PBAF 573:
Educational Policy & Social Inequality

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Spring 2004
Week 4:
Do Resources Matter?
If So, Which Ones?
What’s the Contribution of Schools?

• Difficult to accurately discern because of nonrandom matching of students, teachers, and schools
  – Decomposition of variance in student outcomes may over or understate contribution of schools
    • Attribution of all within school variation in achievement gains to non-school factors (common practice) will underestimate the contribution of schooling if there is any variation in quality within schools, however,
    • Nonrandom selection of students into schools (Tiebout sorting) inflates the between school component of variance and introduces an upward bias
Research Methodology Used to Study Student Achievement

• Educational production functions
  – Multivariate analysis of student outcomes that include family background and schooling variables

• “Value-added” methodology
  – Measurement of growth in achievement, or achievement holding constant prior achievement

• Fixed and random effects
  – Control for special error structures that can cause bias or misestimation of effect sizes in OLS
Example of Variance Decomposition

- 4 students in two schools with the following test scores: school 1 = (10, 20), school 2 = (25, 25)
  - Total variance = between school var + within school var

Total Variance = \( \frac{(10-20)^2 + (20-20)^2 + (25-20)^2 + (25-20)^2}{4} \) = 37.5

Between School Variance = \( \frac{(15-20)^2 + (15-20)^2 + (25-20)^2 + (25-20)^2}{4} \) = 25

Within Variance (school 1) = \( \frac{(10-15)^2 + (10-15)^2}{2} \) = 25, Within Variance (school 2) = \( \frac{(25-25)^2 + (25-25)^2}{2} \) = 0

Average Within Variance = \( \frac{(25+0)}{2} \) = 12.5
What Does Research Tell Us?

• Numerous educational production function studies yield mixed results about the teacher characteristics most focused on: degree and experience level
  – “No strong evidence that ... teacher education, or teacher experience have an expected positive effect on student achievement” Hanushek (1986, 1992, 1997)
  – “... strong support for at least some positive effects of resource inputs and little support for the existence of negative effects” Hedges et al. meta-analysis
Production and Efficiency in Public Schools (Hanushek)

• Large increase in (real) expenditure per pupil, but little change in student outcomes

• Reviews 147 separately estimated “qualified” educational production function studies found in 33 separate published articles: vote counting
  • “The results are startlingly consistent in finding no strong evidence that teacher-student ratios, teacher education, or teacher experience have an expected positive effect on student achievement” (p. 1162)
  • “There appears to be no strong or systematic relationship between school performance and student performance”
The Effect of School Resources on Student Achievement (Greenwald et al.)

• Analyze 60 studies that satisfy particular (controversial) set of criteria in “decision rules”
  – Meta-analysis (as opposed to vote counting) of studies on relationship between resources and student outcomes
    • Combined significance testing - combine significance tests from studies which test the same conceptual hypotheses
    • Effect magnitude estimation - combine effect size estimates from separate studies
  – Conclude that resources do affect achievement
Labor Market Effects of School Quality (Card and Krueger)

- Develop theoretical model of school quality, education, and earnings
  - Key implication is that higher school quality is expected to increase the payoff to each additional year of schooling

- Reviews empirical studies of quality earnings relationship that fall into four classes
  - Conclude that models in each class show positive impact of quality on economic outcomes (disagree with Betts)
  - Examine the returns to school quality in North and South Carolina for blacks in whites in those states - strong correlation between resources for each racial group and return to years of education
Hanushek et al. Study Strategy (1)

Cohort 1 is the older cohort

<table>
<thead>
<tr>
<th></th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Grade 5</th>
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</thead>
<tbody>
<tr>
<td>1984</td>
<td>Cohort 2 (A)</td>
<td>Cohort 1 (B)</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>Cohort 2 (C)</td>
<td>Cohort 1 (D)</td>
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</tbody>
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Compare for two adjacent cohorts the correlation average of achievement cohort gains in different years ($t_1$ and $t_2$) but the same grade ($j$) with the correlation of gains for these adjacent cohorts in the same year ($t_1$) but different grades ($j$ and $k$)
Hanushek et al. Study Strategy (2)

• Compare *correlation* of B and C gains with *correlation* of A and B gains
  – Assuming students in different grades are taught by different teachers, the correlation in school average gain in successive years should be higher for schools in which there is low teacher turnover - this is exactly what they observe

• Estimate individual fixed effects models and decompose variance