PLSC 504

Exercise Three
September 20, 2023

Part I

In an interesting, concerning, and sometimes funny article, Arceneaux et al. (2010) show that – even using a large dataset, exact matching, and an extensive list of potential confounders – unmeasured confounding is both a direct threat to causal inferences in an observational setting and a necessary potential issue with which to grapple when conducting matching and other methods. They do so by comparing matching approaches to a known experimental benchmark, which they treat as a "gold standard" for estimating the treatment effect of a telephone mobilization field experiment.

In the first part of this homework, your assignment is to mimic[1] the result in Arceneaux et al. (2010), via simulation. I'm not going to give you much more direction than that, since (in theory) this is a relatively straightforward exercise, and by now you should be getting pretty good at this kind of thing. However, I'll note one of the key insights from their article:

> "Because the contacted and uncontacted components must add up to the ITT results for the total sample, it follows that the uncontacted component shows strong, significant negative treatment effects. In other words, had we used identical matching procedures to measure the causal effect of calling and not reaching someone, we would have come to the nonsensical conclusion that not speaking to someone sharply reduces their turnout rate. This absurd pattern arises because reachable people are more likely to vote than unreachable people, even after controlling for a long list of background variables" (Arceneaux 2010, p. 272).

Part II

We'll examine a question that has been a perennial favorite of analysts using matching methods: The effectiveness of the death penalty in reducing violent crime, especially murder. We have data on 49 states (Nebraska is, inexplicably, omitted; talk to Stephanie Lindquist if you have a burning need to know why) over ten years (1985-1994) ($NT = 490$). The data are available in the "Exercises" folder on the course Github repo.

The main "dependent" variable, `murder`, is the state's annual murder rate per 100,000 population. Our main treatment of interest, `deathpen`, is coded 1 if the state had a death penalty statute that year and 0 otherwise. In addition, I've included a range of demographic variables measuring state population, urbanization, education, racial composition, school spending equity, plus political variables for control of the state's upper and lower houses, unified control of state government, and political ideology measures for the state's citizenry, elites, and supreme court.[2]

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[1] Note that this doesn't necessarily equate to "replicate;" I'm interested in having you demonstrate the *mechanism* by which the Arceneaux et al. results obtain, not the specific/detailed results themselves. Moreover, *I'm only interested in having you recreate the first part of their paper*, pp. 256-272.

[2] The data were assembled from a variety of sources by Prof. Lindquist; for details, see here.

More specifically, we have data on:

- `pop`: Population in 1000s
- `estbkpct`: Percentage African-American
- `urban`: Percent urban
- `aveeduc`: Avg. Education in years
- `equity`: Equity in School Spending (100=max)
- `aveideol`: State Sup. Ct. Liberalism (0-100)
- `citizenideol`: Citizen Liberalism (0-100)
- `eliteideol`: Elite Liberalism (0-100)
- `upcont`: 1 if Dems control state Senate l
- `owcont`: 1 if Dems control state House
- `unifcont`: 1 if unified state government, 0 else

These are variables that have been chosen as potential influences on a state's likelihood of having the death penalty.

Your assignment is the following:

1. Begin by examining the relationship between the death penalty and murder rates using standard (non-causal) tools. Briefly discuss what you find.
2. Use matching approaches to assess the causal effect (if any) of the death penalty on state murder rates. Feel free to use whatever tools you think are appropriate, and whatever model specification(s) you deem correct. Discuss your conclusions in substantive terms, including how they differ (if at all) from those in part 1.
3. If you're feeling up to it, conduct some diagnostics for the appropriateness of the model, and briefly discuss the conclusions you draw from those diagnostics.
4. Finally, evaluate the corresponding causal effect on the murder rate of Democratic control of both the upper and lower houses of the state legislature, and briefly discuss those two sets of findings. (You need not do any diagnostics for these models).

This assignment is due *electronically*, as a *PDF file*, at 11:59 p.m. ET on Thursday, September 28, 2023; you can submit your homework by emailing copies **both** to Dr. Zorn (`zorn@psu.edu`) and and Mr. Morse (`nam@psu.edu`). This assignment is worth 50 possible points.