

Relative Income and Preferences for Public Goods

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Stockholm Institute of Transition Economics
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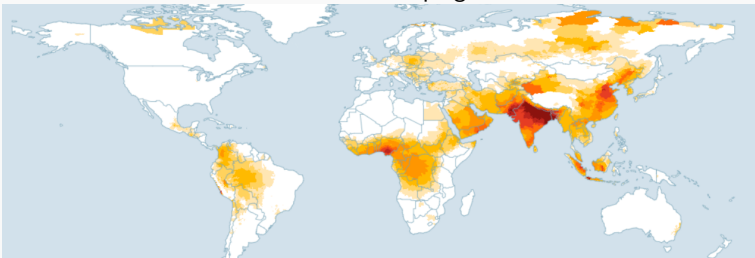


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Motivation

Research puzzle (Greenstone & Jack, 2015)

1. Severe environmental crises in the developing world



Source: aqli.epic.uchicago.edu

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Negative externality on:

- Human health (25% of global disease burden (Pattanayak et al., 2018))
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2. Surprisingly **low valuations for environmental quality** (Hanna et al., 2016; Berry et al., 2020; Baylis et al., 2021; Greenstone et al., 2021)

Difficulties to initiate:

- Individual behavioral change
- Public action

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Difficulties to initiate:

- Individual behavioral change
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Research objective

Study preference formation to better understand **determinants of low valuations** for environmental quality.

Research Setting: Air pollution in India



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WORLD ▾

Air pollution slashing 10 years off life expectancy in Delhi, the world's most polluted city, study says

BY ARSHAD R. ZARGAR
UPDATED ON: JUNE 14, 2022 / 12:49 PM EDT / CBS NEWS

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Research Setting: Air pollution in India



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December 5, 2023 · 4 min read



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Redistributive public good

- The **externality is regressive**: marginal damages are negatively correlated with income (Hsiang et al., 2019; Chakraborty and Basu, 2021)
 - More exposure
 - More vulnerability
- **Improvements** in the provision of the public good are **progressive**

Research Question

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Are **preferences for the public good** sensitive to changes in **perceived relative income**?

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- Two online **survey experiments** with an Indian population
- Introduce variation in **perceived relative income**
 1. Information treatment
 2. Novel priming methodology
- Measure **revealed and stated preferences**

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 1. Information treatment
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Preview of results

When respondents are treated to perceive themselves **relatively richer**, they **reduce preferences** for the public good!

Intuition and Theory

Preference formation

Utility function: $U_i(c_i, g_i) = \alpha_i \cdot c_i + \beta_i \cdot G$

- Budget constraint: $b_i \geq c_i + g_i$
- Each unit of private consumption c_i is valued at α_i
- Each unit of the public good G is valued at β_i (e.g., health benefits)

$$MWTP_i^G \equiv \frac{\frac{\partial U_i}{\partial G}}{\frac{\partial U_i}{\partial c_i}} = \frac{\beta_i}{\alpha_i}$$

Intuition and Theory

- **Personal costs** of an underprovision of the public good are difficult to quantify
→ Available information is usually a **population** or **spatial average** (β)

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Air pollution raises risk of type 2 diabetes, says landmark Indian study

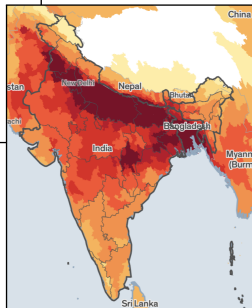
Seven-year study of 12,000 residents of Delhi and Chennai finds link between PM2.5 particles and increased blood sugar levels

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- ⇒ We expect respondents to use an **“anchoring and adjustments”** mechanism (Tversky and Kahneman, 1974)
- **Anchor**: (Noisy) information from the media, government, friends
 - **Adjustment**: personal characteristics and **relative income**

Anchoring and adjustment

$$\hat{\beta}_i = \beta(1 + f(X_i, \hat{a}_i)), \text{ where}$$

- X_i is a set of personal characteristics (e.g., age, general health)
- \hat{a}_i is the **perceived relative income** of individual i

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Prediction 1

All other things equal, an increase in perceived relative income will reduce individuals' willingness to pay for a redistributive public good, i.e.,

$$\frac{\partial MWTP_i^G}{\partial \hat{a}_i} < 0.$$

Intuition and Theory

To **form preferences**, respondents consider **personal benefits** from an improvement in the public good.

