# Assignment #5

*ECON 5783 — University of Arkansas*

Prof. Kyle Butts

These assignments should be completed in groups of 1 or 2 but submitted individually. My preference is for you to use Rmarkdown files to have your code, results, and your answers to the questions intermixed. Since I am not requiring you to code in R for these assignments, you can use latex or microsoft word to write up answers alternatively. Not that in these cases, I would like you to upload your code seperately.

## Theoretical Questions

1. In the following examples, give an example why you think the following exclusion restrictions might fail
    i. You regress future wages ($y_i$) on going to post-secondary school ($D_i$) with an insatrument of being within a 15-minute drive of a community college ($Z_i$)
    ii. You regress house prices ($y_i$) on the town's school quality ($X_i$) with an instrument for whether a town levied an extra school-funding tax ($Z_i$)
    iii. You regress a person's happiness ($y_i$) on their wealth ($X_i$) with an instrument for the parent's wealth ($Z_i$)
2. In your own words, why is inference hard on the two-stage least squares coefficient when you have a 'weak' instrument

## Coding Exercise: Gerber, Huber, and Washington (2010, APSR)

This exercise will have you work with replication material from Gerber, Huber, and Washington.[1] The dataset can be loaded from `gerber_et_al_2010.csv`. This paper wants to test they hypothesis that registering with a political party (instead of as an 'Independent') changes a person's political beliefs. To do so, they run a randomized experiment in Connecticut for the 2008 election. In Connecticut, you have to be registered with a political party (Democrat or Republican) to vote

1. Full data documentation is available at https://isps.yale.edu/research/data/d055.

in that party's primary election. From a sample of unregistered voters, the authors randomly assigned some voters to receive information ($Z$ = `treat`) that let them know this (so that they register with a political party).

Each voter they contacted was asked questions to gauge which political partyt they most closely aligned with. They then recorded whether the vote registered with their ideological party ($D$ = `pt_id_with_lean`). The outcome of interest is the voter's political ideology a few months after registering with a party, which they measured via a follow-up survey with a similar set of policy questions. They created a varaible ($y$ = `pt_voteevalalignindex`) which has larger values if the person more strongly agrees with *their* political party's stances.

**Overview of experiment**

- $Z_i$: Voters are randomly told before the primary (say January) that you must register with a party to vote in the primary
- $D_i$: Voters (possibly) register to vote with a party before the primary
- $y_i$: Voters are surveyed later in the year (say July) about their political beliefs. $y_i$ is larger if you are more 'ideologically aligned' with your registered party

**Questions**

1. First, let's see if the experimental design actually caused some voters to register with their political party. To do so, run the first-stage regression of $Z$ on $D$. Interpret, using the $F$-statistic, whether the first-stage is "strong".
2. Second, run the reduced-form regression of $y$ on $Z$. Then, form the $\beta_{\texttt{2SLS}}$ estimate by hand
3. Estimate the two-stage least squares estimate using `feols`. From this result, interpret whether or not registering with a political party changes a voter's ideology. Is the estimate statistically significant?
4. Now, let's try and characterize compliers using the method highlighted in the lecture slides (2SLS regression of $D_i * X_i$ on $D_i$ instrument by $Z_i$). For the following variables, compare these complier's means to the overall population means: the voter's age in 2008 (`age`); whether the voter voted in the 2006 midterm elections (`voted2006`); and whether the voter attends church of not (`pt_church`).
    - Given this information, how does this change how you interpret the `LATE` estimate?