Heterogeneous Treatment Effects

1. Heterogeneous Treatment Effects (HTE): same treatment but have different effects on different subjects. Use regression to measure HTEs (interaction between covariates of interest and treatment variables)
   1. Motivating examples of HTEs
      1. Potential outcomes are hypothetical population parameters. We only measure treatment or control outcome for a single person.
   2. Treatment effect by Covariate Interactions: split data into two separate samples (parents with above/below-median literacy), compute means and standard errors of the treatment effect in each group. Do a two-sample test of means. Can run a regression with a dummy variable and interaction term (possible due to Central Limit Theorem).
      1. Teacher Incentives Example: watch video for explanation. Interaction term shows the heterogenous treatment effect.
         1. HTEs by Student Characteristics: add each characteristic as a covariate, and then have just as many interaction effects. Hard to put covariates in the same regression because of collinearity. Collinearity isn’t a problem with treatment variables because of the randomly assigned treatment.
         2. HTEs by Teacher Characteristics
      2. Always look at the magnitude of the estimate and the size of the confidence interval.
   3. Discussions (reading tables)
      1. Discussion of Intriguing Quiz
         1. Teacher with more experience deliver fewer benefits based on incentives.
         2. Teachers with more training deliver more benefits based on incentives.
      2. Discussion of Teacher Training Quiz: Add interaction with the base effect.
      3. Discussion of Bachelor’s Degree Quiz: look at base effect+(base effect\*coefficient of the dummy variable)
   4. The Multiple-Comparisons Problem: fishing expeditions can cause overstatement of true statistical significance.
      1. More variables mean more specification searching is possible. Specifications can be changed until the coefficients are suitable. All possible covariates can be tried until statistical significance is found.
      2. An effect isn’t necessarily real when one coefficient was significant out of many possibilities tried.
      3. Fishing Expedition solutions
         1. Use the Bonferroni correction to prevent fishing expeditions. Critical values will be higher than without correcting.
         2. Consider findings to be interesting hypotheses to test in next experiment to ensure replication.
   5. Options for reporting Heterogenous treatment effects
      1. Report separate treatment effect for each subgroup.
      2. Use regressions where the treatment dummy variable is multiplied by covariates of interest.
         1. Define covariates so that reading the output is easier.
      3. Test the significance of treatment effects between subgroups.
         1. Can be done with a t-test on one coefficient.
         2. Can be done with a F-test.