TD Econometrics of causality

Exercise 2 -- DID

The data we are using comes from an article written in 1994 by David CARD and Alan B. KRUEGER. It studies the link between an increase of the minimum wage on the employment rate in fast-food in New Jersey and Pennsylvania. More generally, this article sought to provide empirical estimates of the effect of minimum wages at time of important policy debates in the United States.

The data you will be working with are panel data with two waves of surveys. One before the minimum wage increase and one after. The increase took place in New Jersey where 331 fast-food restaurants (the treatment group) saw their minimum wage increase from $4.25 to $5.05 per hour. In contrast, 79 fast-food restaurants in Pennsylvania (just across the river between the two States) did not see an increase in wages and serve as a control group.

Key variable:

store	Unique store id
chain	Chain : 1=burger king; 2=kfc; 3=roys; 4=wendys
co_owned	= 1 if company owned 0 if franchisee-owned
state	= 1 if NJ; 0 if Pa
southj	= 1 if in southern NJ
centralj	= 1 if in central NJ
northj	= 1 if in northern NJ
pa1	= 1 if in Pennsylvania, northeast suburbs of Phila
pa2	= 1 if in Pennsylvania, Easton, etc
shorej	= 1 if on NJ shore
empft	Number of full-time employees
emppt	Number of part-time employees
nmgrs	Number of managers/asset managers
wage_st	Starting wage ($/hr). Wage of the employee that has the smaller wage
inctime	Months to usual first raise
firstinc	Usual amount of first raise ($/hr)
meals	Free/reduced price code
open	Hour of opening
hoursopen	Number hours open per day
pricesoda	Price of medium soda, including tax
pricefry	Price of small fries, including tax
priceentree	Price of entree, including tax
nregisters	Number of cash registers in store
nregisters11	Number of registers open at 11:00 am
time	= 0 before treatment and 1 after treatment
fte	Full-time employment equivalent (= empft + emppt/2 + nmgrs)

Questions

Part I: Summary Statistics

Let's first look at summary statistics for the full sample. This will give you an idea of the characteristics of your population of interest. Then we will examine whether there are differences between treatment and control stores.

Q1) Present individual summary statistics for the study sample. What is the average number of employees in fast foods (use full time employment equivalent)? Which fast-food chains are includes in the study? What is the average starting wage ? What is the percentage of store owned by a franchisee? How many hours a day, the store is open on average ?

Q2) Now present these same statistics for treatment store vs. control stores. Are there any significant differences in t=0 (before minimum wage regulation started in New Jersey)? What are the main differences that you observe?

Part II. Simple Difference

Q3) Compare fast foods in Pennsylvania vs New Jersey after the treatment: run the following regression.

$$FTE = \alpha + \beta 1(state) + \varepsilon$$

(State=1 if New Jersey, which means that it is the state where minimum wage was implemented in t=1. Do this regression only for t=1: You have to do a conditional regression. Check the chapter "Comment faire une régression uniquement sur un sous-groupe » in Guide XLstat)

Q4) Based on your answers to questions 2 and 3, do you think that estimates in Q3 are a good measure of the impact of the minimum wage that was implemented in New-Jersey?

Part III; Difference-in-Difference

Q5) What is the hypothesis needed to show a causal effect with a DID approach?

Q10) We will now estimate the treatment effect using a standard diff-in-diff regression.

$$FTE = \alpha + \beta 1(time) + \beta 2(state) + \beta 3(State * time) + \varepsilon$$

(Generate an interaction variable named state_time = 1 if the individual is in treatment state and in the period time=1, and =0 otherwise.)

What is your estimate of β3? Is it statistically significant (at the 5% level)? Interpret your results : what is the effect of the minimum wage on employment in this data?

Q11) Robustness: what happens if you add some control variables? Are your conclusions sensitive to the introduction of these variables?

Q12) Conclusion: Based on your analysis from Parts I, II, and III, do you think increasing the minimum wage has an impact on FTE? What are some potential problems with the above analysis?