution has triggered a paradigm shift

(Angrist & Pischke, 2010; Abadie & Cattaneo 2018; Banerjee & Duflo, 2020)

New focus on causal inference research designs in social sciences

Randomized trials are presented as the ideal research design

(Leamer 1983; Lalonde, 1986; Angrist Pischke, 2010)

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Motivation

- Policymakers demand causal evidence (Hjort et al. 2021, AER)
- But they are unlikely to change their policy choices in response to new evidence
- Large body of evidence is accumulating that policymakers are highly averse to shifting their beliefs and policy choices (Baekgaard et al.2019; Banuri et al. 2019; Vivalt and Coville 2021)
- Sticking to priors and being inattentive to evidence may stymie the implementation of good policies and hurt economic development (Kremer, Rao, Schilbach 2019)

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- Will training them in concepts associated with the credibility revolution make them more likely to shift their beliefs?
- Will it induce them to change their policy choices?

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Personnel economics of the state (Finan, Olken, and Pande 2017)

selection

incentives

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Assumes civil servants are fixed and not malleable

but a growing body of causal evidence suggests they can be taught

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Paradigm Shift in Science

Causa effects of paradigm shifts using a field experiment

We used training of the paradigm as its instrument

After receiving a book, an intense training workshop based on SEL

Summarize

Apply

Structured discussion

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Economics and financial literacy (Lusardi and Mitchell 2014)

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Choose mastering metrics vs. self-help book

Lottery with high or low probability

Outcome of lottery allows estimating causal effects

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Preview

Training about causal thinking increases

1) perceived value of causal inference, quantitative data and RCTs

After 6 months, treated individuals' ratings on the importance of quantitative analysis increase by 50%

Writings reflect an increase in perceived importance of causal inference and understanding of causal concepts

2) improved test scores on public policy and research methods

Performance in national research methods and public policy examsimproves by 0.5-0.8 sigma

3) willingness to pay for quantitative data, only for RCTs ($\downarrow$ correlations)

WTP for commissioning RCTs using public funding increases by 300% and decreases by 50% for correlations

SHIFT IN DEMAND FOR INFORMATION

4) responsiveness to evidence from a RCT

40 percent more likely to adopt policy $>$ 10 percent (Hjort et al. 2021)

Treated ministers are twice as likely to choose a (deworming) policy for which there is RCT evidence.

OPENNESS TO INFORMATION

5) only for those whose priors were lower than the evidence from the RCT

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Pakistan Deputy Ministers

- Policy experts who advise the President, Prime Minister, cabinet ministers, governors and police chiefs.
- "key wheels on which the entire engine of the state runs" (Central Superior Services, 2019)
- Select 1.5% of test-takers
  - 14,521 candidates => 213 qualified
- Mandatory attendance and high-stakes training academy
  - Training workshop counted 5% towards requirements
  - Affects career trajectories, transfers, promotions

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- October 20, 2020 baseline survey
  - choose one of the two books (70-30 lottery)
  - Mastering Metrics (Joshua Angrist and Jörn-Steffen Pischke)
  - Mindsight: The New Science of Personal Transformation (Daniel J. Siegel)

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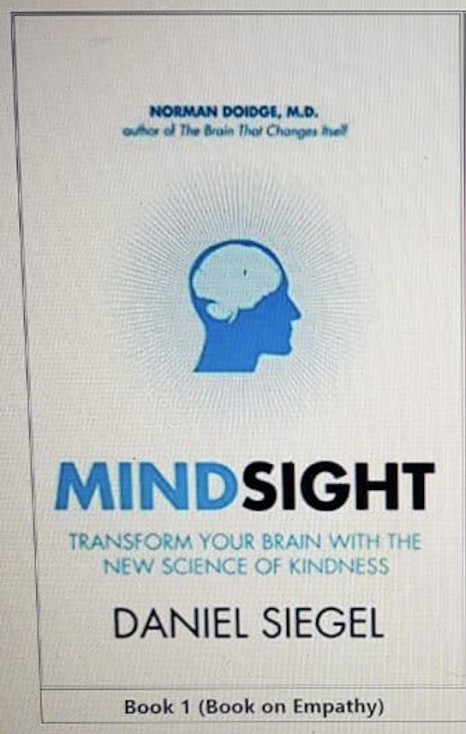
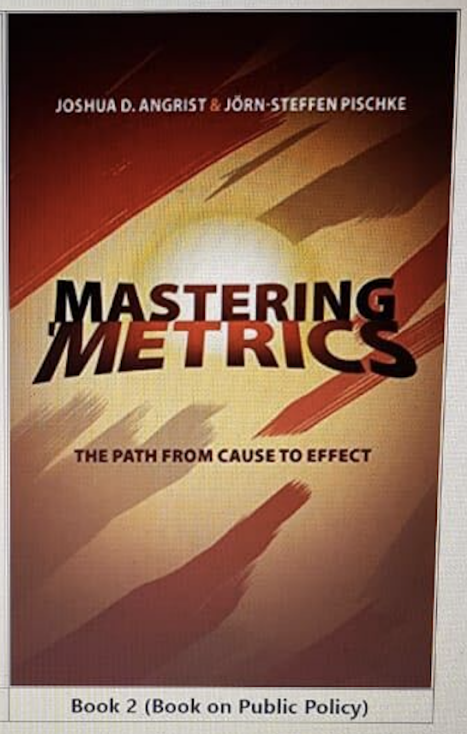
Book Choice (lottery)

As stated earlier in the session, you will receive a free book. Please tell us which book you prefer.



Book 1 (Book on Empathy)



Book 2 (Book on Public Policy)

We hope to send you the book of your choice. Therefore, it is very important that you provide us the mailing address where you would like to receive the book in the next two weeks. You will also receive questions about the book from the Civil Service Academy, so make sure you receive the book on time.

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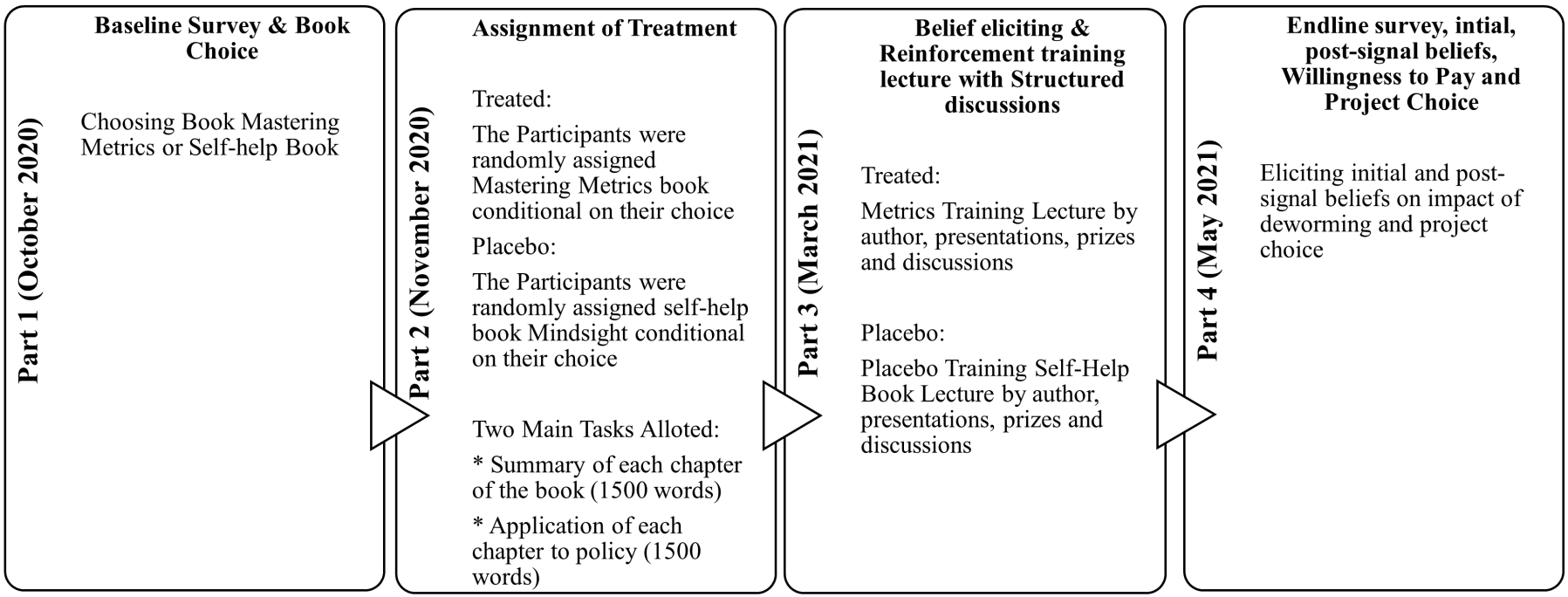
Part 1 (October 2020)
Baseline Survey & Book Choice
Choosing Book Mastering Metrics or Self-help Book
Part 2 (November 2020)
Assignment of Treatment
Treated:
The Participants were randomly assigned Mastering Metrics book conditional on their choice
Placebo:
The Participants were randomly assigned self-help book Mindsight conditional on their choice
Two Main Tasks Alloted:
* Summary of each chapter of the book (1500 words)
* Application of each chapter to policy (1500 words)
Part 3 (March 2021)
Belief eliciting & Reinforcement training lecture with Structured discussions
Treated:
Metrics Training Lecture by author, presentations, prizes and discussions
Placebo:
Placebo Training Self-Help Book Lecture by author, presentations, prizes and discussions
Part 4 (May 2021)
Endline survey, intial, post-signal beliefs, Willingness to Pay and Project Choice
Eliciting initial and post-signal beliefs on impact of deworming and project choice

Work with CSA

- November 10, assignment of treatment
- December 10, deadline of first assignment
  - Main Task 1: Provide a summary of the whole book of around 1500 words.
  - Main Task 2: Provide an analysis of how you would apply the lessons learned from the book in your future job. This again should be around 1500 words.

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- March 10, 2021 (zoom)
  - Belief Elicitation I
  - Reinforcement lecture of 30 minutes
    - Links in oTree to watch videos
    - Students could pick which video (behavioral measure of defier)
  - Live discussion of 30 minutes
    - a) what do you think is the main point of the lecture?
    - b) how can you apply the concepts learned in this lecture to future job?
  - Belief Elicitation II

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  - Project Choice
    - deworming relative to computer labs project
  - Willingness to Pay from both private and public funds for
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    - (2) RCT assessing the impact of deworming on hourly earnings
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  - Signal (Kremer et al. 2021)
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- $Y_i = \theta + \alpha$ Metrics Assigned$_i$ + β Metrics Chosen$_i$ + $W'_i\psi + \epsilon_i$
- Subscript i represent policy-maker
- Y represents a set of attitudes, beliefs, and choices
- Metrics Chosen denotes an indicator variable that switches on for **choosing** Mastering Metrics vs. Mindsight
- Metrics Assigned denotes an indicator variable that switches on for being randomly **assigned** the book
- W is a vector of individual controls from administrative data
  - written test scores, interview test scores, gender, birth in political capitals, asset ownership, income before joining public service, age, education, foreign visits and occupational group dummies.
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- Subscript *i* represent policy-maker
- Y represents a set of attitudes, beliefs, and choices
- Metrics Chosen denotes an indicator variable that switches on for **choosing** Mastering Metrics vs. Mindsight
- Metrics Assigned denotes an indicator variable that switches on for being randomly **assigned** the book
- W is a vector of individual controls from administrative data
  - written test scores, interview test scores, gender, birth in political capitals, asset ownership, income before joining public service, age, education, foreign visits and occupational group dummies.
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Balance Check

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Written test scores	Interview test scores	Birth in political capitals	Income	Age	Education	Visited Foreign Country	PAS	PSP	Other groups
Metrics Assigned	0.867	1.221	0.087	-7412.042	0.232	0.082	-0.002	-0.002	-0.054	0.023
	(5.000)	(3.141)	(0.091)	(4629.089)	(0.392)	(0.087)	(0.072)	(0.045)	(0.035)	(0.057)
Metrics Chosen	-3.164	-4.326	-0.027	8366.162*	-0.229	-0.054	0.066	0.051	0.053	0.065
	(4.652)	(2.813)	(0.086)	(4595.222)	(0.391)	(0.083)	(0.069)	(0.042)	(0.037)	(0.053)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190	190	190	190	190	190	190	190	190	190
R-squared	0.485	0.22	0.05	0.161	0.257	0.223	0.072	0.634	0.452	0.647
Mean of dependent variable	655.585	131.085	0.324	34258.260	26.775	0.516	0.225	0.169	0.099	0.641

Differences are small, almost all p-values > 0.1

High take-up with $> 80\%$ compliance in all responses

(no attrition differences)

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Partial and Full Metrics Training

- Partial Training = Pre Lecture
  - Write short summary of each chapter of the book
  - Write main lessons that you learned to apply each chapter of the book's concepts in your policymaking
- Full Training = Post Lecture
  - Video Lectures by authors: Joshua Angrist and Daniel Siegelman
  - Structured discussion: "what are the key lessons?" "how will you apply these concepts in your career"
  - Presentation of the main lessons of the book
- Assignments and presentations were rated in a competitive manner with cash awards and commemorative shields awarded to top performers