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- Important: **elasticity of preferences** to changes in personal benefits
- Test for heterogeneous treatment effects by **political orientation** (Gromet et al., 2013; Hoenig et al., 2023)
 - Political **right-wing** (in India): priority for economic growth, nationalism
⇒ **High elasticity**
 - Political **left-wing**: priority for public good provision, equality
⇒ **Low elasticity**

Intuition and Theory

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 - Political **right-wing** (in India): priority for economic growth, nationalism
⇒ **High elasticity**
 - Political **left-wing**: priority for public good provision, equality
⇒ **Low elasticity**

Prediction 2

All other things equal, a shift in perceived relative income will affect individual preferences for public good provision more for the right-wing than for the left-wing. i.e.,

$$\left| \frac{\partial MWT P_i^G}{\partial \hat{a}_i} 1_{i,\text{right}} \right| > \left| \frac{\partial MWT P_i^G}{\partial \hat{a}_i} 1_{i,\text{left}} \right|$$

Survey Experiment 1

Summary

Preference: $MWTP_i^G = \beta_i / \alpha_i$

Anchor and adjustment: $\hat{\beta}_i = \beta(1 + f(X_i, \hat{a}_i))$

Idea: Experimentally treat \hat{a}_i and then measure $\hat{\beta}_i$ and $MWTP_i^G$.

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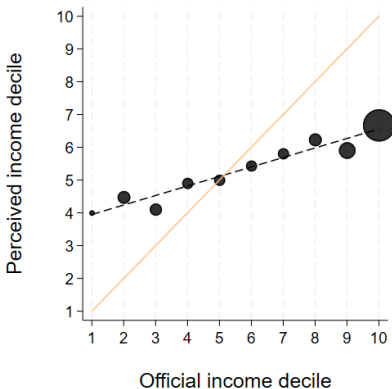
Assume the entire population living in your state is divided into 10 income groups, each with the same number of households. The figure below illustrates the 10 groups, ordered from left to right from the 10% with the lowest income to the 10% with the highest income.

All households living in your state									
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10
10% lowest income									10% highest income

Q2 Think of **YOUR** household. In your opinion, which income group is your household part of? *

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Survey Experiment 1 – Misperceptions



⇒ Asymmetric misperceptions, *i.e.*, a “middle-class bias” or “center-bias” (Fehr et al., 2022; Hvidberg et al., 2023)

Survey Experiment 1 – Information Treatment

Treatment

Provide information about actual relative income to **induce variation in perceived relative income**

→ Standard approach in the related literature (Cruces et al., 2013; Kuziemko et al., 2015; Karadja et al., 2017; Hoy and Mager, 2021; Hvidberg et al., 2023)

All households living in your state									
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10
10% poorest									10% richest

↑
You are here!

This means:

- At least **20%** of all households in your state have a **lower** income than you.
- At least **70%** of all households in your state have a **higher** income than you.

Survey Experiment 1 – Overview

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Main Outcomes

1. Perceived position in the income distribution (*i.e.*, manipulation check of \hat{a}_i)

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1. Perceived position in the income distribution (*i.e.*, manipulation check of \hat{a}_i)
2. Belief about the effect of air pollution on own health ($\hat{\beta}_i$)
3. Real-stakes contribution to an NGO that addresses air pollution ($MWTP_i^G$)
 - a. extensive margin
 - b. intensive margin

Survey Experiment 1 – Overview

Treatment

Provide information about actual relative income to **induce variation in perceived relative income**

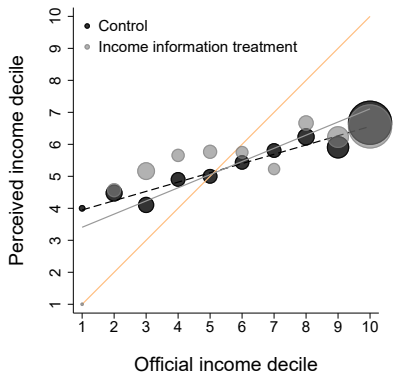
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2. Belief about the effect of air pollution on own health ($\hat{\beta}_i$)
3. Real-stakes contribution to an NGO that addresses air pollution ($MWTP_i^G$)
 - a. extensive margin
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4. Intended use of private protection measures against pollution exposure (purifier, medical checks, change in commute, frequent ventilation)

