Identifying the Effects of SNAP on Child Health Outcomes When Participation Is Endogenous and Misreported

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Outline

1. Introduction
2. Data
3. Analysis Without Measurement Error
4. Analysis With Measurement Error
5. Conclusion

Introduction

Motivation

- food insecurity is an important issue in the U.S.
- over 40 million Americans receive SNAP benefits (food stamps)
- nearly 50% of children in the U.S. will benefit from SNAP during their childhood

Problems in Evaluating SNAP I

Selection Problem

- endogenous participation decision
  1. stigma
  2. high transaction costs
  3. benefit level decreases with income

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Nonrandom Measurement Error Problem

- substantial underreporting
- misreporting is correlated with respondents' characteristics

Contribution of the Paper

1. **Theoretical:** Extend partial identification methods to account for selection and measurement error problem in a single unifying framework

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2. **Empirical:** Estimate informative bounds on the ATE of SNAP on important child outcomes

Data

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- 2001-2006
- 4418 SNAP eligible children
- detailed information on health-related outcomes
  - food insecurity
  - obesity
  - anemia
  - subjective health status

Descriptive Statistics

- 45% of eligible families report receiving food stamps

Variable	Recipients	Non-Recipients
Age (in years)	8.6***	9.5
Ratio of income to the poverty line	0.64**	0.86
Food-insecure	0.45**	0.35
Poor or fair health	0.09	0.07
Obese	0.19	0.18
Anemia	0.013	0.010

Analysis Without Measurement Error

Set-Up of the Problem

Interest

- population: SNAP eligible children
- object of interest: $\text{ATE} = P[H(1) = 1] - P[H(0) = 1]$

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Notation

- $FS^* \in \{0, 1\}$: actual treatment status
- $H(FS^*) \in \{0, 1\}$: health outcome given FS^*

The Bounding Approach

Recall: we don't observe the probabilities in

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Solution Approach by the Bounding Literature:

1. Decompose unobserved quantities with the Law of Total Probability

   $\Longrightarrow$ Introduce observed quantities into the expression

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2. Make assumptions about the unknown quantities

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Possible Assumptions I

1. No Assumption

2. Monotone Treatment Selection Assumption (MTS)

Children in SNAP have weakly worse health outcomes than other children:

- $P[H(1) = 1|FS^* = 0] \leq P[H(1) = 1|FS^* = 1]$
- $P[H(0) = 1|FS^* = 0] \leq P[H(0) = 1|FS^* = 1]$

