

Université Paris-Saclay  
Master of Economics – 1st year  
Advanced Econometrics – Tutorial #7 \*

April 04th 2022

## Context of session and objectives

This session is an introduction to the difference in differences (DiD) estimation strategy based on the paper: “*Minimum Wages and Employment: A Case Study of the FastFood Industry in New Jersey and Pennsylvania*”, by David Card and Alan B. Krueger, American Economic Review (1994). In this exercise, we are interested in estimating the effect of an increase in minimum wage on the demand for low skilled labor. The dataset for this exercise, the codebook presenting the dataset, as well as the research article of Card and Krueger(1994), are available on eCampus.

## 1 Presentation of the research question and the data

Before moving on to the practice, we address some preliminary questions on the research question and on the research design to identify a causal effect of a variation in minimum wage on the demand for labor.

1. What does economic theory predict on the effect on an increase in minimum wage on employment, in perfectly competitive markets?
2. We want to estimate the effect empirically. We observe that minimum wage regulations vary across States in the US (some States have higher minimum wage regulations than others). We have a database with wage and employment for firms in different States.
  - (a) Write the regression of employment on minimum wage.
  - (b) Do you think that this simple regression might give us the causal effect of the minimum wage on employment? Explain.

In order to assess the impact of minimum wage laws on employment, David Card and Alan Krueger exploited the exogenous policy change in minimum wage that occurred in April 1992 in New Jersey (NJ): the hourly minimum wage was raised from 4.25 to 5.05 dollars in NJ but not in nearby States. Card and Krueger collected data at fastfood stores in NJ, before (in February 1992) and after the policy change (in November 1992) and also collected data at fast food stores in a nearby State, Pennsylvania (PA), where the minimum wage was not changed.

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3. Consider the policy change:
  - (a) What is the interest of looking at a policy change in order to estimate the effect of minimum wage on employment?
  - (b) What is the interest to look at fast food stores?
  - (c) What is the interest of having stores in different US states? Compare the characteristics of the stores by states and by time period.
  - (d) We need to create unique variables measuring full-time equivalent employment and starting wage for the two time periods. Generate a variable denominated `fte` which measures the full-time equivalent employment in the store (including managers and the number of part-time employees count for half of the full-time employees), and another variable denominated `starting_wage`. *Note: be careful not to forget that the same variables observed in February 1992 and in November 1992 are stored in different variables.*
  - (e) How can you check in the data that the policy has indeed been implemented in NJ stores and not in PA stores?
4. We now investigate the variation in full time employment in New Jersey stores. Compute the difference in average full-time employment in NJ stores before and after the policy change. Do you think this calculation provides an unbiased estimate of the effect the increase in minimum wage on employment? Why?

## 2 The Difference-in-Difference estimation strategy

Card and Krueger used their data set to compute differences-in-differences (DD) estimates of the effects of the New Jersey minimum wage increase. That is, they compared the change in employment in New Jersey to the change in employment in Pennsylvania around the time New Jersey raised its minimum wage.

5. Card and Krueger apply the following strategy: they compute the difference in average full-time employment before and after the policy change in NJ and Pennsylvania and calculate the difference in these average differences.
  - (a) Compute this “difference-in-differences”. How do you interpret this number? Under which hypothesis this strategy can estimate the causal effect of the minimum wage on employment?
  - (b) Can you compute the “counterfactual” average FTE employment in NJ stores after April 1992 if the policy had not been implemented?
6. Lets perform the same analysis in a regression:
  - (a) Write the corresponding regression model that would give you the same DiD estimator of the effect of the policy change, and perform the regression. Show how the results change when you include additional controls for: location within State, chain ownership, type of chain (i.e. KFC, Wendys, Roys or BK).

- (b) Compare the results with a standard OLS regression of employment on wages.
- 7. Discuss the validity of the DiD strategy implemented. What checks can be done to test the validity of the strategy?