Impacts of Metrics Training on Beliefs

	Pre-Lecture Rating Quantitative	Post-Lecture Rating Quantitative	Pre-Lecture Rating Qualitative	Post Lecture Rating Qualitative	Pre-Lecture Run RCT	Post-Lecture Run RCT	Pre-Lecture Why Run RCT	Post-Lecture Why Run RCT
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Metrics Assigned	0.912***	1.538***	0.136	0.122	0.167**	0 .220**	0.151*	0.153*
	(0.176)	(0.178)	(0.196)	(0.206)	(0.082)	(0.085)	(0.087)	(0.087)
Metrics Choose	-0.042	0.006	0.203	0.068	-0.126	-0.133	-0.126	-0.118
	(0.178)	(0.181)	(0.183)	(0.200)	(0.082)	(0.085)	(0.084)	(0.085)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	190	190	190	190	190	190	190	190
Mean of dep. var. (placebo)	2.745	2.979	2.490	2.596	0.362	0.404	0.396	0.396

Treated policy-makers increase 35% rating on quantitative evidence

Reinforcement video increases effect by 50%

Impacts of Metrics Training on Beliefs

	Pre-Lecture Rating Quantitative	Post-Lecture Rating Quantitative	Pre-Lecture Rating Qualitative	Post Lecture Rating Qualitative	Pre-Lecture Run RCT	Post-Lecture Run RCT	Pre-Lecture Why Run RCT	Post-Lecture Why Run RCT
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No crowd-out on perceived importance of qualitative analysis

15 (25) percentage points more likely to choose RCTs before policy rollout

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In high stakes writing assignment

15 percentage points more likely to write that randomized evaluations are "apple to apple comparisons"

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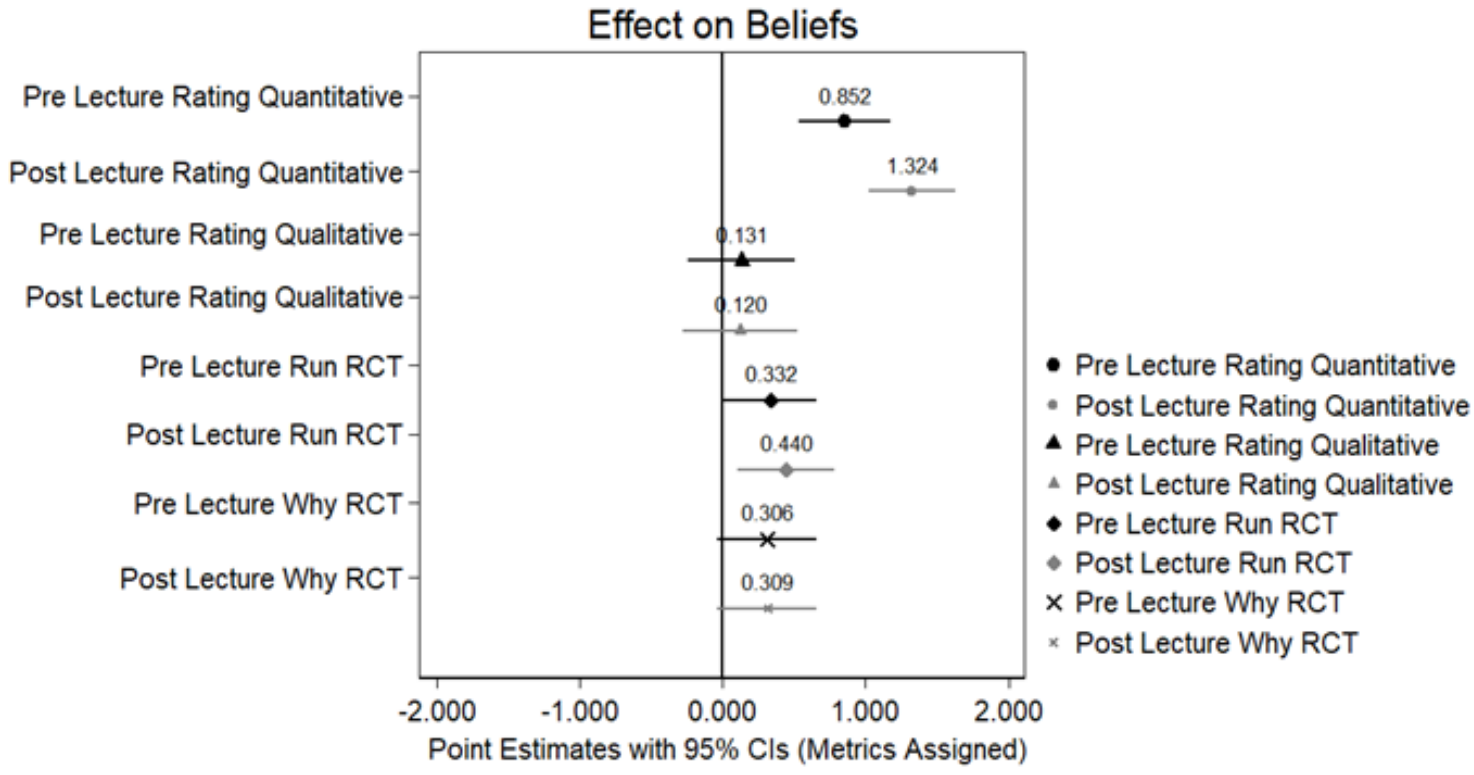

0.85-1.32 σ increase in rating assigned to quantitative evidence

0.33-0.44 σ increase in requesting randomized evaluations

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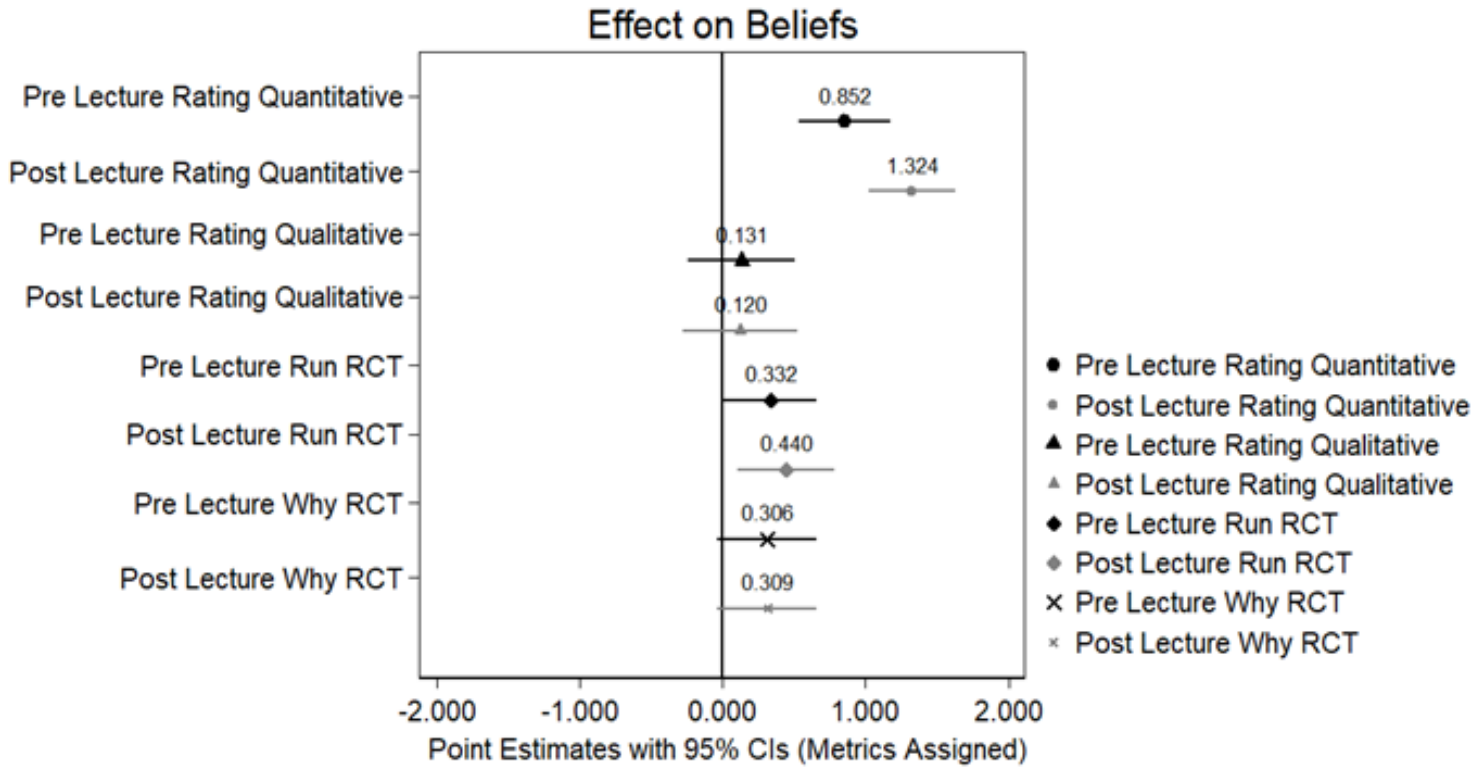

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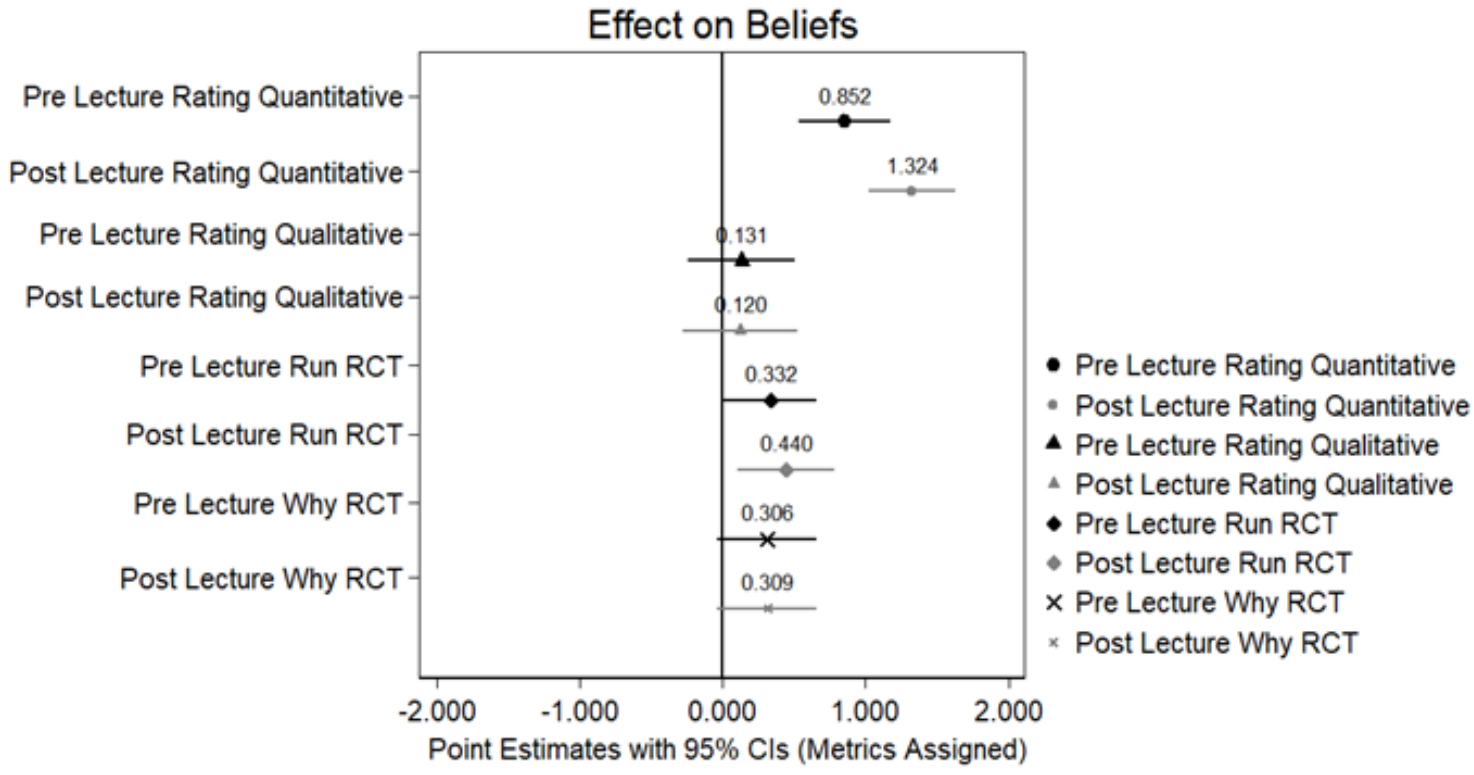

