Causal Inference II

Mixtape Session

Introduction

- Welcome to Mixtape Sessions workshop on difference-in-differences and synthetic control (“Causal Inference II”)
- 9:00am to 6:00pm CST, 15 min breaks every hour, 1 hour lunch at noon CST
- Lecture, discussion, exercises, application

Workshop outline

Introduction to DiD basics

- Potential outcomes review
- DiD equation and OLS
- Triple differences, event studies
- Including covariates

Workshop outline

Differential timing

- Decomposing constant treatment effect model (TWFE)
- Aggregating group-time ATTs
- Issues and solutions with event studies
- Turning treatments on and off
- Stacked regression
- Imputation estimators
- Continuous treatments
- Time-varying covariates

Workshop outline

Synthetic control

- Canonical synth

Natural experiments

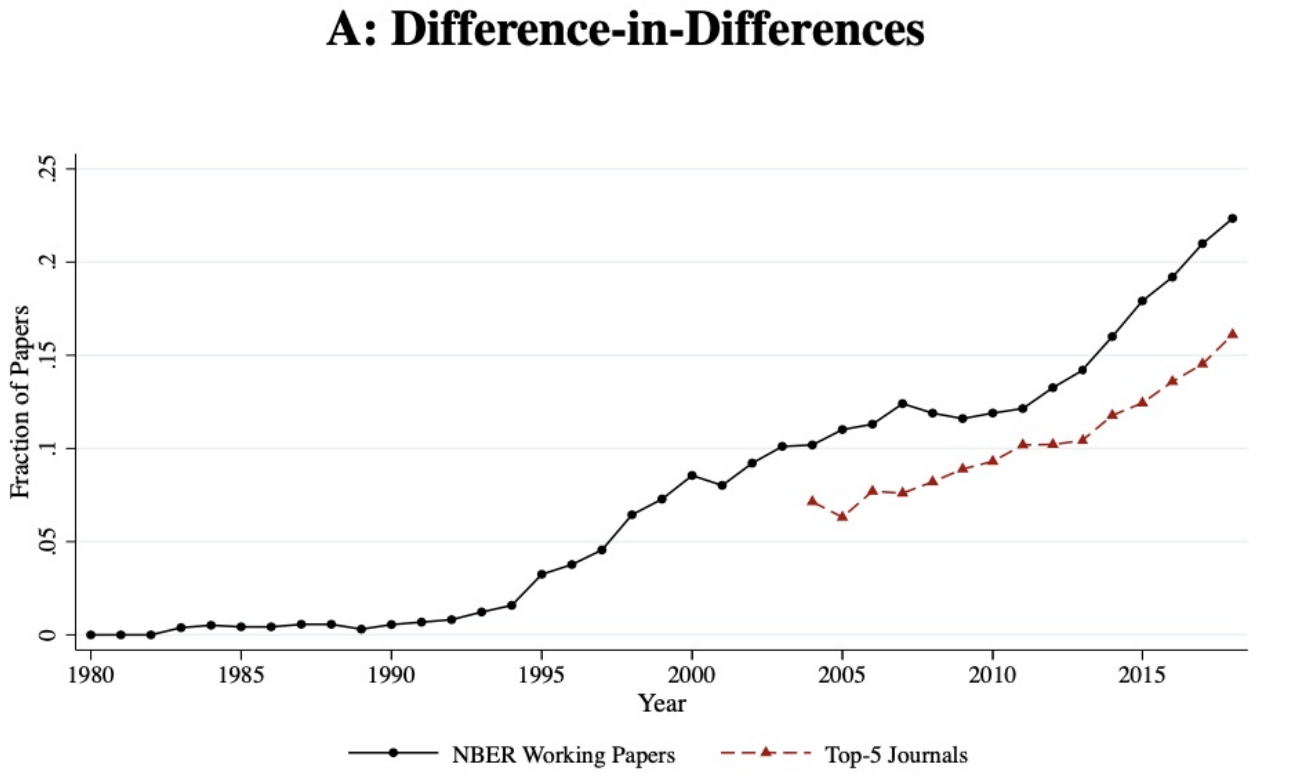
“A good way to do econometrics is to look for good natural experiments and use statistical methods that can tidy up the confounding factors that nature has not controlled for us.” – Daniel McFadden (Nobel Laureate recipient with Heckman 1992)


I
federalism
(for the natural experiments)

What is difference-in-differences (DiD)

- DiD is a very old, relatively straightforward, intuitive research design
- A group of units are assigned some treatment and then compared to a group of units that weren't
- Closely associated with 1980s Princeton Industrial Relations Section (Orley Ashenfelter, David Card, Alan Krueger, Bob LaLonde)
- Unclear when key identifying assumptions like parallel trends are worked out (as originally there is no potential outcomes in play), but Angrist says he invented the term with Pischke
- One of the most widely used quasi-experimental methods in economics and even used in industry

Figure: Currie, et al. (2020)



Why an entire workshop on DiD?

- **Research advantages**: DiD is sometimes the only way we have to study large social policies
- **Time to retool**: Recent wave of scholarship suggest model misspecification has been pronounced
- **Good news**: Better understanding of our models, new tools, new programs
- **Hope**: I think we can get to the bottom of this in a way that will stick with you

Let’s begin with DiD

- With all this out of the way, let’s dig into the DiD material
- We will start with the simplest situation using simple difference in means without covariates
- We will then move into OLS with covariates
- And then move into alternatives to OLS when we have covariates
- Later we go into the more advanced material (e.g., differential timing, continuous treatments)