Survey Experiment 1 – Results

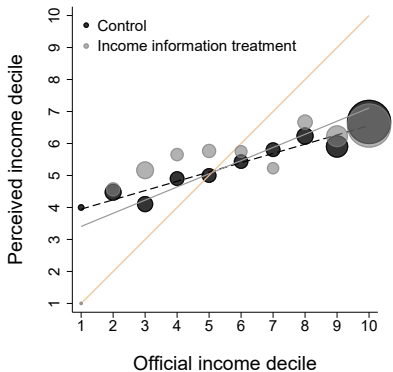
Panel A. Prior perceptions



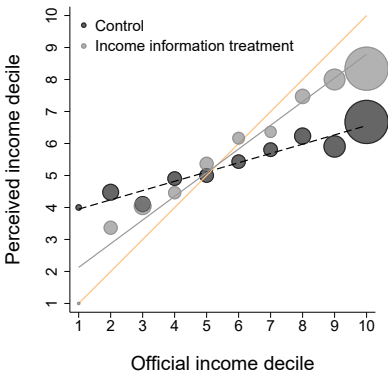
- No difference in prior misperceptions

Survey Experiment 1 – Results

Panel A. Prior perceptions



Panel B. Posterior perceptions



- No difference in prior misperceptions
- Partial updating: treatment reduces misperceptions by 62%

Survey Experiment 1 – Results

	Perceived income decile (1)	Health concerns (2)	Contrib. extensive margin (3)	Contrib. intensive margin (4)	Protection measures (5)
<i>Panel A: Marginal treatment effects of interaction with sign of the prior misperception</i>					
IIT x Pos.misp.	-1.438*** (0.263)	-0.124 (0.140)	-0.077 (0.055)	-0.002 (0.044)	0.023 (0.073)
IIT x Neg.misp.	1.656*** (0.099)	-0.148*** (0.040)	-0.042 (0.026)	-0.017 (0.023)	-0.064** (0.030)
Observations	1,253	1,253	1,253	1,253	1,253
Controls	Yes	Yes	Yes	Yes	Yes

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- Shifting relative income perceptions upwards:
 - **Health concerns decrease**

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Controls	Yes	Yes	Yes	Yes	Yes

- Shifting relative income perceptions upwards:
 - **Health concerns decrease**
 - **Reduces the intended adoption of private protection measures against air pollution**

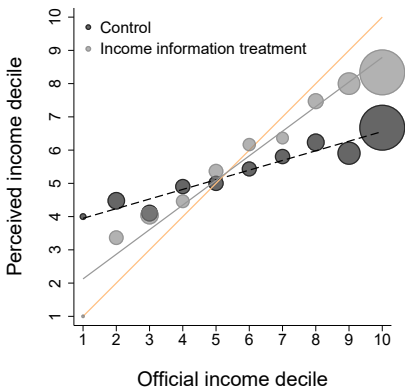
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Observations	1,253	1,253	1,253	1,253	1,253
Controls	Yes	Yes	Yes	Yes	Yes
<i>Panel B: Marginal treatment effects of interaction with sign of prior misperception and political leaning</i>					
IIT x Pos.misp. x Right	-1.606*** (0.450)	-0.098 (0.169)	-0.034 (0.064)	0.116*** (0.044)	0.054 (0.083)
IIT x Pos.misp. x Center-left	-1.231*** (0.473)	0.034 (0.271)	-0.150 (0.115)	-0.096 (0.083)	0.063 (0.141)
IIT x Neg.misp. x Right	1.489*** (0.137)	-0.151*** (0.051)	-0.106*** (0.036)	-0.046** (0.021)	-0.087*** (0.023)
IIT x Neg.misp. x Center-left	1.598*** (0.211)	-0.190 (0.137)	0.041 (0.062)	0.029 (0.060)	-0.045 (0.103)
Observations	1,253	1,253	1,253	1,253	1,253
Wald test p-value Pos.misp.	0.650	0.585	0.418	0.030	0.941
Wald test p-value Neg.misp.	0.633	0.812	0.028	0.202	0.710
Controls	Yes	Yes	Yes	Yes	Yes

- Treatment effects are heterogeneous by political orientation:
 - Only **right-wing respondents withdraw contributions**
 - Center-left respondents do not withdraw their contributions despite a similar decrease in health concerns

Endogeneity of Experiment 1

- The treatment is **conditional on prior perceptions**



Survey Experiment 2 – Treatment Design

Assume the entire population living in **your state** is equally divided into 10 income groups, each with the same number of households.