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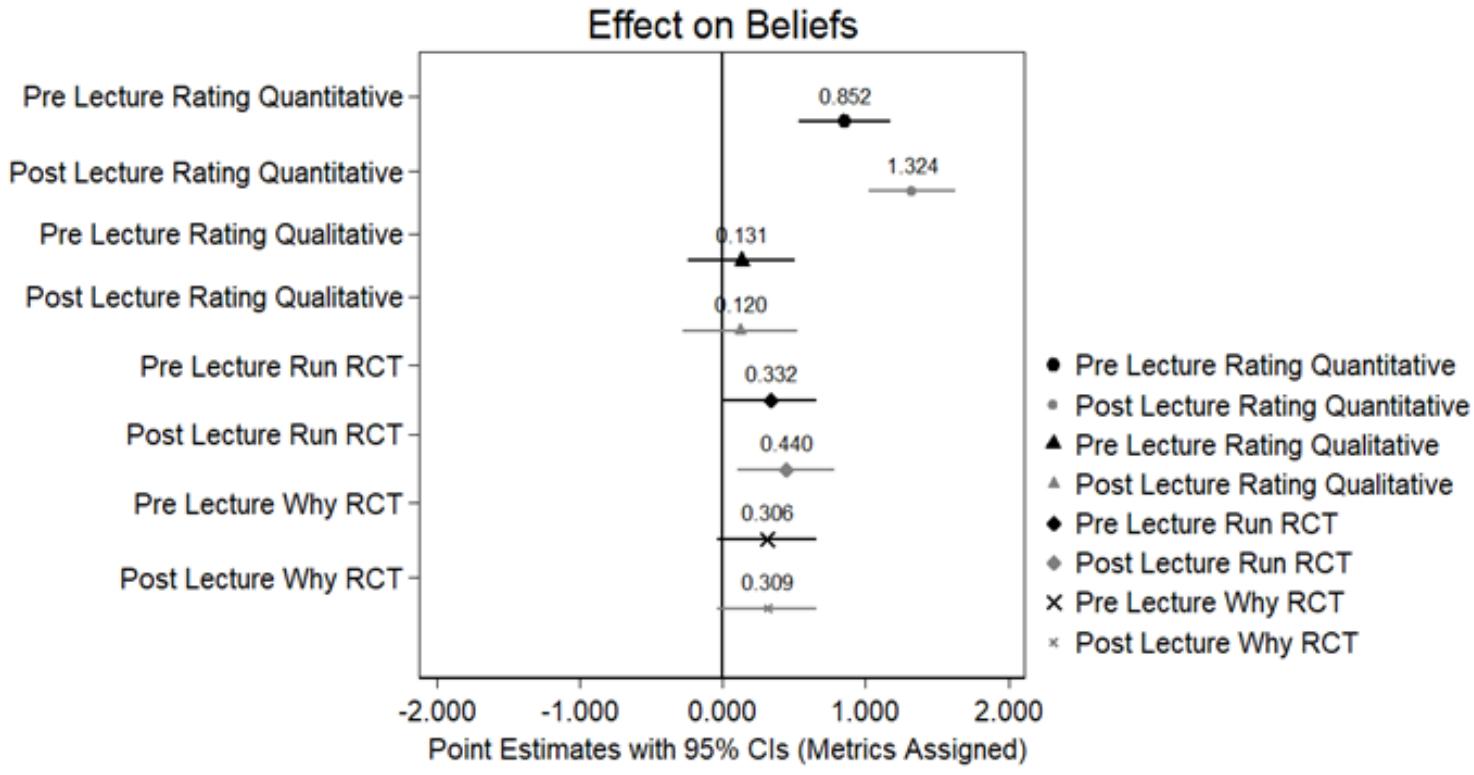

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Impact of Metrics Training on Policy Making Assessments

	Assessment Public Goods and Policy		*Assessment Research Methods*		*Assessment Teamwork*	
	(1)	(2)	(3)	(4)	(5)	(6)
Metrics Assigned	0.574***	0.505***	0.814***	0.799***	-0.004	0.017
	(0.165)	(0.168)	(0.173)	(0.180)	(0.189)	(0.194)
Metrics Choose	0.168	0.132	0.170	0.142	0.075	0.084
	(0.160)	(0.168)	(0.161)	(0.173)	(0.188)	(0.186)
Individual Controls	No	Yes	No	Yes	No	Yes
Observations	190	190	190	190	190	190
R-squared	0.097	0.171	0.186	0.219	0.001	0.123

policymakers' performance in the national research methods and public policy exams (24% of total grade)

0.5σ higher in national public policy exams

0.8σ higher in research methods

no effect on teamwork assessments

Impact of Metrics Training on Policy Making Assessments

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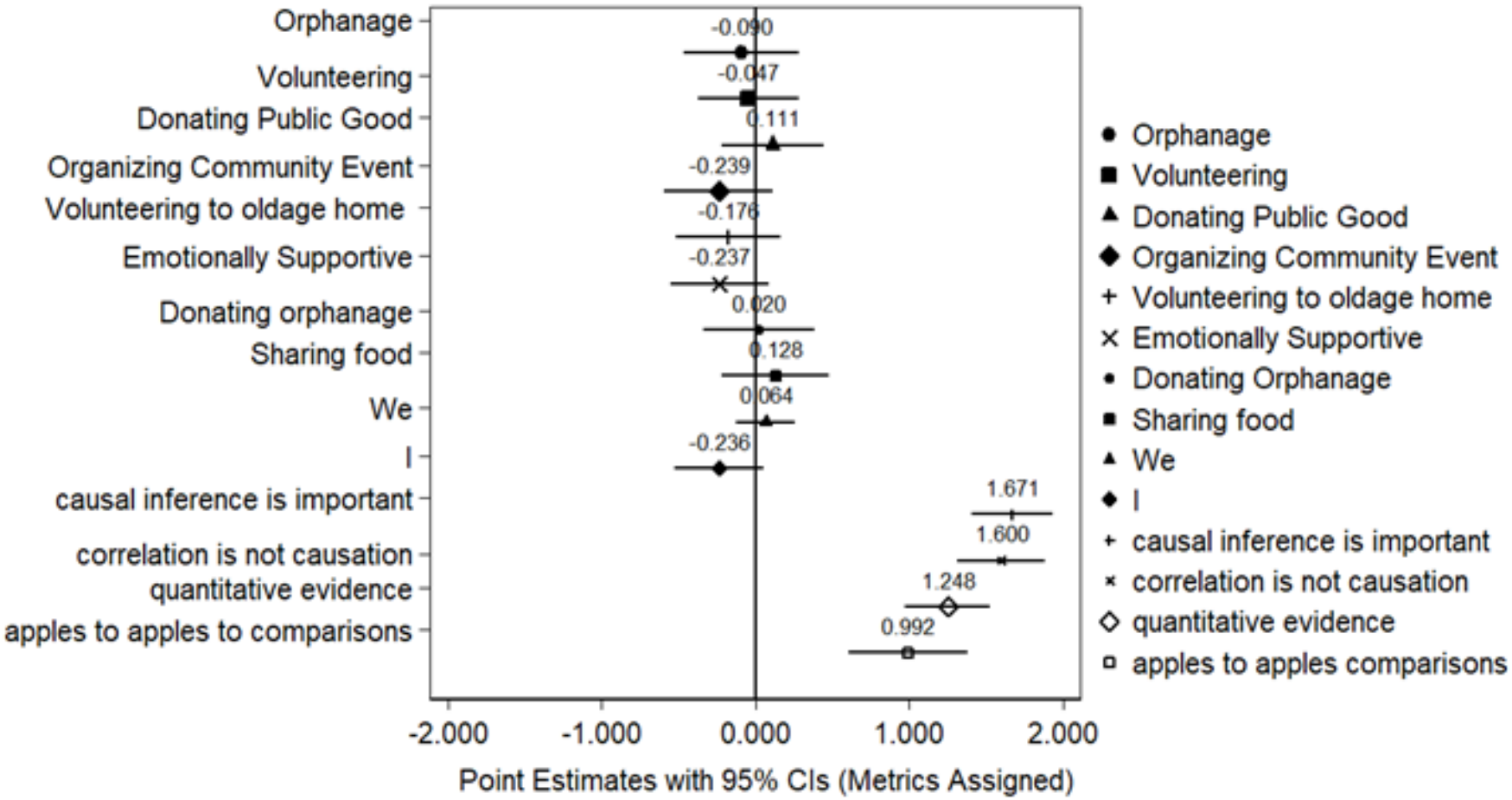
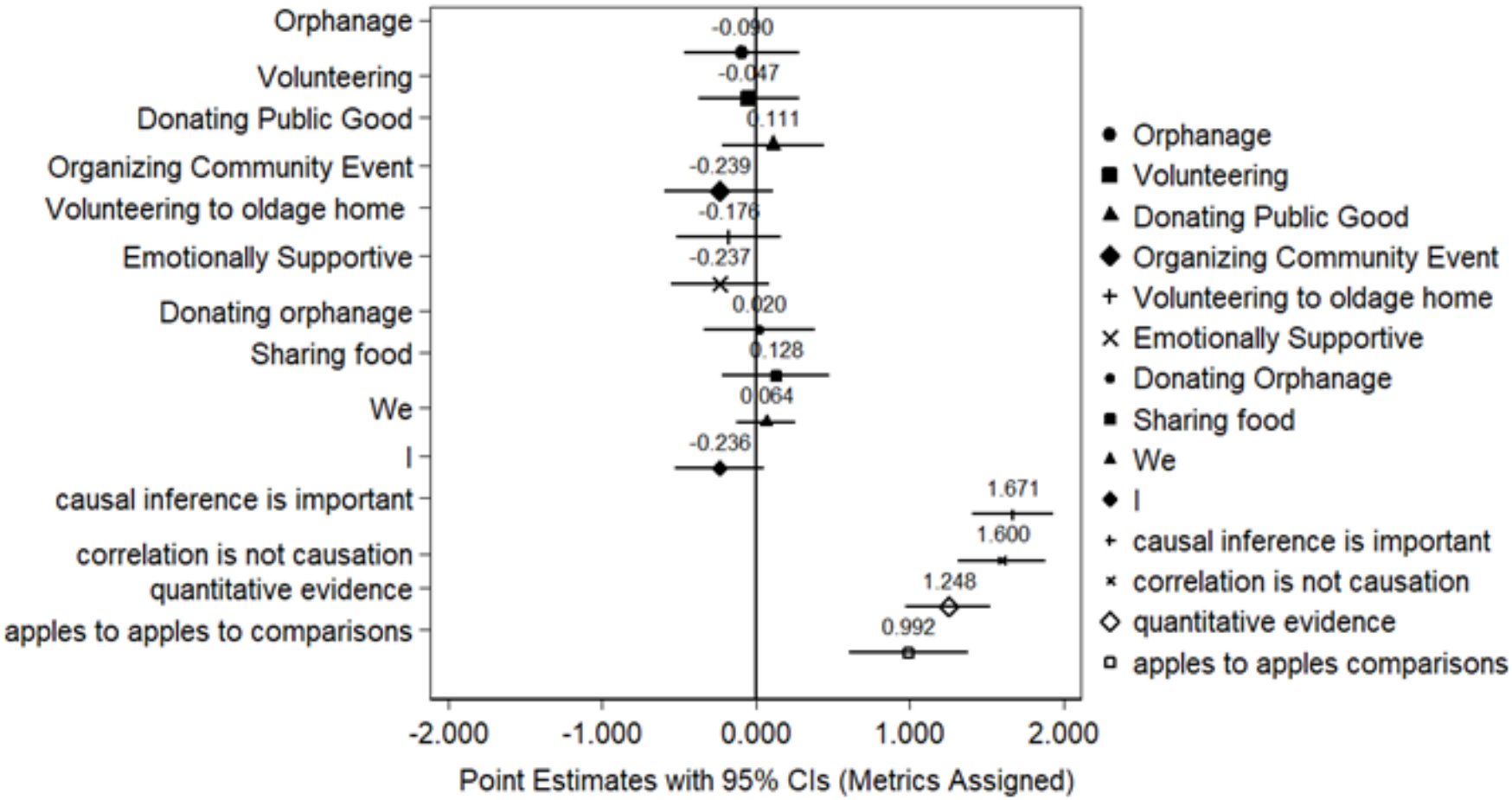
Impacts of Metrics Training on Prosociality and Causal Language



no crowdout of prosocial behavior

measured as visits to orphanages and volunteering in impoverished schools & use of prosocial phrases

