Instructions for Mustard and Lott (1997) replication exercise

The Mustard and Lott (1997) study on concealed carry was a controversial study conducted in 1997 and published in the *Journal of Legal Studies* because of its finding primarily (as opposed to its methodology). Using a rollout of state laws allowing individuals to carry concealed weapons, the authors estimated a panel fixed effects model and found that the laws were associated with **declines** in a range of criminal offenses.

But since then, the dominant paradigm for analyzing these types of "differentially timed" rollout of laws has been the difference-in-differences design. Differential timing in particular has been the focus of econometricians since 2016 starting with Borusyak and Jaravel's seminal paper on event studies. In our assignment, you will be replicating the original Mustard and Lott study using **contemporary methods** in difference-in-differences that are **robust** to differential timing. Here are your instructions.

You will write a short essay in the format of a typical empirical microeconomics study. The format will following the following structure. The rubric is below.

- **Introduction (10 points)**. What is the purpose of your study? State very clearly why people should care about this project.
- **Background and Economic Theory (10 points)**. This section should *only* focus on the original Lott and Mustard (1997) project. What was this study? How did they do it? How were the laws coded? It should include a table of the rollout state by state (Table 1), clear description of the laws, the theory behind why you should find deterrence (as well as a description of the economic theory of deterrence), and what the authors found in their original paper.
- **Data (10 points)**. In this section, you will describe the **state-level** data. While the authors used county-level data, we will be using state-level since the laws are ultimately at the state level and critics have noted that the county-level data has substantial measurement error. Describe the data, produce a table of summary statistics for the various crime outcomes as Table 2. Anything additional that you want to show (like time series of the crimes) is up to you. The goal is to create a **readable document**, so make your own choices.
- **Empirical model and Estimation (see below for point distribution)**. Here you should describe the model that you will be using. There are two models.
    - **Twoway fixed effects (10 points)**. This model should be similar to the one used by the authors only you will be using the state level data with state and year fixed effects plus all controls. Choose the outcome specification (log or levels in rate form) that the authors use.
    - **Bacon decomposition (10 points)**. Implement the Bacon decomposition discussed in class, but unlike the previous section, only report the TWFE *without controls* (as we did not discuss the interpretation of the Bacon decomposition with controls in class). It is also discussed in my Mixtape chapter in the Mixtape. Interpret this. Product Table 3 with this information. The types of things I want

you to focus on are the weights and average DiD estimate on the early to late 2x2s as well as the late to early 2x2s. Why are the late to early 2x2s a problem? Read closely my section on this in the Mixtape to help you understand this problem.

- **Callaway and Sant'anna (10 points)**. Present a subsection in which you implement the Callaway and Sant'anna estimator. Describe the model with an equation and a description (short). Use the double robust specification. You will be analyzing each outcome and reporting the overall ATT. Do not report the group-level ATTs because many states simply do not have enough states per treatment date for the bootstrapping to provide accurate 95% confidence intervals. Use no more than 2 covariates – use your own judgment in selectin them. Report this in Table 4 and in your discussion compare what you found with the original findings. Are they similar? If not how do they differ?
- **Event study (10 points)**. Finally, implement the Sun and Abraham event study. While you can estimate Callaway and Sant'anna event studies, I would like to use Sun and Abraham. Explain the interaction weighted estimator and show a figure of each crime. Do pretrends appear to hold? How confident do you feel then that parallel trends holds *for each outcome*. This should only be presented as a Figure, not a table.

- **Conclusion (10 points)**. What do you think you learned from this exercise? Feel free to discuss as little or as much as you want. I am just interested in your opinions. The purpose of this is *merely* to give you a nudge in considering how to interpret results and offer some commentary.

Rubric for grading

You will be graded per section in the following manner.

- The quality of your writing. I want you to produce for me a manuscript that is in draft form. It's okay if it is not a polished final draft. I only want it to follow the above sections. So you will immediately be given 5 points per section if you simply include those items listed.
- You will then be given the remaining points by the following:
  - Did you produce the table and figures listed? This will be worth 3 points per section
  - Did you clearly explain the intuition and description elements of each section? This is worth 2 points per section.

Due date

As I was late in posting this, I would like you to turn this in by the end of the semester, as in the last day of class. I apologize for posting so late.