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Returns to Large-Scale Public School Pre-K Programs: Evidence from Within All States

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Returns to Large-Scale Public School Pre-K Programs: Evidence from Within All States

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What is this paper’s contribution?

• Prior research: pre-K works in both **short-term and long-term in small-scale, high quality programs** (e.g., Perry).

• Prior research: pre-K can work in **short-term and medium-term in large-scale, high-quality programs** (e.g., Tulsa).

• This paper:

  (1) Does pre-K work on large-scale for “average” state program, for typical students?

  (2) Does pre-K work on large-scale for “average” state program, for disadvantaged groups?
This paper’s methodology

• We estimate effect of a school district’s pre-K enrollment rate in a given year on average 4th grade student outcomes in that school district 5 years later.

• Outcomes: math/reading scores; special ed. & over-age for grade rates.

• Outcome data from National Assessment of Educational Progress, 1998-2013, on over 1 million students in over 5,000 school districts.

• Enrollment rate: Ratio of pre-K to grade 1 enrollment in district, 1993-2008, from Common Core of Data.

• Model controls for student characteristics, district K-12 spending, Head Start & private pre-K enrollment rates.
Variation in Pre-K Enrollment Rate Across Districts, 1990-2007: Quantiles
Only modest effects of pre-K needed for pre-K to pass benefit-cost test, because benefits potentially lifelong

- Average cost of typical state pre-K program is about $5,000/student
- Increase of 1.3 percentiles in avg. test scores at 4th grade would be predicted to increase present value of lifetime earnings by $5,000.
- Reduction of 3.3 percentage points in % of students in special education sufficient to reduce special education costs by $5,000, averaged over all pre-K participants.
- Reduction of 2.7 percentage points in grade retention provides benefits from increased earnings & reduced crime of $5,000.
- Challenge: more difficult to detect modest effects.
For average student in average pre-K program, pre-K has scant benefits at 4th grade

Effects of Average State Pre-K on Average 4th Grade Outcomes in Average Districts

Math: 0.2
Reading: -1.3
Special Ed: -0.9
Over-age: -0.5

NOTE: 90% confidence intervals are shown.
Quality: We know it when we see it, but…

- Everyone agrees “quality” programs matter
- Difficulty is defining quality: existing metrics (NIEER, CLASS, etc.) only modestly correlated with successful outcomes
- We drew upon expert opinion to designate five states as having high-quality public pre-K before we began data analysis:
  - MD, MA, NJ, NC, and OK
- We compare district pre-K adoption in these five states to district adoption in other states
In “high-quality” states (MA, MD, NJ, NC, OK), pre-K increases math scores more than enough to pass benefit-cost test.

**Effects of Pre-K on 4th Grade Math Scores in Districts in Different States**

NOTE: 90% confidence intervals are shown.
In majority Black school districts, pre-K has large effects on both math and reading test scores.

Effects of Pre-K on 4th Grade Outcomes, Majority Black Districts

<table>
<thead>
<tr>
<th>Variables</th>
<th>Percentiles for tests, % pts for status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>5.9</td>
</tr>
<tr>
<td>Reading</td>
<td>3.9</td>
</tr>
<tr>
<td>Special Ed</td>
<td>-2.2</td>
</tr>
<tr>
<td>Over-age</td>
<td>-1.3</td>
</tr>
</tbody>
</table>

NOTE: 90% confidence intervals are shown.
Summary

Pre-K on a large scale can work. But it needs to be either:

(1) High-quality, or

(2) Targeted at disadvantaged groups.

Caveat: None of this precludes “sleeper effects” that may not be apparent at 4th grade, e.g. high school grad rates.