Impacts of Metrics Training on Prosociality and Causal Language



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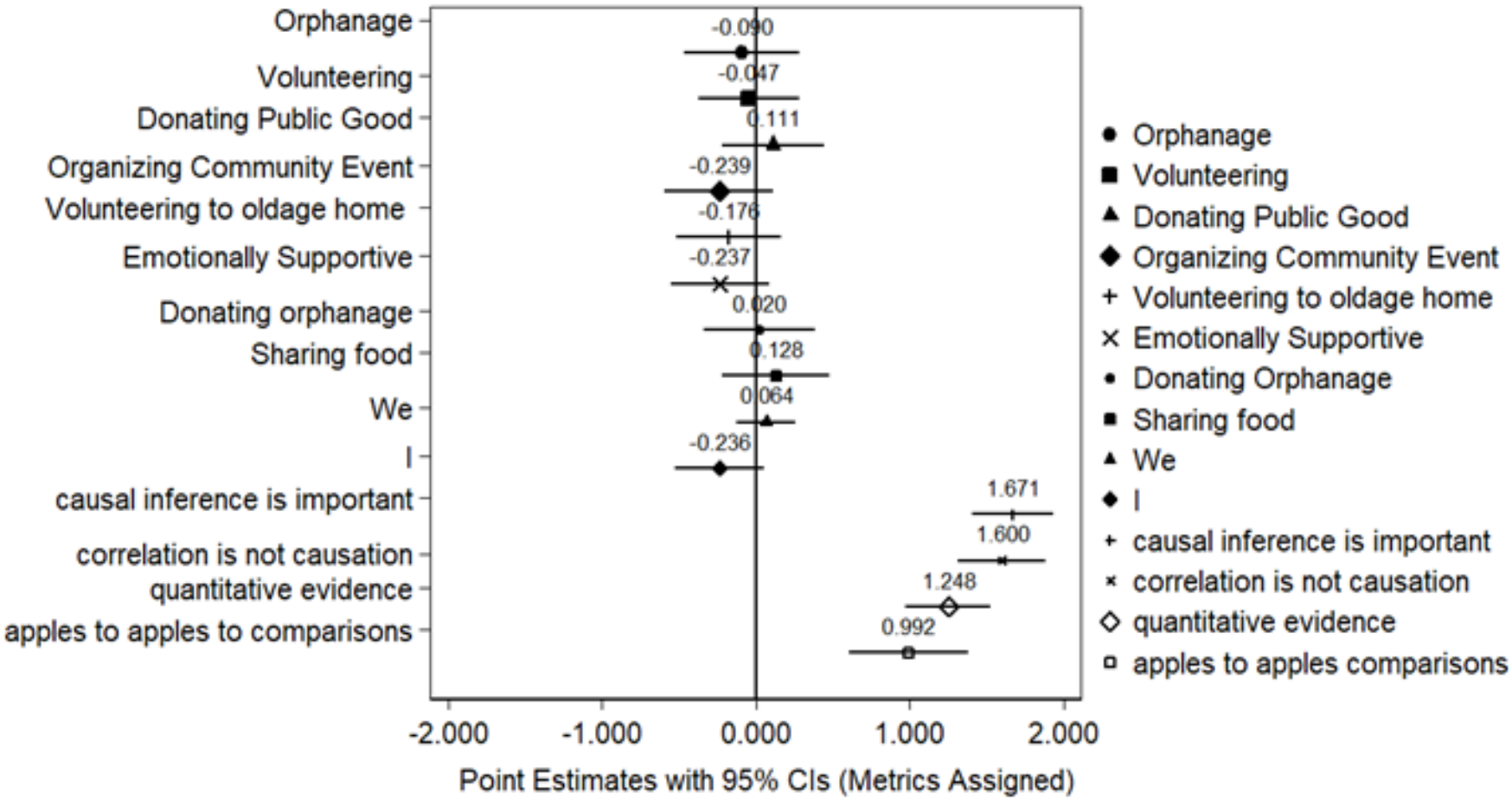

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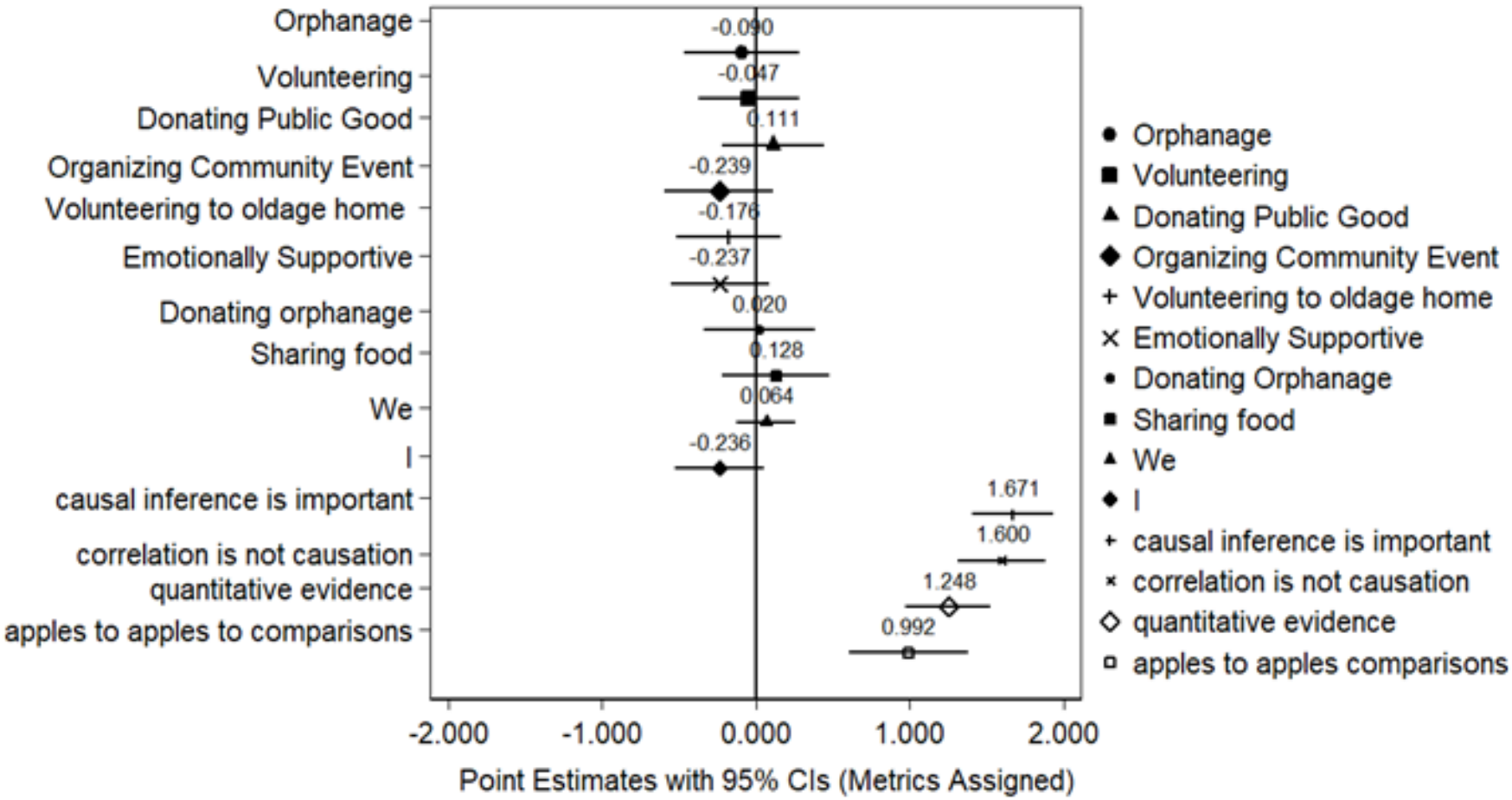

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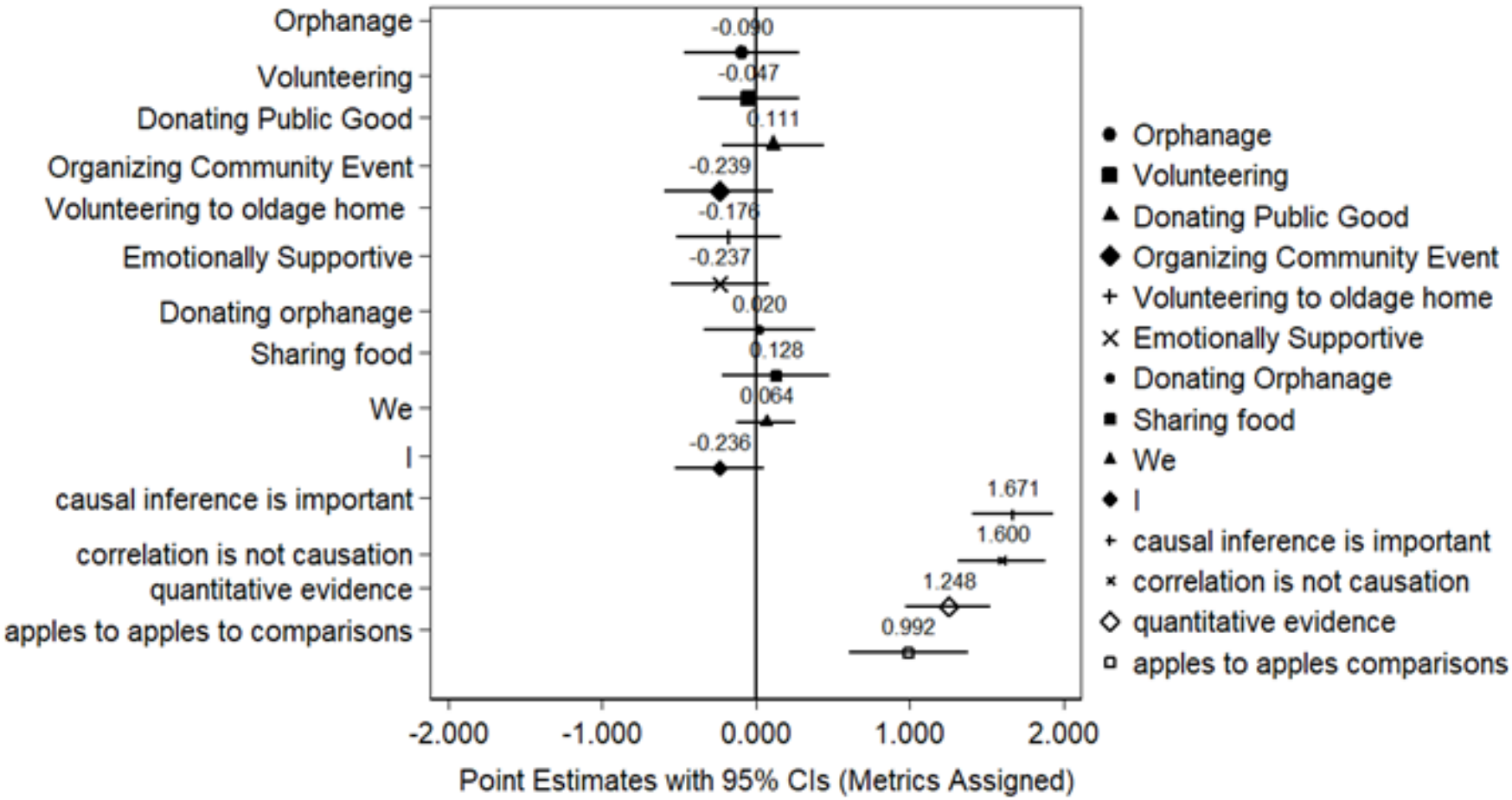

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Signpost

Training about causal thinking increases

1) perceived value of causal inference, quantitative data and RCTs

2) improved test scores on public goods and research methods

3) willingness to pay for quantitative data, only for RCTs ($\downarrow$ correlations)

SHIFT IN DEMAND FOR INFORMATION

4) responsiveness to evidence from a RCT

40 percent more likely to adopt policy $>$ 10 percent (Hjort et al. 2021)

OPENNESS TO INFORMATION

5) only for those whose priors were lower than the evidence from the RCT

LACK OF EVIDENCE OF CONFIRMATION BIAS/MOTIVATED REASONING

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RESPONSIVENESS TO INFORMATION

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Metrics Training on Willingness to Pay

Panel A: Private Spending						
	Before Signal Amount Randomized Trial	*Before Signal Amount Correlational Data*	*Before Signal Amount Expert Bureaucrat*	*After Signal Amount Randomized Trial*	*After Signal Amount Correlational Data*	*After Signal Amount Expert Bureaucrat*
	(1)	(2)	(3)	(4)	(5)	(6)
Metrics Assigned	1369.290*	-1048.355*	279.115	2012.892***	-1018.698***	-1866.809
	(702.448)	(555.314)	(271.880)	(585.769)	(335.110)	(1365.653)
Metrics Choose	728.1.59	948.031*	-99.643	1646.977***	880.527***	-285.501
	(725.718)	(538.251)	(232.258)	(602.013)	(332.546)	(1396.293)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	180	180	180	180	180	180
R-squared	0.107	0.104	0.111	0.217	0.204	0.104
Mean of dep. var. (placebo)	2503.594	2267.188	430.977	1539.453	2214.07	4490.008
Panel B: Public Spending						
	(1)	(2)	(3)	(4)	(5)	(6)
Metrics Assigned	739148.720***	-55164.030***	15058.640	1301597.000*	-36507.414***	4685.422
	(224074.900)	(13629.180)	(47215.290)	(721138.800)	(12872.410)	(32512.540)
Metrics Choose	119080.700	12554.130	22428.540	-356638.500	-8874.433	15751.800
	(201589.900)	(13895.560)	(46853.630)	(650493.700)	(13992.260)	(34727.420)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	180	180	180	180	180	180
R-squared	0.234	0.170	0.069	0.092	0.150	0.611
Mean of dep. var. (placebo)	224604.700	109746.900	168464.800	928546.100	94136.720	115937.500

WTP $10 (1% of monthly salary)

WTP $5K (of public funds)

