Home Assignment # 2

ARE 256b
Due: 2/13/2023, 11:59 pm

Instructions. You are welcome to work in groups of a maximum of three students. Each group member has to hand in their individual problem sets and compose their separate Stata files. Please list your group members on your problem set. Present hand-written answers to each question clearly and concisely and use tables to present results wherever possible. Attach a print-out of your Stata do file to you Canvas submission. The problem sets are meant to help you understand the material. If you have any questions, please come to the instructor or TA.

1. **Causal Inference Methods**. Explain the key similarities and differences between randomized control trials, regression discontinuity, and difference-in-difference methods in terms of how they obtain a causal effect and what types of effects we can learn from them.

2. **Minimum Legal Drinking Age and Mortality**. Chapters 4 and 5 in *Mastering 'Metrics* show an RD and DD approach, respectively, to identify the causal effect of the minimum legal drinking age (MLDA) on death rates.
   In answering the following part of this problem, write down the regression equations that you use to obtain the RD estimates, and clearly label which regression equation is used to obtain estimates in the different columns of the table.

   (a) *Sharp RD*: Use the data set AEJfig.dta (available on Canvas) to replicate Table 4.1 and Figures 4.2 and 4.4 in *Mastering 'Metrics*.[1]

      i. Comment on the size and statistical significance of the RD estimate. What type of treatment effect does it estimate? Can we learn about the effect of alcohol consumption on all adults from the RD estimate?

      ii. Explain the difference between the columns in Table 4.1.

      iii. Do you suspect that the RD estimates might be confusing nonlinearity with a discontinuity as illustrated in Panel C of Figure 4.3?

   (b) *DD*: Replicate Table 5.2 using the data set deaths.dta (available on Canvas).[2] Comment on the size and statistical significance of the DD estimate. What type of treatment effect does it estimate? Explain your answer in the context of this example.

   (c) *Comparison*: The point estimates of the MLDA effects on death rates are much larger using RD (Table 5.2) and DD (Table 4.1). Explain your answer.

3. **One Mississippi, Two Mississippi**. Using Table 5.1 Panels A and B, compute the difference-in-difference (DD) estimate of the lending policy that the Sixth District executed during the Great Depression on the outcome variables in question. For each outcome variable, show the DD estimate on a plot with clearly labeled points and axes.

[1] Note that the variables for different mortality dependent variables by cause are the following, listed by order of their appearance in Table 4.1: *all*, *mva*, *suicide*, *homicide*, *externalother*, *internal*, *alcohol*.

[2] Note that the death type is the variable *dtype*, where $1 = all$, $2 = MVA$, $3 = suicide$, $6 = internal$.