ECON 523: Program Evaluation for International Development
Empirical Exercise 11

In this exercise, we will extend the simulation program that we used in the in-class activity. To get started, create a new do file containing the same simulation program that we used before (with 50 clusters, 20 observations per cluster, and a treatment effect of 0). Extend your do file as you answer the following questions.

1. We can use the stata command `loneway` to estimate the degree of intra-class correlation, ρ. Modify your code so that you create an empty matrix `rho` (just like the empty matrix `pval`) where you can store your estimates of the intraclass correlation. Then add an `svmat rho` command near the end of your do file. What is the mean level of intra-class correlation across your 1,000 simulations?

2. Given this level of intra-class correlation, what does the MDE formulate indicate is the MDE in this data set?

3. Change the value of the local macro effect to be equal to the MDE that you calculated in Question 2, and then run your code. How many times (out of 1,000) do you reject the null hypothesis?

4. With an individually-randomized sample of $N = 1000$, we were powered to detect an effect of about 0.25 (given the variance of the outcome was 2). With an intra-class correlation of 0.4956562 and a resulting Moulton factor of 3.22761, how large of a sample would we need to obtain that MDE (of 0.25)? Use the MDE formula to answer this question.

5. Confirm that, with the sample size you have calculated, you are powered to detect an MDE of 0.25 using your simulation code.

6. An intra-class correlation of about 0.5 is **very** high. Even among students within the same classroom in the same school, the intra-class correlation is often closer to 0.1 or 0.2.

   (a) How large of a sample would you need to be powered to detect an impact of 0.25 if the intra-class correlation were 0.2?

   (b) How large of a sample would you need to be powered to detect an impact of 0.25 if the intra-class correlation were 0.05?