Possible Assumptions II

3. Monotone Instrumental Variable Assumption (MIV)

Probability of bad health decreases weakly in income

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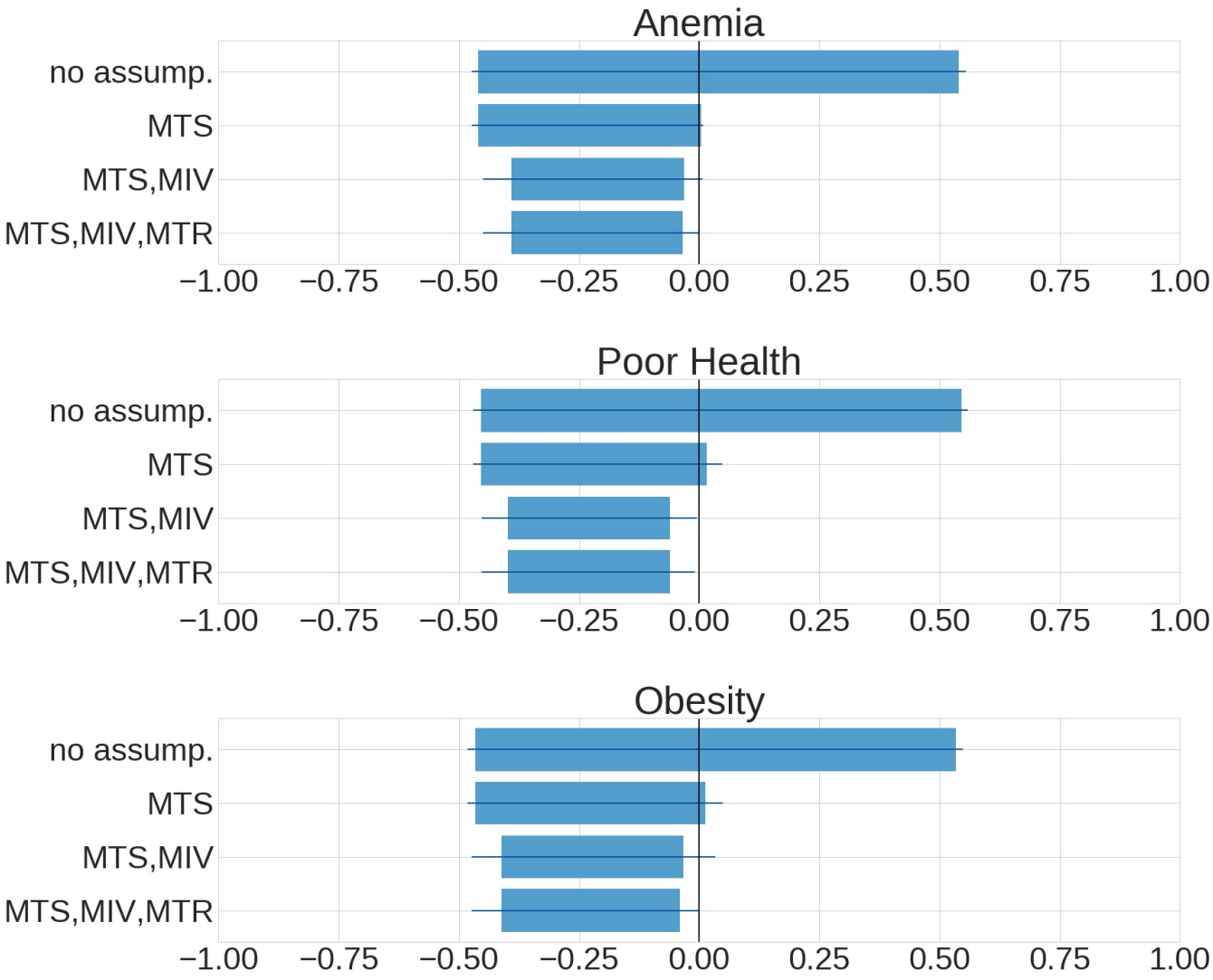
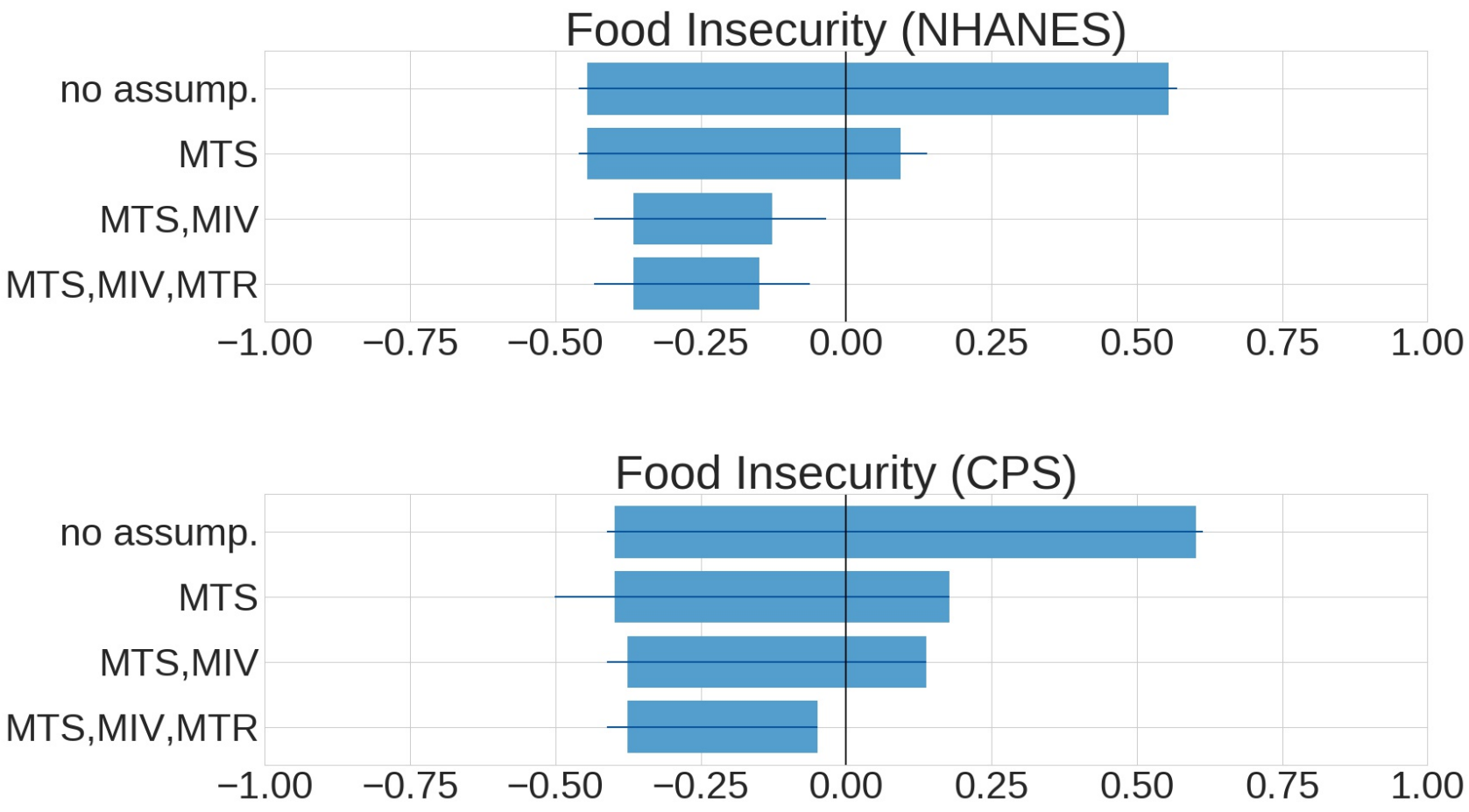
4. Monotone Treatment Response Assumption (MTR)

