Heterogeneity of Treatment Effects:
Evidence from Head Start Impact Study

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Introduction

- The National Head Start Impact Study (NHSIS)
- Low-income families
- Age 3 cohort & Age 4 cohort
- --> Stage-environment fit
Research questions

• How *quantity* and *quality* of center care impact child development?

• How does the impact *vary by age*?
Quantity
Quantity

- NICHD (2003): quantity of nonmaternal care
  - more behavioral problems
- Loeb et al. (2005): quantity of center care
  - more academic benefits
  - more behavioral problems
- Causal inference?
NHSIS

- 4442 Children
- Random assignment within 383 centers
NHSIS

• 4442 Children

• Random assignment within 383 centers

• Hours/day at center care
  • Age 3: 4.6 (2.7) vs. 2.1 (3.2)
  • Age 4: 4.1 (2.5) vs. 2.1 (2.9)

• Instrumental variable approach
Identification Strategy

- The Wald estimator

\[ \rho = \frac{E[Y_i | TX] - E[Y_i | CT]}{E[Q_i | TX] - E[Q_i | CT]} \]
Identification Strategy

- First Stage

\[ Q = TX \cdot \text{Center} \gamma_1 + \text{Center} \gamma_2 + X \gamma_3 + \varepsilon \]

- Second Stage

\[ Y = \hat{Q} \beta_1 + \text{Center} \beta_2 + X \beta_3 + e \]
Identification Strategy

- First Stage
  \[ Q = \text{TX} \cdot \text{Center} \gamma_1 + \text{Center} \gamma_2 + X \gamma_3 + \varepsilon \]

- Second Stage
  \[ Y = \hat{Q} \beta_1 + \text{Center} \beta_2 + X \beta_3 + \epsilon \]
Age 3 cohort:
Estimated effects of an additional hour/day at center care

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Age 4 cohort:
Estimated effects of **an additional hour/day** at center care

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Robustness check

- Anderson-Rubin statistic
- Stock-Wright LM S statistic
- LIML
- Subset of large centers
- Results are consistent
Further work

- Multiple imputation
- Spline regression + IV
Quality
• Most children in Control group (40% of the sample) didn’t go to any child care settings
Challenges

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![Bar chart comparing CT and TX]
Challenges

- Most children in Control group (40% of the sample) didn’t go to any child care settings
- Low 1st-stage F
Suggestions?

- Thank you!