AREC 345: Global Poverty and Economic Development

Problem Set 5

Department of Agricultural and Resource Economics
University of Maryland
Fall 2016

Problem Set 5 is due at the start of section on October 21. 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.

1. You are working with a non-governmental organization (NGO) that provides free textbooks to elementary school students in rural Malawi. You would like to estimate the impact of the textbooks on student test scores (on an end-of-year national exam). The NGO is considering running a pilot in a single village. The village comprises 80 percent poor households and 20 percent wealthier households. All wealthy households purchase textbooks for their children (without any help from the NGO); poor households cannot afford to buy textbooks for their children.

   Suppose the true relationship between household wealth, textbook ownership, and student test scores is given by:
   $$\text{score}_i = a + b \cdot W_i + x \cdot T_i$$
   where score_i is the test score of student i, W_i is a dummy variable equal to one if student i comes from a wealthy household, and T_i is a dummy variable equal to one if student i owns a textbook (prior to the program.

   (a) If $a = 50$, $b = 10$, and $c = 20$, what is the naive cross-sectional estimate (i.e. the difference in means) of the impact of textbooks on test scores?

   (b) The NGO randomly selects half the village children/households to receive textbooks (if they don't already have them). You then compare the average test score among those randomly assigned to the textbook group to the average score among those randomly assigned to the control group (that does not receive textbooks from the NGO). What is the estimated treatment effect of the program. How does this compare to the true impact of textbooks (on those who receive them from the NGO)?

   (c) What if the NGO implemented the pilot randomized evaluation in a village with no wealthy households (so, no households would have textbooks if it weren't for the program). What would the estimated treatment effect of the (randomly assigned) program be in a village with no wealthy households? How does this compare to the true impact of textbooks?

2. You are helping the Ministry of Education evaluate the effectiveness of a teacher training program. As a pilot, the Ministry has provided the training to the 6th grade teacher at a single school in a rural area, and you have test score data for students in that school and students in a neighboring school (whose teacher did not receive training). For each child who was in 6th grade in either school during the study year (after the one teacher received training), you have data on their test performance at the end of both their 5th and 6th grade years. Average test scores in the two schools are presented in the table below.

| | **Average Test Score** | |
	Pilot School	**Nearby School**
Grade 5	65	60
Grade 6	80	70

(a) You wish to calculate the naive cross-sectional estimate (i.e. the participant vs. non-participant or enrolled vs. not enrolled estimate) of the program's impact by comparing test scores in the treatment school during the year of the program (6th grade) to test scores in the neighboring school during the year of the program. Calculate this treatment-vs-comparison estimator.

(b) Calculate the treatment-vs-comparison estimator in the year prior to the teacher training (5th grade). Since 5th grade test scores were recorded before the teacher in the pilot school received training, they cannot actually be impacted by the program. What does you estimated treatment effect for 5th grade suggest about your answer to (a)?

(c) Calculate the before-after (or pre-vs-post) estimator of the program's impact on test scores in the pilot school.

(d) Calculate the pre-vs-post estimator for the comparison school (whose teacher did not receive training). What does your estimate suggest about your answer to (c)?

3. You are interested in evaluating a program that offers entrepreneurship training to unemployed youth. The non-governmental organization (NGO) implementing the program has compiled a list of unemployed youth who might be interested in the program. To assess the impact of the program, they suggest comparing the incomes of youth who enroll in the training program to the incomes of youth who were not interested in the program. You learn that 50 percent of the unemployed youth on the NGO's list of potential participants come from poor households; the remainder come from non-poor households. Unemployed youth from poor households are typically unable to find even short-term, casual work; so all the poor youth on the NGO's list are interested in the training program. However, non-poor youth can often earn money doing casual work for their parents or relatives; as a result, only half of the non-poor youth on the NGO's list are interested in the program.

(a) What proportion of youth who choose to participate in the program are wealthy?

(b) What proportion of youth who choose NOT to participate are wealthy?

(c) In the absence of the program, non-poor youth earn an income of 6 dollars a week. Poor youth cannot earn any income in the absence of the program. What is the average income **in the absence of the program** for youth that choose NOT to participate in the program?

(d) What is the average income **in the absence of the program** for youth that choose to participate in the program?

(e) Suppose that the true impact of the program is to increase participant's income by 2 dollars per week. If you compared the average income (after the program) among those who participate to the average income of those who do not participate, what would the difference be? (So, this question is talking about the difference in actual observed incomes, not incomes in the absence of the program.)

(f) What if you randomly assigned half the youth on the list to a treatment group who was offered the opportunity to participate in the program? If you compared the average income after the program among those **offered** the opportunity to participate to the average income among those randomly assigned to the control group, what would your estimate of the treatment effect of the program be?