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14.771 Development Economics: Microeconomic Issues and Policy Models
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Problem Set 3 - Duflo, Hanna, and Ryan (2008)

Carefully read Duflo, Hanna, and Ryan (2008) - "Monitoring Works: Getting Teachers to Come to School". You should also download the data used in this paper, which you can find posted on Stellar. The data and documentation are also available online at <http://www.povertyactionlab.org/JPALdata/>. The following questions will make sure you are following the paper's argument and empirical techniques.

Question 1

Before designing a randomized trial, it is important to have a model in mind regarding how the program you'd like to evaluate works. This helps you construct a trial that is as economically interesting and informative as possible. Think about the role that this process may have played in the design of the camera project evaluation.

1. Based on the paper (and your own hypotheses), sketch a schematic model that highlights different channels (not math - make a diagram) through which the camera program could impact student test scores. Why might we be interested in these channels apart from the impact on student achievement?
2. How was the study designed to distinguish between these channels? Can you think of any elements that could have been added to the study to further shed light on these different mechanisms?
3. Why do the authors estimate a structural model? What are the advantages of this approach? What are the disadvantages?
4. Can you think of an extension of the randomized experiment that could have answered some of the questions that the structural model addresses?

Question 2

1. Try and reproduce panels A and B of table 1 (you will need data from the file Random-Check.dta and the file TreatmentSchools.dta) and columns 4, 5, and 6 of table 2 (you will need data from TreatmentSchools.dta and Pretest.dta). Assume that the program was announced on August 24, 2003 - why do we limit our sample to the schools visited before the announcement of the program?. You will not be able to match the results exactly, but they should be similar. Why is it important to compare the characteristics of the treatment and control groups? Would we worry if there were many statistically significant differences?

Question 3

1. Try and reproduce the results in table 3, panel A (again, you'll use data from RandomCheck and TreatmentSchools). Now, reproduce the results, but don't cluster your standard errors by school. What happens? What do the results of this comparison imply for the process generating teacher attendance?
2. What if teachers exposed to the program were more likely to quit, in protest of the imposition of incentive pay? Would this cause problems for our estimates? If so, what do you think the direction of the bias would be? Do the authors address this in their paper?
3. Why are these referred to as "reduced form" results? (Don't just define what the reduced form is - explain why these particular estimates are reduced form).

Question 4

1. Now try and reproduce the first two columns of table 5 and figure 5. What happens when the month changes? Why is there a different impact on teachers who are "in the money" versus those who are not? What assumption allows the authors to interpret the discrete change in absence associated with the month change as they do? Do you think this assumption is satisfied here?
2. What are the results here telling us? How is the information from this exercise different from that obtained in table 3?
3. The point estimate on "in the money" declines substantially when teacher and month fixed effects are included. Why do you think this is? Does this imply that there is a problem with running RD?
4. Contrast the difference in attendance rates for teachers who are in the money vs. those who are not. Explain what it means to say that there is an "option value" to attending school at the beginning of the month. What do you think about the size of this option value given the results for both groups?

Question 5

Now we'll consider the dynamic labor supply model presented in section 3.3

1. Write the value function for the agent's problem, and explain what it means - what parameters are we interested in estimating? Why are we interested in estimating them? Why is the problem static at time T?
2. First, let's consider the iid case. Imagine that we only have data on teacher behavior during period T (the last school day in the month - note that in India school meets 6 days a week). We are interested in estimating β and μ . Can we estimate these parameters in one step? Why or why not? Would we be able to estimate this model if teachers were just paid Rs 50 for each day they came to school?

3. Just using the data on period T, generate the equivalent of columns 1 and 2 of table 6. (Hint: you only need to run probits to do this). Just give estimates for β and μ_1 , don't worry about the bottom part of the table. Given your results for column 2, do you think it's reasonable to assume that μ is common to all teachers? Explain what this restriction means in language that your mother could understand (unless your mother is an economist, in which case, use language my mother could understand).
4. Now consider the serially correlated case. Why do we think this might be important in practice? Why is ϵ_t treated as a "state variable" in the new value function listed in equation (10)? Based on the empirical results, does allowing for serial correlation in the errors matter?
5. How do the authors model heterogeneity in the non iid case (also - say heterogeneity in what)? Given your results in question 5.3 above, do you think this may be restrictive? What evidence do the authors present to support the idea that this specification may be sufficient? Do you find their results convincing? Why or why not?
6. Estimating the dynamic labor supply model was a lot of work. What does this buy us above the results we obtained using the RD?

Question 6

1. Explain several reasons why children present for the baseline test may not have data for the mid or post test. For each reason, give the direction of bias you'd expect to see when comparing mid/post test scores between treatment and control schools.
2. What evidence do the authors present regarding attrition? Based on this evidence, do you think it is likely a big problem in this paper? Given the point estimates, in what direction would you think attrition would bias impact estimates?
3. In table 10, the authors present estimates with and without controls for school characteristics. Imagine that including school level controls significantly changed the estimates. List some reasons why this might happen. Would this necessarily mean that the experiment has been corrupted?
4. Finally, consider table 12. Using a bivariate example, illustrate how measurement error can bias OLS coefficients. What is the direction of this bias? Now, use the data to back out the reliability ratio, λ (you cannot do this given the information on the table - why?). Is measurement error a big problem here?