Metrics Training on Willingness to Pay

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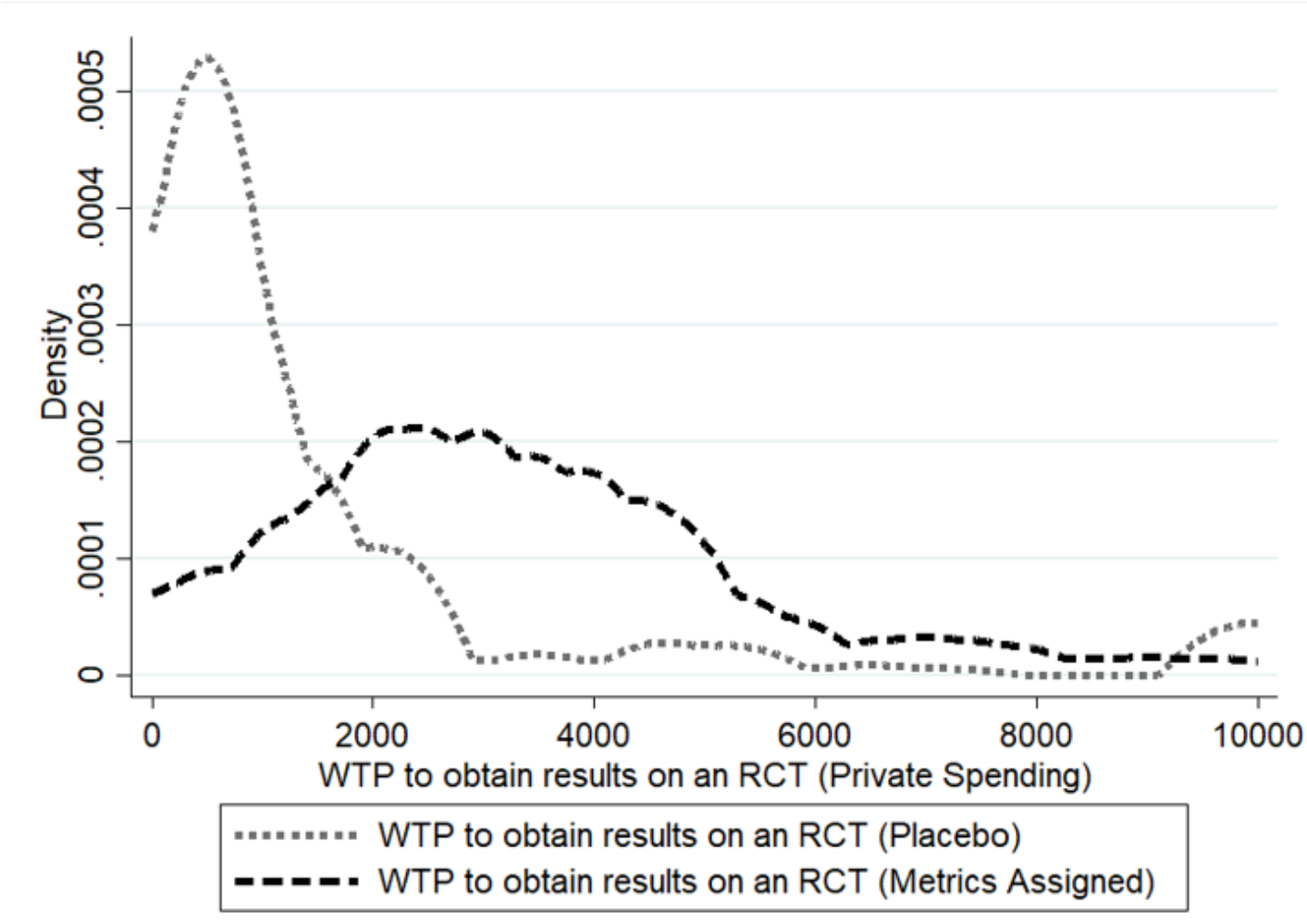
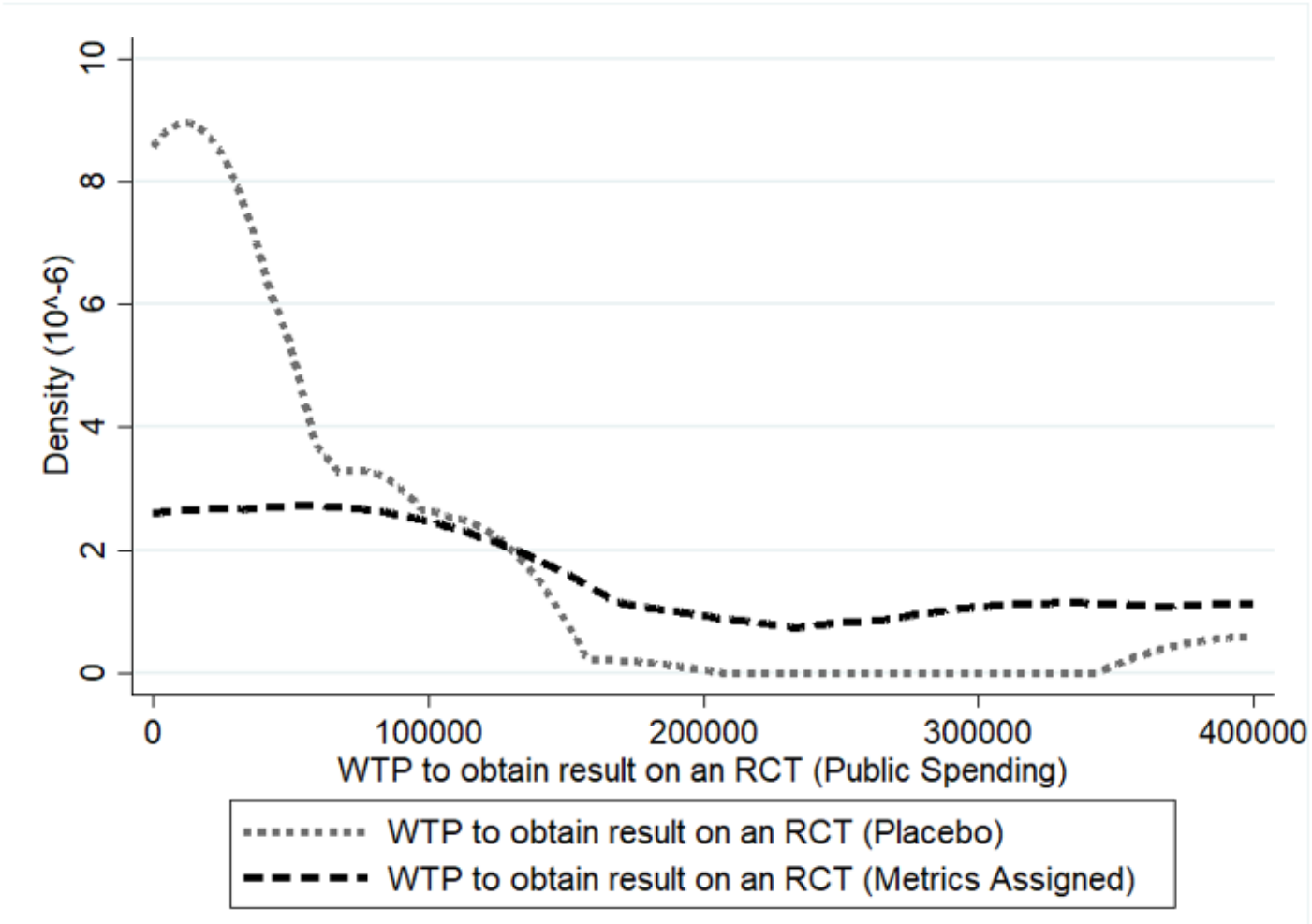
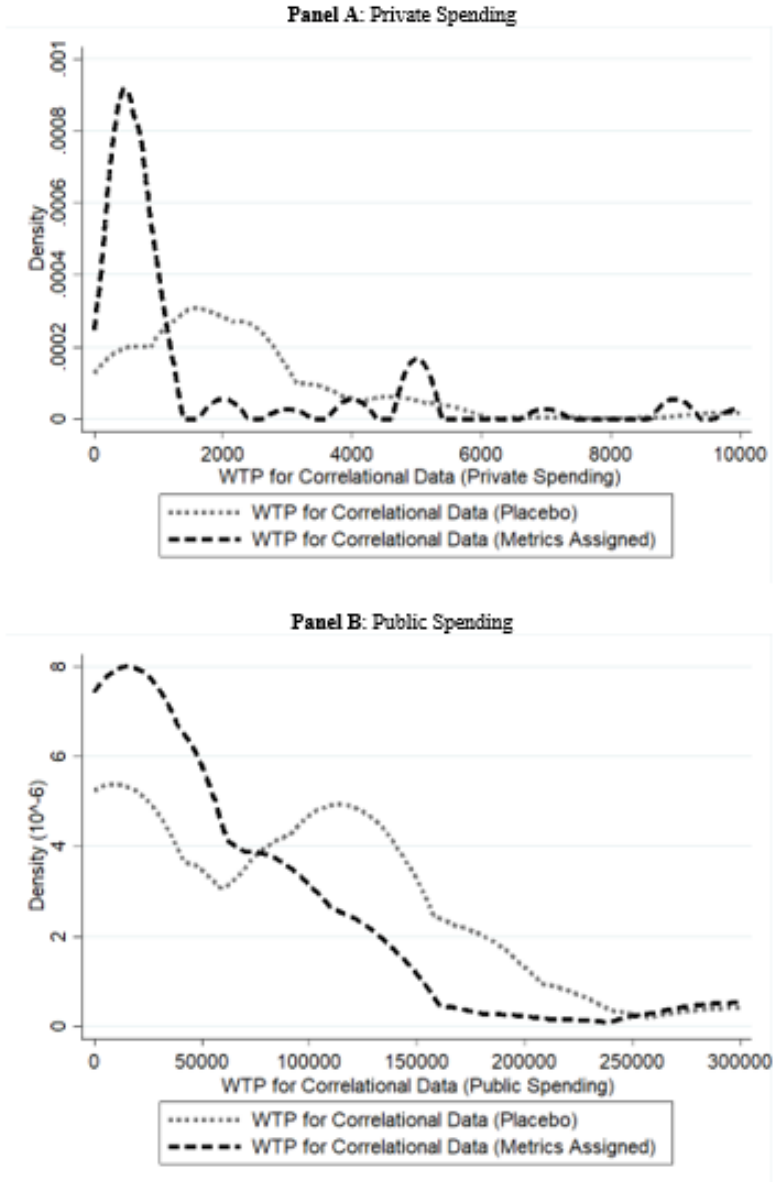
Metrics Training on WTP - RCT Study - Private



Metrics Training on WTP - RCT Study - Public



Metrics Training on WTP - Correlational Data



Lower demand for correlational data

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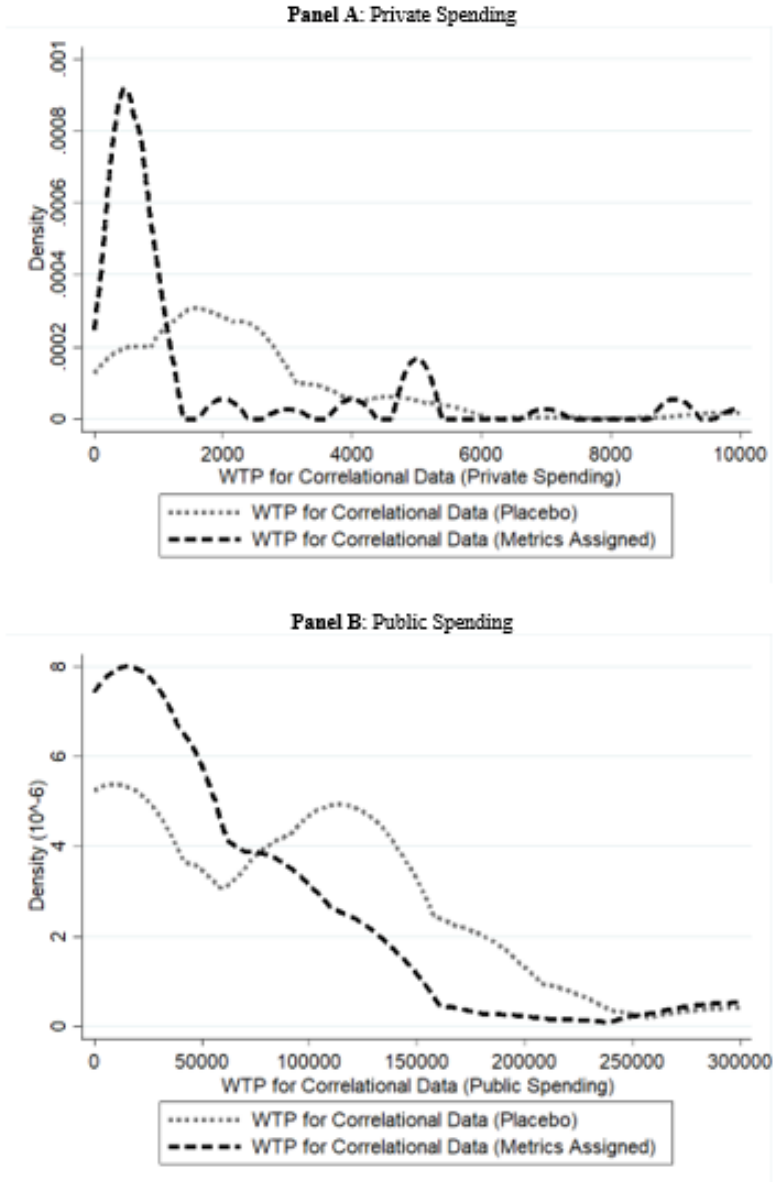

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Metrics Training on WTP - Advice Data

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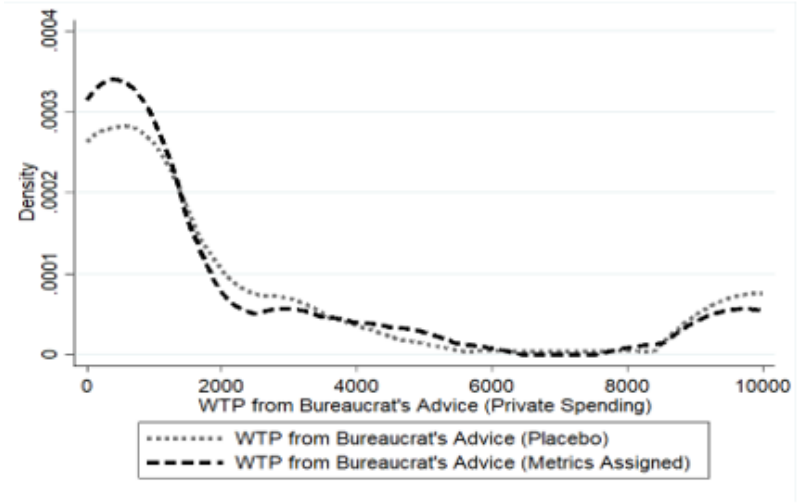

