AREC 345: Global Poverty and Economic Development

Problem Set 7

Department of Agricultural and Resource Economics
University of Maryland
Fall 2016

Problem Set 7 is due at the start of section on November 18. Problem sets turned in more than 5 minutes after the start of section will be marked as late. All problem sets must be turned in as hard copies; points will be deducted if multiple pages are not stapled together.

You are helping the Ministry of Education evaluate the effectiveness of a program to distribute textbooks to students in Grade 4. A pilot program has distributed free textbooks to Grade 4 students in a school in a rural area, and you have test score data for students in that school and a neighboring school. For each child that is now in the 4th grade in either school, you have data on their test performance at the end of both their 3rd and 4th grade years. Average test scores in the two schools are presented in the table below.

	Average Test Score	
	Pilot School	**Neighboring School**
Grade 3	72	89
Grade 4	86	92

1. Calculate the naive cross-sectional (or treatment vs. comparison) estimate of the program's impact by comparing test scores in the treatment school during the year of the program (4th grade) to test scores in the neighboring school during the year of the program. Report your results.

2. The treatment vs. comparison estimator is, of course, only valid if the treatment school and the comparison school looked similar prior to the intervention; evidence that students in the treatment school were performing better (or worse) prior to the program (i.e. in 3rd grade) suggests that selection bias is a problem. Estimate the magnitude of selection bias by calculating the treatment vs. comparison estimate of the textbook program's impact using the data from 3rd grade, when the program had not yet taken place. What do your results suggest about the estimate reported in Question 1?

3. Calculate the before vs. after (or pre vs. post) estimator of the program's impact on test scores in the pilot school by taking the difference between the 4th grade scores in the pilot school and the 3rd grade scores in the pilot school.

4. The pre vs. post estimator assumes that there is no time trend in the absence of the program. This may not make sense in this setting if children are learning in school — students might do better on a standardized test administered in 4th grade (relative to 3rd grade) in the absence of the program. Test whether this is the case by calculating the pre vs. post estimator for the comparison school. Discuss your results.

5. Calculate the difference-in-difference estimator of the program's impact by taking the difference between the pre vs. post estimator for the treatment school and the pre vs. post estimator for the comparison school (or, equivalently, the difference between the treatment vs. comparison estimator for 4th grade test scores and the treatment vs. comparison estimator for 3rd grade test scores). Report your estimate. What does this result suggest about the textbook distribution program?

6. Difference-in-difference estimation fails (as in, it is biased and does not yield valid estimates of program impacts) when treatment and comparison groups are on different trajectories — in other words, when time trends are not the same in the two groups. The technical term for this is the "common trends assumption." Your diligent research assistant has been able to obtain data on the performance of the students in your sample in 1st and 2nd grades. What does this information suggest about the difference-in-difference estimate that you reported in Question 5?

	Average Test Score	
	Pilot School	**Neighboring School**
Grade 1	58	83
Grade 2	65	86