SNAP does not worsen health status: $H(1) \leq H(0)$

Results Ignoring Measurement Error I



Results Ignoring Measurement Error II



Analysis With Measurement Error

The Problem With Misclassification

- **Remember, we had:**

$$\text{ATE} = P[H(1) = 1] - P[H(0) = 1]$$

$$P[H(1) = 1] = P[H(1) = 1|FS^* = 1] \cdot P[FS^* = 1]$$
$$+ P[H(1) = 1|FS^* = 0] \cdot P[FS^* = 0]$$

- **Now we allow:** $FS \neq FS^*$

- **Problem:** none of the elements above are identified

The Solution With Missclassification

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- Decompose further using the Law of Total Probability!
- $FS^* = 1$ consists of correct and incorrect reports

$\Longrightarrow$ Get bounds of ATE that consist of:

- observed probabilities
- unobserved counterfactual probabilities
- fractions of false positive and negative classifications for each health realization (θs)

Finding Bounds with Misclassification

- the true and self-reported rate of participation imply restrictions on the θs
  - self-reported rate is in the data
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  - self-reported rate is in the data
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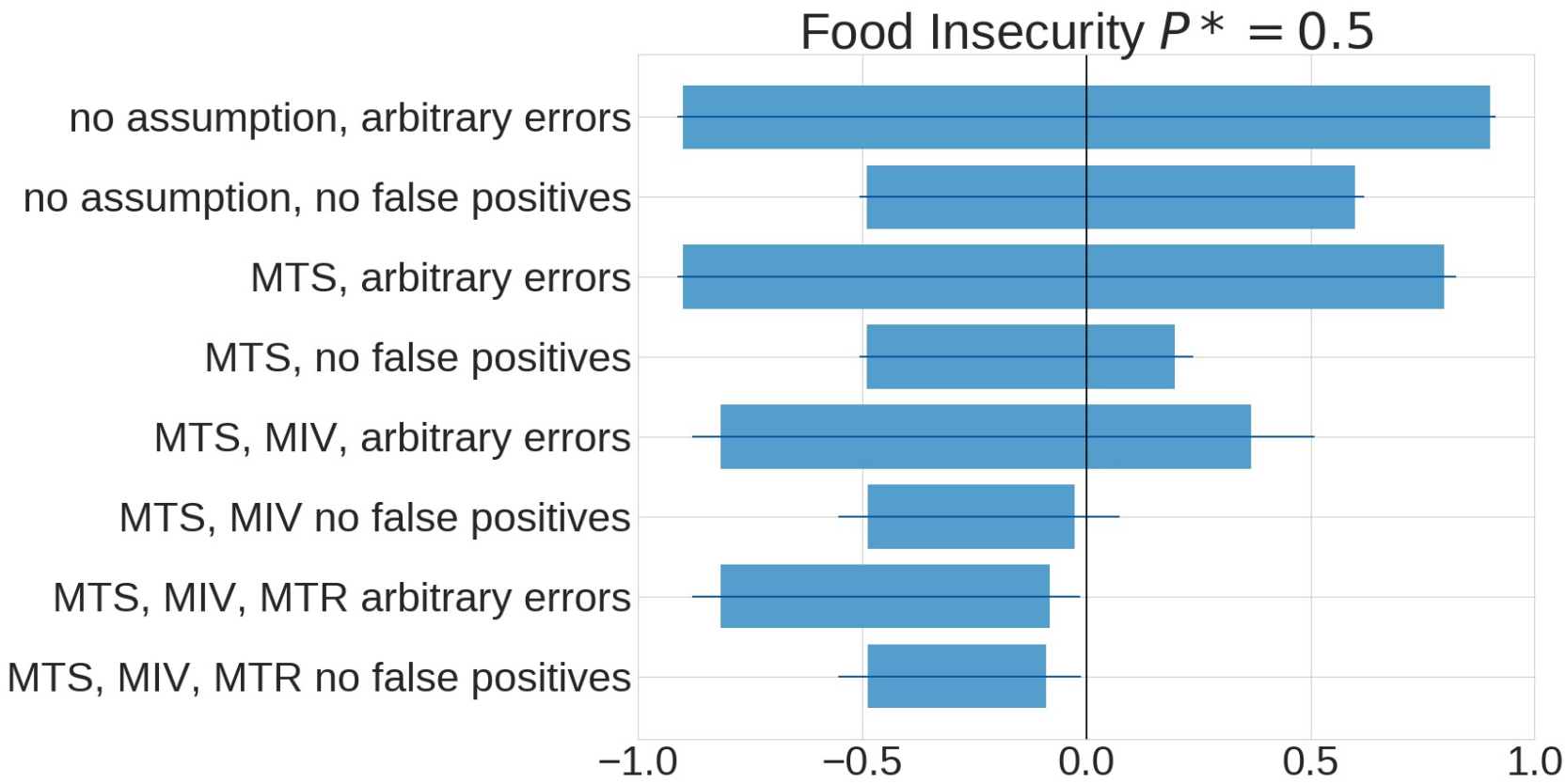
- we get tighter bounds if we assume a limit on the maximum amount of data corruption
  - extreme case 1: no excess errors
  - extreme case 2: arbitrary errors

Results


Food Insecurity $P* = 0.5$
no assumption, arbitrary errors
no assumption, no false positives
MTS, arbitrary errors
MTS, no false positives
MTS, MIV, arbitrary errors
MTS, MIV no false positives
MTS, MIV, MTR arbitrary errors
MTS, MIV, MTR no false positives
−1.0
−0.5
0.0
0.5
1.0

Conclusion

Conclusion

- SNAP is hard to evaluate
  - non-random selection into the program
  - common and non-random under-reporting in surveys
- Kreider et al. derive bounds on the ATE
  - accounting for non-random selection
  - accounting for misreporting
- Relying only on credible economic consumptions:
  - estimate informative bounds on the effect of SNAP on
    - health outcomes
    - food insecurity