The figure below illustrates the 10 groups, ordered from left to right from the 10% with the lowest income to the 10% with the highest income.

All households living in your state										
Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	
10% lowest income										10% highest income

Remember, there are the same number of households in each of the 10 groups!

Q2 Think of a household living in the same state as you where its members:

- have **no education**
- are **unemployed**
- **cannot afford enough food and clothing**
- live in a **non-recognized slum** with overcrowded rooms
- have **no toilet** and **no access to fresh water**

In your opinion, which income group is this household part of?

Remember, there are the same number of households in each of the 10 groups! *

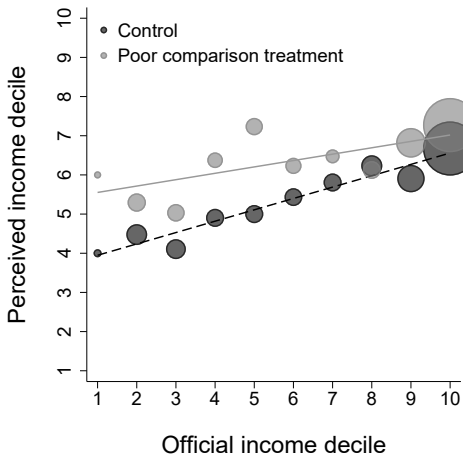
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Q2b Think of **YOUR household now. In your opinion, which income group is your household part of?**

Remember, there are the same number of households in each of the 10 groups! *

Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10
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Survey Experiment 2 – Treatment Design



→ **Upwards shift** in perceived relative income across the distribution

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10% lowest income									10% highest income

Remember, there are the same number of households in each of the 10 groups!

Q2 Think of a household living in the same state as you and earning a total annual income of 1,00,00,000 INR.

In your opinion, which income group is this household part of?

Remember, there are the same number of households in each of the 10 groups! *

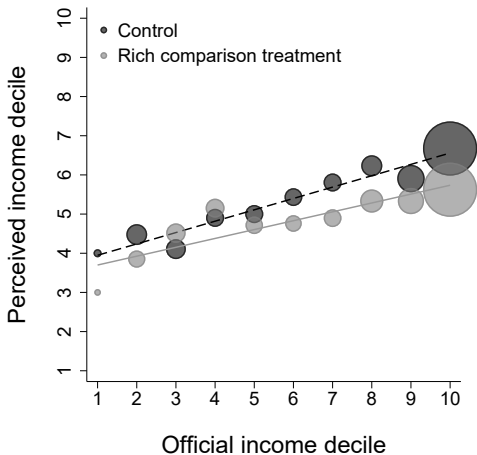
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Q2b Think of YOUR household now. In your opinion, which income group is your household part of?

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Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10
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Survey Experiment 2 – Treatment Design



→ **Downwards shift** in perceived relative income across the distribution

Survey Experiment 2 – Results

	Perceived income decile (1)	Health concerns (2)	Contrib. extensive margin (3)	Contrib. intensive margin (4)	Protection measures (5)
<i>Panel A: Average treatment effects</i>					
PT	0.792*** (0.081)	-0.140** (0.054)	-0.017 (0.021)	0.011 (0.022)	-0.013 (0.029)
RT	-0.722*** (0.085)	-0.212*** (0.050)	-0.022 (0.018)	-0.003 (0.025)	-0.063*** (0.022)
Observations	1,852	1,852	1,852	1,852	1,852
Control mean	5.970	3.990	0.770	0.330	0.590
Controls	Yes	Yes	Yes	Yes	Yes
<i>Panel B: Marginal effects in interaction with political leaning</i>					
PT x Right	0.807*** (0.112)	-0.210*** (0.060)	-0.056* (0.030)	0.001 (0.024)	-0.050 (0.031)
PT x Center-left	0.141 (0.273)	-0.170 (0.138)	-0.023 (0.049)	0.009 (0.060)	0.033 (0.046)
RT x Right	-0.471*** (0.146)	-0.256*** (0.072)	-0.055** (0.026)	-0.014 (0.026)	-0.107*** (0.034)
RT x Center-left	-1.345*** (0.380)	-0.127 (0.129)	0.011 (0.041)	0.007 (0.061)	0.066 (0.072)
Observations	1,852	1,852	1,852	1,852	1,852
Control mean right	6.040	4.080	0.810	0.340	0.640
Control mean center-left	6.400	4.020	0.770	0.330	0.540
Controls	Yes	Yes	Yes	Yes	Yes