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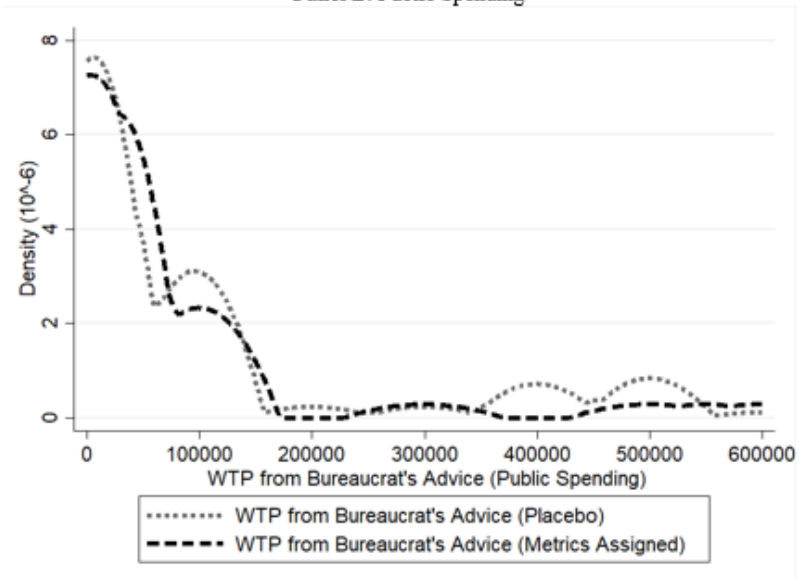

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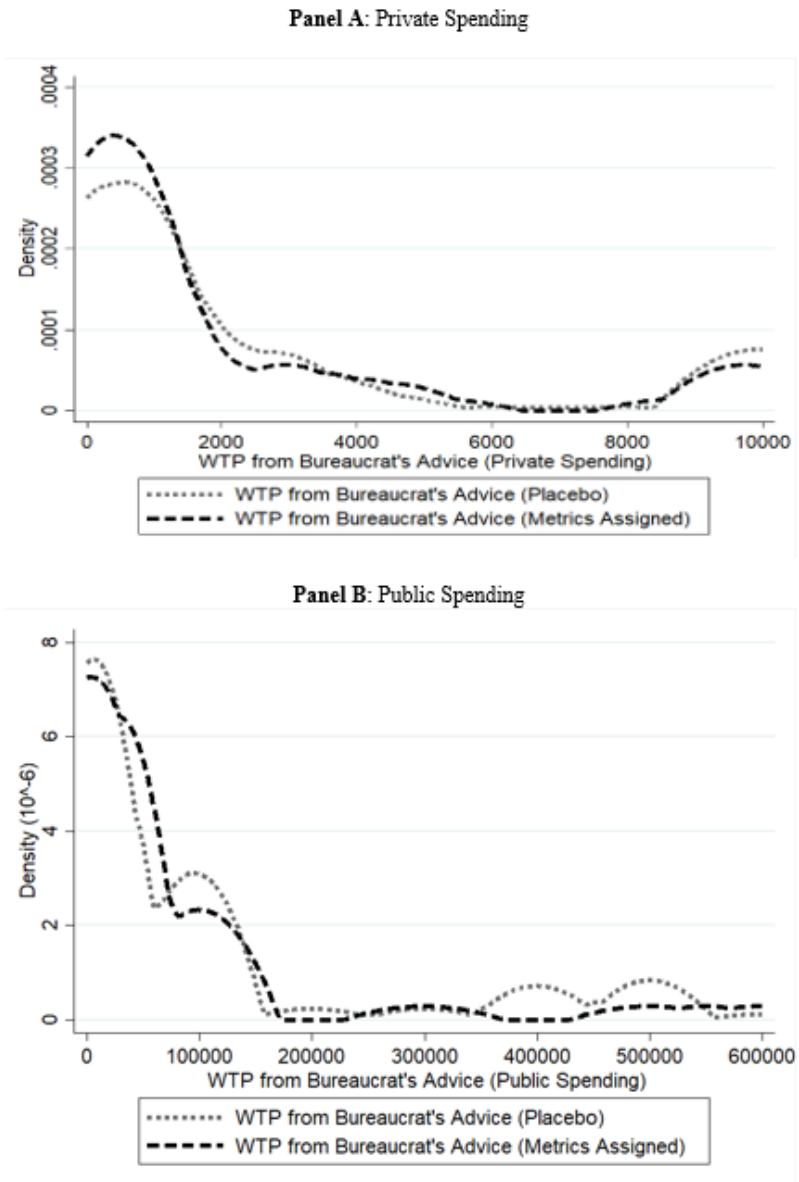

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Responsiveness to Information

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Information - A Signal about Policy

Recent randomized evaluation finds deworming impacts on economic outcomes up to 20 years later. Individuals who received deworming experience up to 3 additional years of schooling, 14% increases in consumption expenditure, **13.01%** increases in hourly earnings, 9% in non-agricultural work hours (Source PNAS, 2020).

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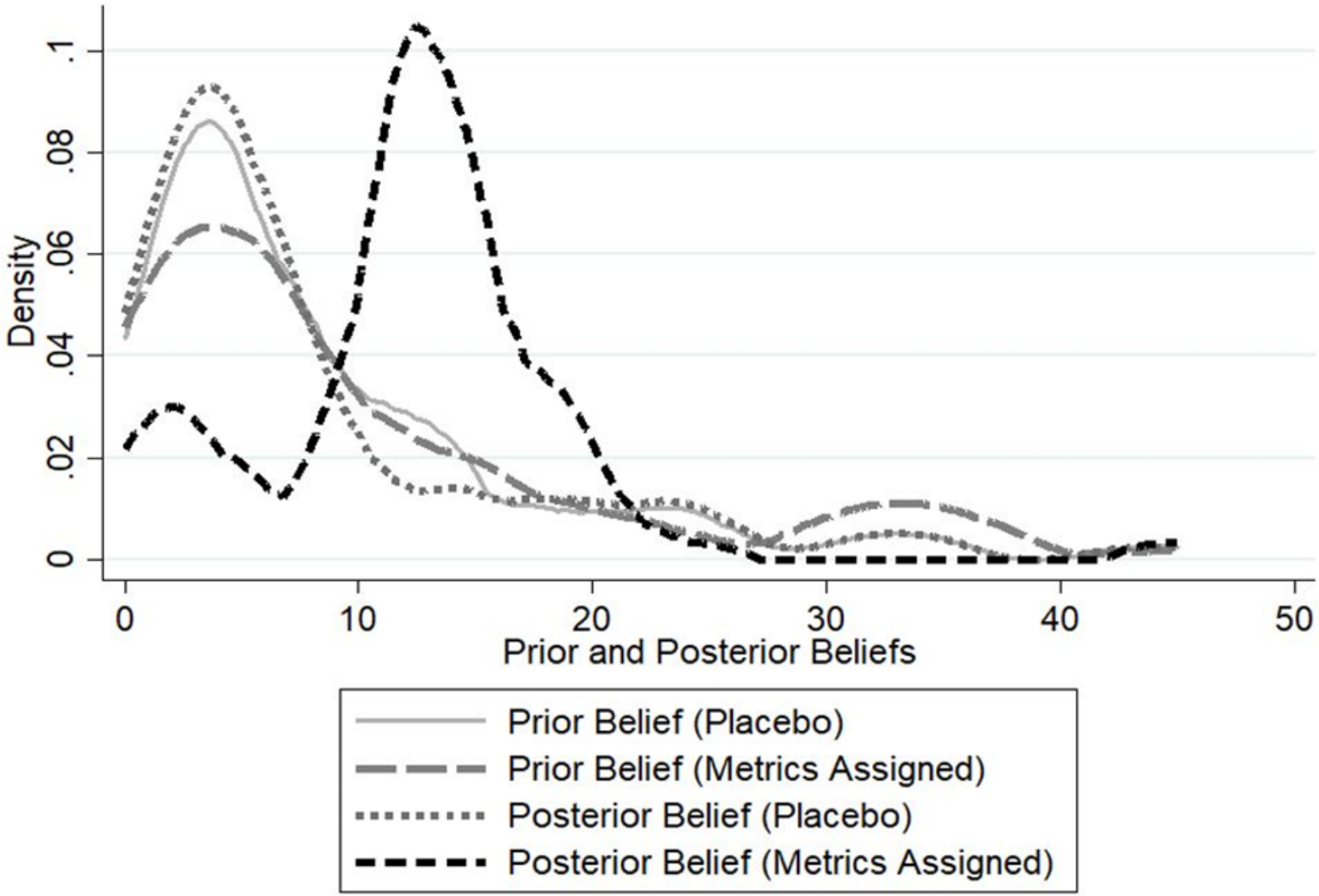

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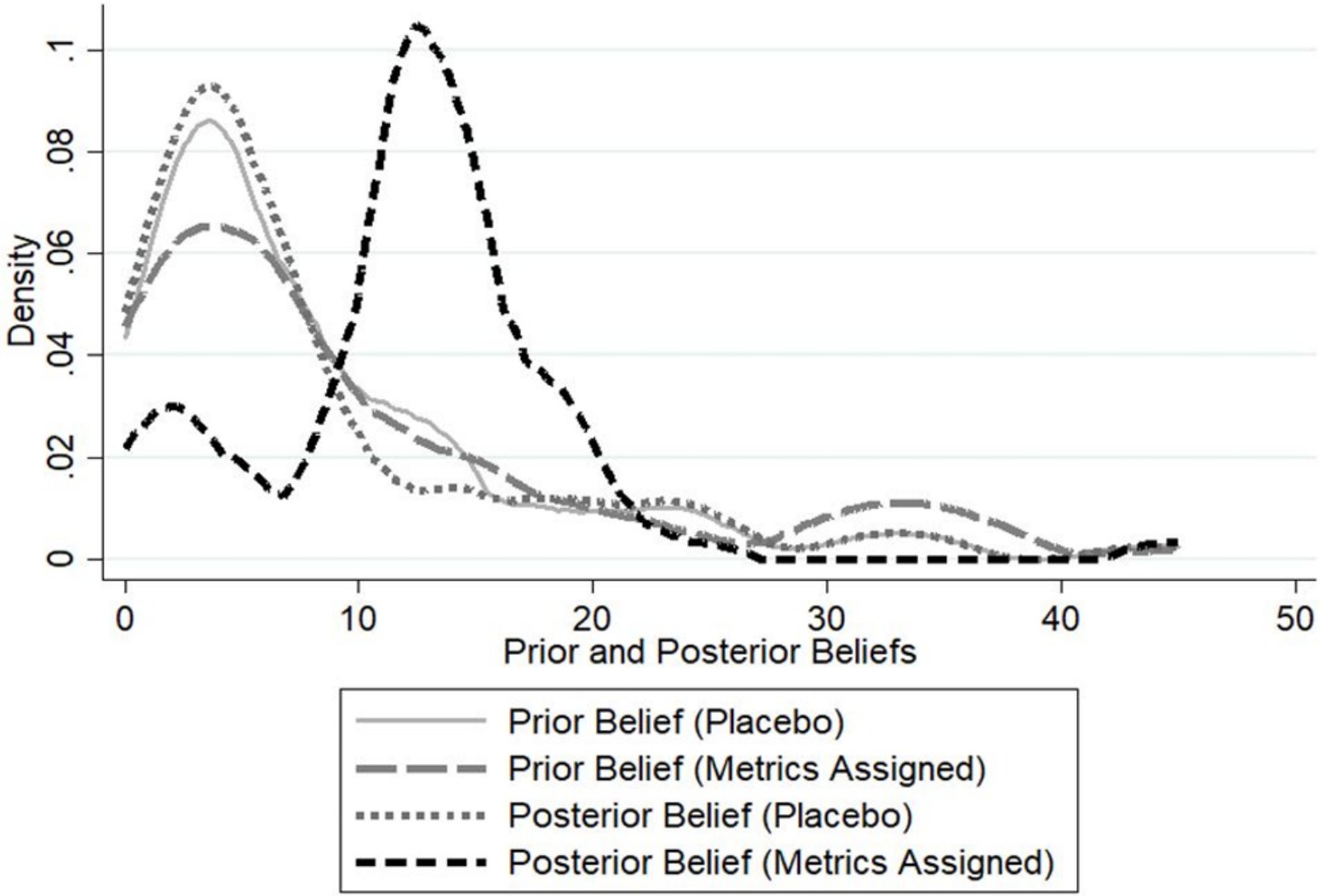

