14.48, Economics of Education
Prof. Frank Levy
Lecture 13

Questions from last lecture:
Question-
Why have there been so few experiments similar to STAR?
Answer-
Parents will often be very aggressive about getting their children into the program/experiment, leading to problems for program administrators. Additionally, unlike a medical experiment, students and teacher all know whether they are in the treatment or control group in educational experiments.

Question-
The 2 out of 15 schools that showed improvements adapted math and readings curriculum used across the district for gifted students. Why didn't more schools do this? Can we attribute this achievement to self selection or causation due to the choice of curriculum?
Answer-
The 2 schools chose to adopt the program so something is going on in these school to motivate them to make these changes. The results may be very different in schools forced to use similar curricula.

1) Based on ACT tests, readiness for college courses: Approx. 1/3 of kids or more who took the ACT were not ready for their first college course in various fields
2) The trends in NAEP scores from 1978 to today: Have increased slightly in math, flat in English. How could flat English scores mean students and schools are actually doing better? There could have been changes in the test. More importantly, there has been an increase in the number of students in the US public school system whose first language is not English, making teaching English courses more difficult on average.
3) Parents regard schools attended by their own kids as much better than the average local or nation school. This is a steady trend. Why, especially NAEP scores show that this isn't likely true? Because it's hard for parents to admit that their child's school is not good.
4) The way to evaluate effectives of smaller class sizes or more resources and funding is through an educational production function.

$$(Achievement\,Test\,Score)_{it}=\alpha_0+\beta_1(ClassSize)_{it}+\beta_2(Masters)_{it}+\beta_3(Mother'sEducation)_i$$
$$+\beta_4(Father'sEducation)_i+\beta_5(Gender)_i+\beta_6(Race)_i+\beta_7(SchoolLunch)_i$$

What about the school lunch variable?
We use it as a control for parental income/SES because a family must be low income to qualify for free lunch. At the beginning of the semester, we talked about how low parents SES affects early childhood development, school readiness, and later school performance and educational attainment.

Variations on the educational production function found in the literature:
1) The level of aggregation
    a) level of the individual
    b) level of the classroom
    c) level of the school
    d) level of the state---you can do this analysis because states spend varying levels per child

2) Dependent variable
    a) achievement test score
    b) years of education, ultimate educational attainment

c) income earned as an adult

3) Form of dependent variable
   a) level of test score
   b) change in test score/value added

$$(Achievement\ Test\ Score)_{June,2007} - (Achievement\ Test\ Score)_{June,2006}$$

With the calculation, we are assuming that a lot of the year to year fixed effects will cancel out.

However, educational production functions are not usually consistent with what schools actually do.
Why?

Say we want to calculate a production function that describes how to produced 100 typed correspondence letters. 1 person sitting at a computer can produce 10 letters per hour.

Hours of Labor	Hours of Computer
10	10
10	17,000
600	10
32	96

Certainly all the above combinations of labor and computer hours will produce 100 letters, but the top choice is the most efficient.

We assume that businesses maximize profits, but businesses sometimes have goals other than that.
Schools also have multiple goals outside of raising test scores.

Hanushek: Basic finding: Out of 277 teacher/pupil ratio studies, 15% had a positive and statistically significant coefficient, 13% had a negative, statistically significant coefficient, 27% had a positive, insignificant coefficient, 25% had a negative and statistically insignificant coefficient, and 20% had a coefficient that was not significantly different from 0.

How should we interpret these results since we can't confirm a definite positive or negative relationship?

1) Class size and funding/student don't make much of a difference. What are we assuming about a school's behavior here? That schools are trying to maximize test scores.
2) Resources and class size may affect achievement in a different organizational structure.
   a) In most students, the test scores were not visible Presently, most states have their own standards or even tests and the results are very public
   b) How did class size variations appear? What causes them? Chance

In theory, why is a smaller class size supposed to improve educational achievement?
There can be more teacher attention per student which leads to better achievement test and educational outcomes. However, it is difficult for teachers to change their teaching style and lesson plans each year because class size is random.

These problems make good natural experiments hard to find.

Generally, controlled experiments are hard to implement in education:

STAR Experiment: Grades K-3
-3 types of classes:
    Small class size: averaged 15.7 students

Large class size: averaged 22.7 students
Large class with teachers aide: averaged 23.4 students
-Attempted to keep students in the same type of classroom for all 4 years
-School had to have enough students to be able to offer all 3 options to participate
-Teacher assignment was random
-Initial student assignment to a class type was random
-Test is very visible

The experiment was designed to last for 4 years. Since everyone knew the design of the experiment, all participants knew they were participating in the experiment. Specifically, teachers knew they'd be teaching the same size-type class for all 4 years, giving them incentive to adapt their teaching style and lesson plans to their assigned class type. Teachers also had incentive to teach to the test since the test results were publicized. However, this is OK, as long as the test is designed properly.

Attrition rate: 40-50% of student were in the program from grades K-3, the full 4 years.
You do have to consider that, in very low income schools, students change schools and home town very often. In other words, the student turnover in low income schools is huge. This is definitely a problem if you are using test scores to evaluate quality of teaching.

Regression:

$$(Achievement\,Test\,Score)_{it}=\alpha_0+\beta_1(Small\,Class)_i+\beta_2(Regular_{Aide})_i+\Sigma(\delta_k(schoolk))$$

Did small classes work?
Students in regular class sizes with a teacher's aide didn't achieve much differently from students in a regular class size.