Discussion and Conclusion

Contributions

- Heterogeneous **belief updating** about personal marginal benefits
So far:
 - Homogeneous marginal benefits (Heap et al., 2016)
 - Stochastic heterogeneous marginal benefits (Fischbacher et al., 2014; Asensio and Delmas, 2015)

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 - Potentially compromises public good provision, especially when the political majority is not sufficiently inequality averse
 - Additional concern: alarming results on health concerns and private exposure protection

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 - Discussion on **income transparency**
 - Potentially compromises public good provision, especially when the political majority is not sufficiently inequality averse
 - Additional concern: alarming results on health concerns and private exposure protection
- ⇒ Efforts towards **personalized exposure information** are important to anchor beliefs to correct estimates

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Respondent Characteristics

Table 1: SUMMARY STATISTICS OF RESPONDENT CHARACTERISTICS.

	All (1)	Political leaning			p-value: right vs. center-left (5)
		Undisclosed (2)	Center-left (3)	Right (4)	
Age	37.59	38.19	37.19	37.46	0.70
Female	0.48	0.51	0.50	0.47	0.22
Household size	4.38	4.33	4.32	4.43	0.21
Unemployed	0.24	0.33	0.22	0.21	0.69
Official income decile	8.02	8.08	8.01	8.00	0.95
University degree	0.88	0.86	0.90	0.88	0.22
Rural	0.06	0.06	0.06	0.06	0.70
Smoking	0.20	0.14	0.24	0.22	0.25
Infrequent physical exercise	0.13	0.16	0.12	0.13	0.62
Diagnosed illnesses	0.38	0.32	0.43	0.39	0.12
Observations	2472	603	452	1417	1869



Attrition

Table 2: COMPLETION RATES AND SAMPLE ATTRITION, BY TREATMENT.

Stage	C	IIT	PT	RT	Pooled
Completed	0.792	0.786	0.791	0.763	0.783
Consent form	0.016	0.013	0.016	0.023	0.017
Entry questionnaire	0.086	0.091	0.102	0.103	0.095
Air pollution info	0.068	0.071	0.067	0.072	0.070
Voluntary contribution	0.031	0.030	0.021	0.030	0.028
Support for public policies	0.003	0.000	0.000	0.002	0.001
Adoption of defensive measures	0.001	0.000	0.001	0.000	0.000
Exit questionnaire	0.000	0.001	0.001	0.001	0.001
No. obs. in raw data	1025	1021	1024	1019	4089



Attrition

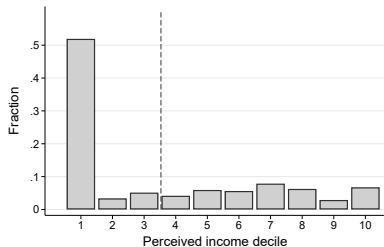
Table 2: COMPLETION RATES AND SAMPLE ATTRITION, BY TREATMENT.

Stage	C	IIT	PT	RT	Pooled
Completed	0.792	0.786	0.791	0.763	0.783
Consent form	0.016	0.013	0.016	0.023	0.017
Entry questionnaire	0.086	0.091	0.102	0.103	0.095
Air pollution info	0.068	0.071	0.067	0.072	0.070
Treatment variation	0.001	0.005	0.002	0.004	0.003
Voluntary contribution	0.031	0.030	0.021	0.030	0.028
Support for public policies	0.003	0.000	0.000	0.002	0.001
Adoption of defensive measures	0.001	0.000	0.001	0.000	0.000
Exit questionnaire	0.000	0.001	0.001	0.001	0.001
No. obs. in raw data	1025	1021	1024	1019	4089

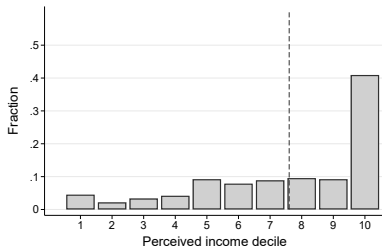


Comparison Treatment Mechanism

Panel A. Poor comparison household placement



Panel B. Rich comparison household placement



- Only 8% in PT place themselves *poorer* than the poor comparison household
- Only 10% in RT place themselves *richer* than the rich comparison household

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