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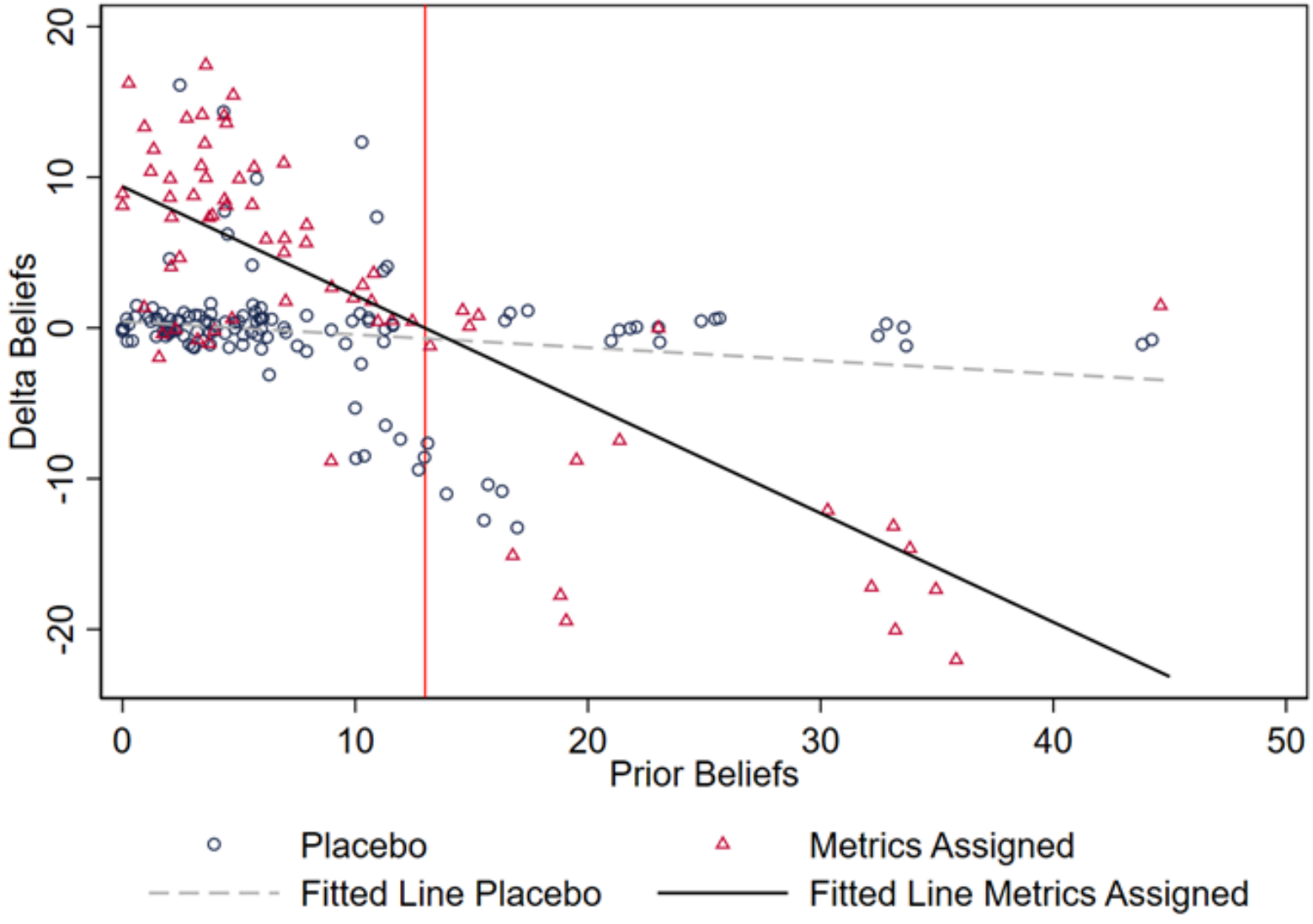
Initial and Shifts in Beliefs



non-treated policymakers do not update

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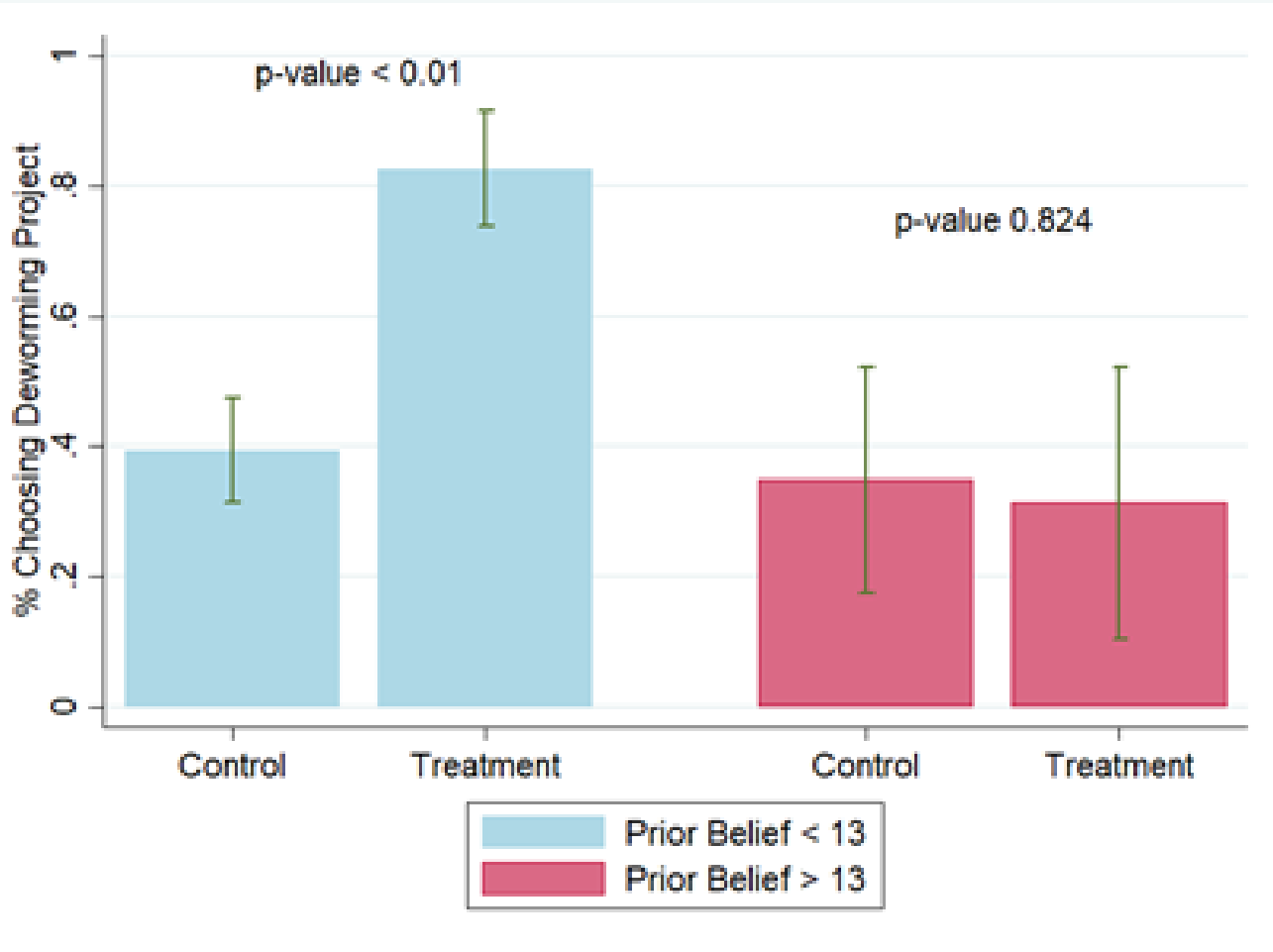
Project Choice After Signal

What project would you choose 1 or 2? One being deworming and two being computer lab.

Effect of Metrics Training on Deworming Project Choice by Prior Beliefs



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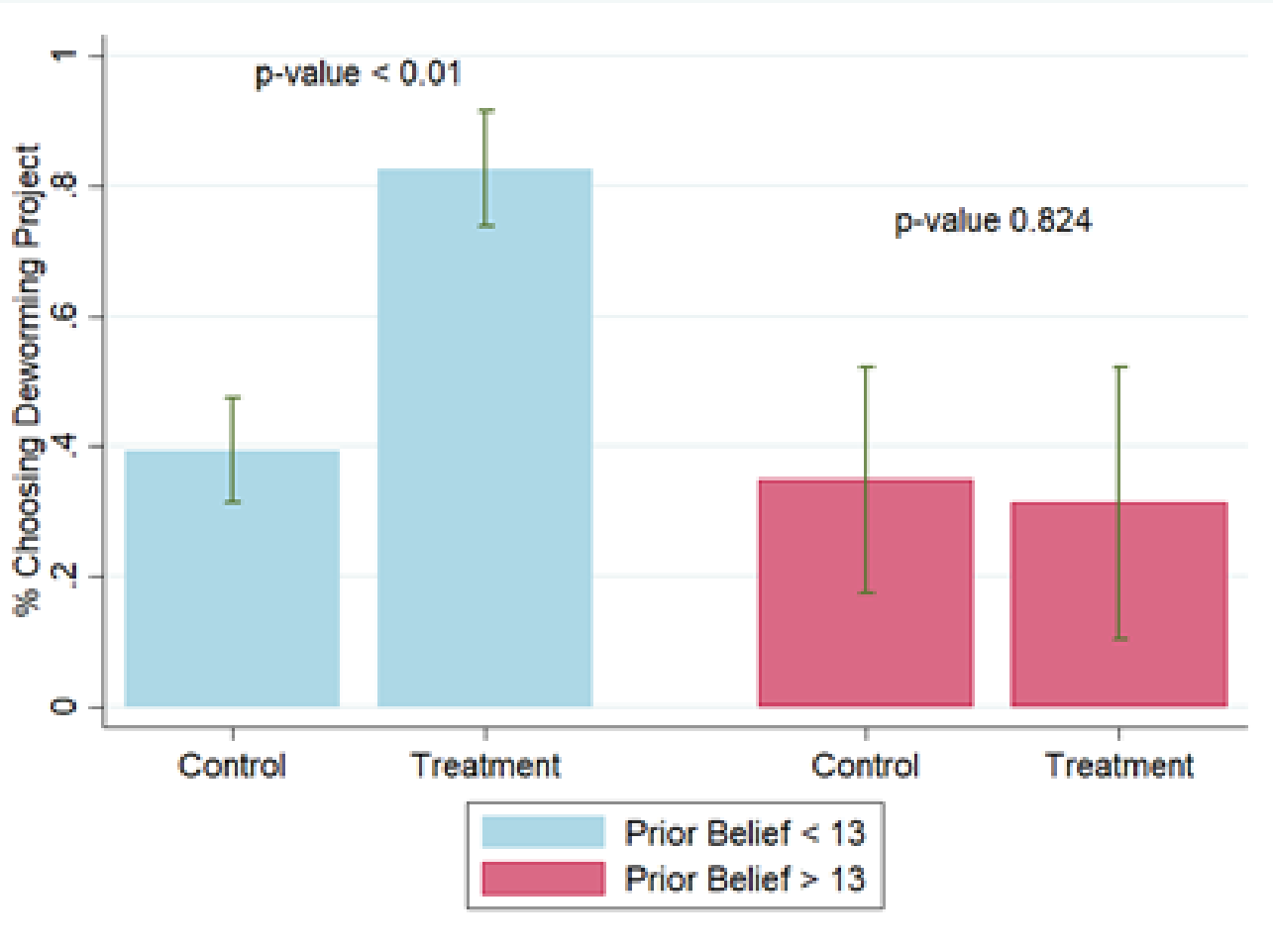

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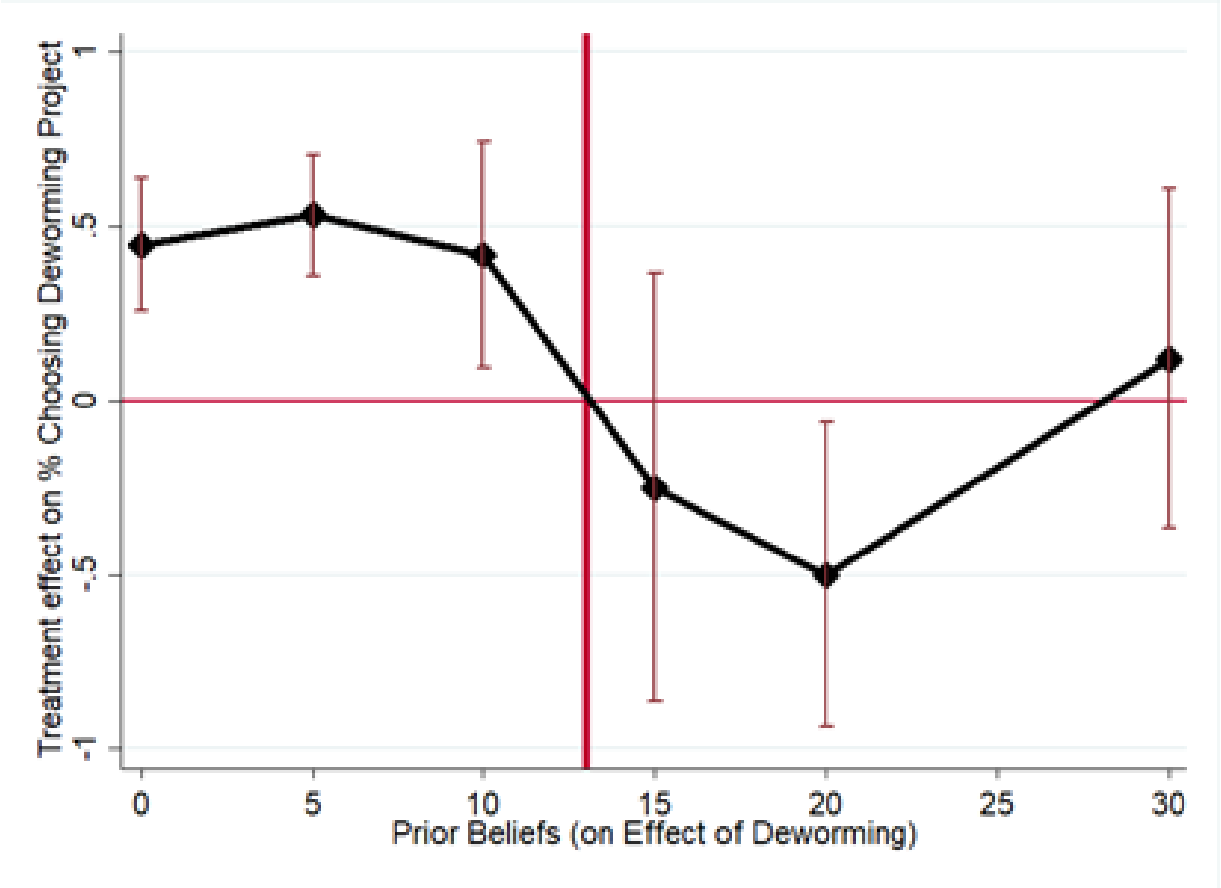

