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Lab 9: Evaluating Anti-Smoking Policy using Synthetic Control Methods

In this lab, you will use the synthetic control method to evaluate the impact of tobacco control policy on cigarette consumption, using data from 1970-2018. You will start with California's Proposition 99, and in the last question, return to analyzing cigarette tax policy in your home state (or a state of your choice).

1. *Sensitivity of synthetic California to predictors*

    a. Modify the predictors chosen by Abadie et al. (2010) to exclude the lags of cigarette consumption. How does this affect the fit of synthetic California?

    b. Modify the other predictors. How does this change affect the fit of synthetic California?

    c. One issue with Synthetic Control Method is that, mechanically, there will be a divergence between California and Synthetic California in 1989 if the weights are chosen to minimize the MSPE for the entire 1970-1988 period.

    That is, even if Proposition 99 had no impact on cigarette consumption, there will tend to be separation between the two series simply because of the way that synthetic California is constructed. One can instead leave a reserve sample before the actual policy change as a placebo test to assess fit.

    Implement this approach (sometimes called "backdating") by only using data through 1984 to generate the weights. How well do California and Synthetic California match up between 1985-1988?

    d. Based on these analyses, what do you conclude about the robustness of synthetic California and the conclusions in Abadie et al. (2010) about the impact of Proposition 99?

2. *New Hampshire (state_fips = 33) has the highest cigarette consumption per capita in the United States. Utah (state_fips = 49) has the lowest cigarette consumption per capita in the United Sates.*

    a. Will the synthetic control procedure work well to study policy changes in either of these two states? Why or why not?

b. To check whether you are right, modify the example code to generate synthetic New Hampshire and synthetic Utah.

3. *Returning to your analysis from Lab 8, apply the synthetic control method to analyze the tax policy change from your home state (or a state of your choice).*

   a. Choose a set of predictors and generate the synthetic counterpart to your chosen state. What states receive the most weight?

   b. What is the estimated treatment effect in the first year after the policy change? Does the treatment effect grow over time? How do your estimates compare with your difference in difference estimates from Lab 8?

   c. Use the permutation test ("placebo in space") method to assess whether the estimated treatment effect in (b) is statistically significant. What do you conclude?