DEMAND FOR INFORMATION

RESPONSIVENESS TO INFORMATION

UPDATING POLICY CHOICES

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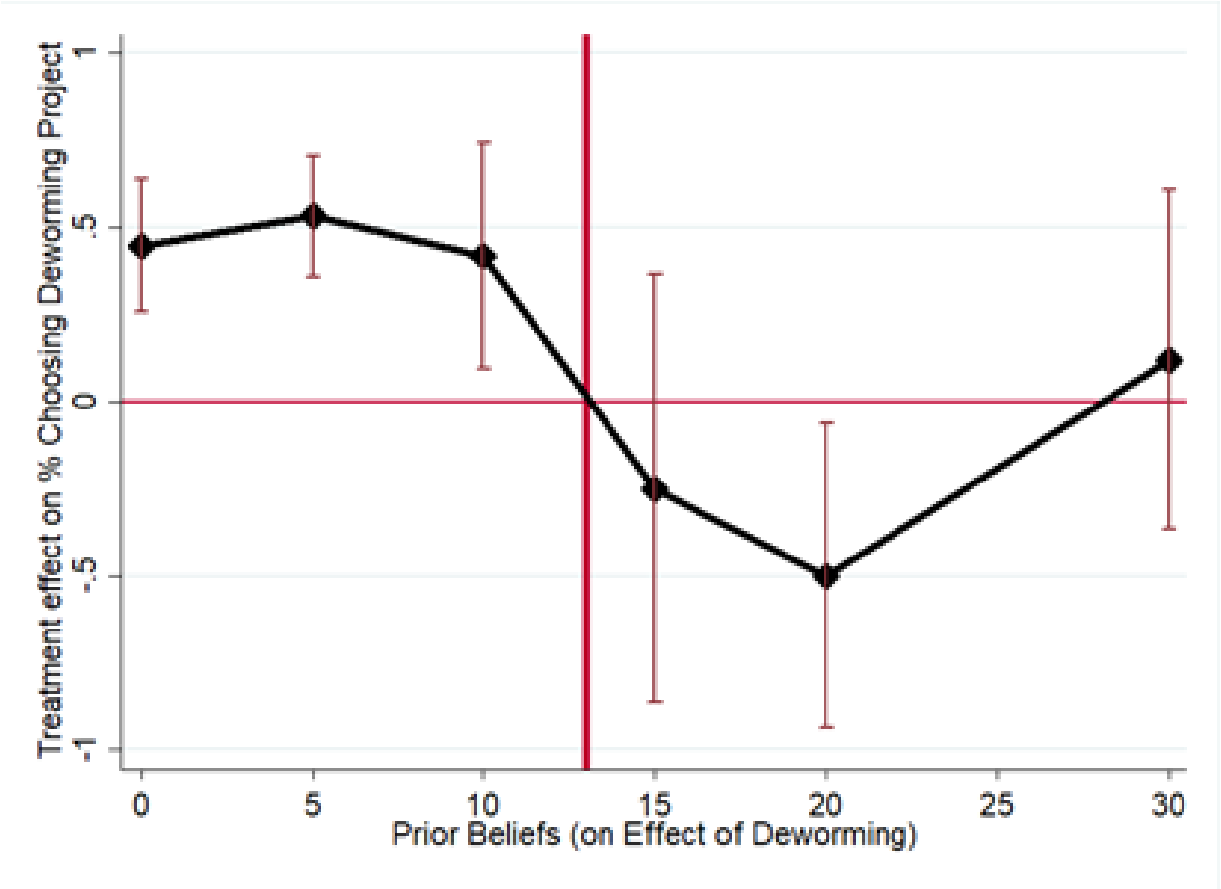

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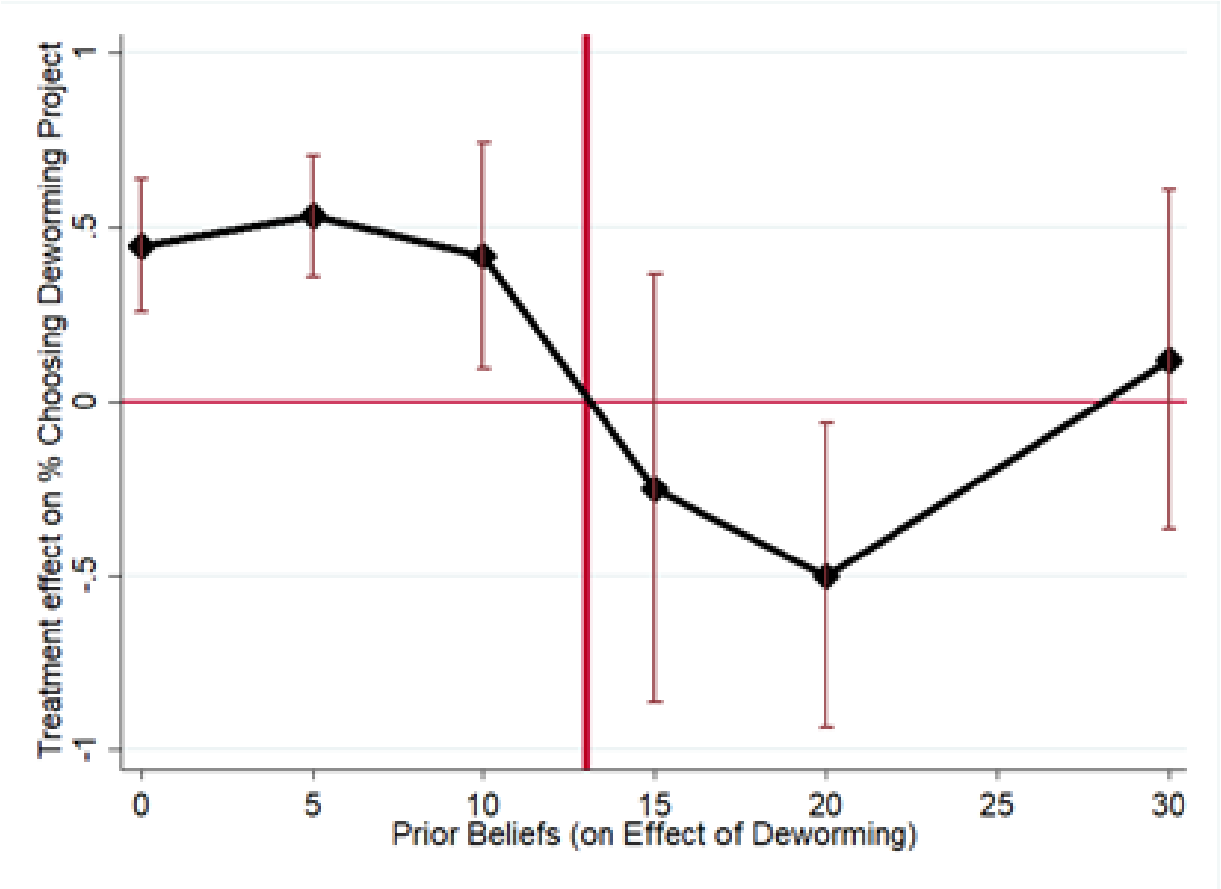

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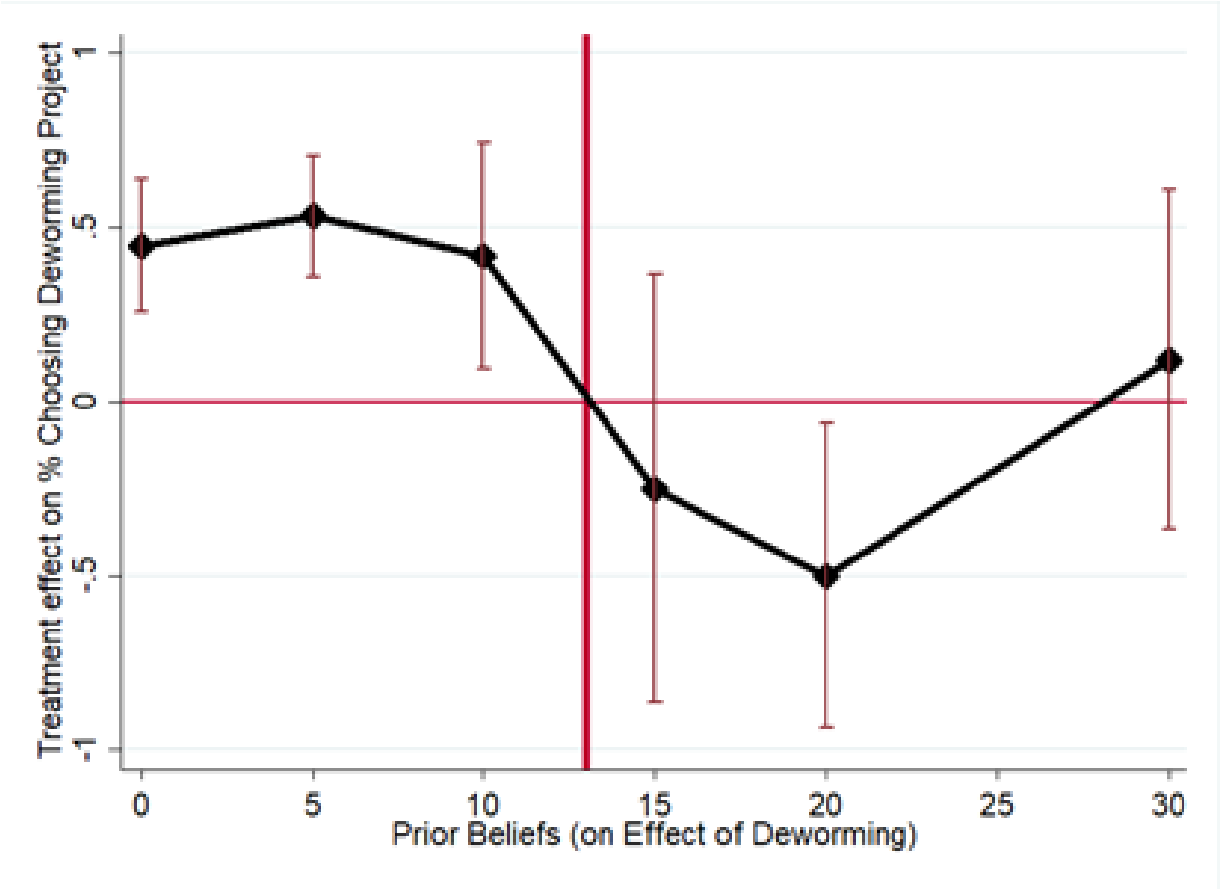

DEMAND FOR INFORMATION

RESPONSIVENESS TO INFORMATION

UPDATING POLICY CHOICES

Counting Defiers

- March 10, 2021 (zoom)
  - Belief Elicitation I
  - Reinforcement lecture of 30 minutes
    - ★ Links in oTree to watch videos
    - ★ Students could pick which video (behavioral measure of defier)
  - Live discussion of 30 minutes
    - ★ a) what do you think is the main point of the lecture?
    - ★ b) how can you apply the concepts learned in this lecture to future job?
  - Belief Elicitation II

Effect of Treatment on WTP by Defiers

	Private Spending		***Public Spending***	
	Amount Randomized Trial	*Amount Randomized Trial*	*Amount Randomized Trial*	*Amount Randomized Trial*
	(1)	(2)	(3)	(4)
Defiers X Metrics Assigned	-550.306	-888.410	-1987315.100***	-2531651.000*
	(1177.783)	(1301.347)	(667571.300)	(1367816.000)
Metrics Assigned	2342.989***	2179.581***	1986365.500***	1775415.200***
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	(630.280)	(654.429)	(606327.300)	(808353.900)
Individual Controls	No	Yes	No	Yes
Observations	180	180	180	180
R-squared	0.154	0.224	0.031	0.114
Mean of dep. var. (placebo)	1539.453	1539.453	928546.1	928546.1

Defiers' WTP for RCT less or unaffected by treatment

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Concluding remarks

- Econometrics training yielded
  - Persistent effects on policymakers in attitudes, beliefs, and exams (0.5-0.8 sigma)
- Greater **demand for RCTs** (300%)
  - Reduced demand for correlational information (50%)
- Enhanced **responsiveness to RCTs**
  - More likely to adopt a policy when shown RCT evidence
  - Only when priors are less than the evidence
- Receptiveness to policy evidence only with econometrics training
  - 40 percent more likely to adopt policy $>$ 10 percent (Hjort et al. 2021)
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