Recent Advances in Difference-in-Differences
Michigan ISR Workshop

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July 27, 2023

Welcome!

Welcome to the Recent Advances in Difference-in-Differences Workshop!

- I am excited to learn with you all today.

Who Am I?

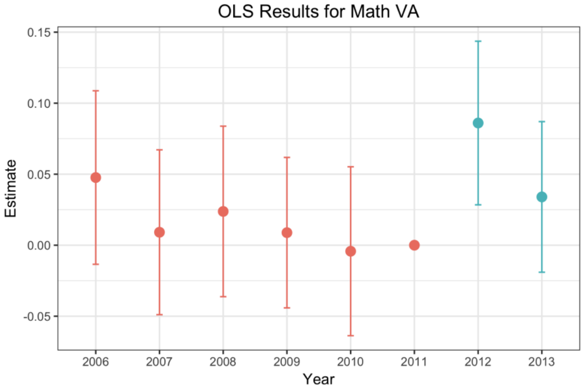
- Assistant Professor of Economics at Brown University.
- I consider myself an *applied econometrician*.
- The main goal of my research is to develop *usable* tools that improve the quality of empirical work.

My DiD Journey

- Early-on in graduate school, I was an aspiring labor economist running a lot of DiDs...

Figure 7: Event Study Results for the Effects of Retirements in 2011 on Math Value-Added

(a) OLS



My DiD Journey

- I realized I had a lot of questions about the methodology of what I was doing.
  - → Should I believe parallel trends holds in this context?
  - → Why do I have pre-trends in some of my specifications but not others?
  - → Is it okay if I focus only on the specifications without pre-trends...?

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  - → I never published the Act 10 paper – oops!
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- But the goal of my research has always been to try to inform real-world analyses of economic topics
- Today I hope to share with you some of the insights that I and others have learned over the last few years, with the **goal of helping you improve your research.**
  - → Focus on both theory and applying it in practice!

(Approximate) Schedule

All times Eastern Time.

- 9-9:15 Introduction: Overview of Recent Advances in DiD
- 9:15-10:15 Lecture 1: Testing the Parallel Trends Assumption: Issues and Limitations
- 10:15-10:30 Break
- 10:30-11:45 Lecture 2: New Approaches When Parallel Trends May Be Violated
- 11:45-12:15 Coding Exercise
- 12:15-1 Open “Office Hours” (Q&A)

Course logistics

- I strongly encourage you all to participate and ask questions!
  - → It's more fun for me and helps you learn better!
- There are several ways that you can ask questions:
  - → Raise hand on Zoom
  - → Put questions in chat
- I will pause periodically for you to ask live questions and to review messages in chat

What's trending in difference-in-differences?

- **Difference-in-differences** (DiD) is one of the most popular strategies for estimating causal effects in non-experimental contexts.
  - → Used in over 20% of NBER WPs (Currie et al., 2020), and growing over time
- The last few years have seen an explosion of econometrics on DiD, making it hard to keep up (sorry!)
- In Roth, Sant'Anna, Bilinski, and Poe (Forthcoming JOE), we attempted to synthesize the recent literature and provide concrete recommendations for practitioners
- Today's workshop will focus mainly on the developments in Section 4 of that paper, on violations of parallel trends. But first, a helicopter tour...

Canonical DiD

The econometrics of DiD have been understood for a long time in what I'll call the "canonical DiD" model. In this model:

- **Timing:** There are 2 periods; treatment occurs (for some units) in period 2
- **Identification:** Obtain ID of the ATT using parallel trends and no anticipation
- **Estimation and Inference:** With many clusters, OLS with TWFE gives consistent estimates and valid CIs

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The canonical model is great... but typically doesn't match settings that people study in practice

Characterizing the recent literature

Recent work on DiD has tried to make the econometrics more realistic by relaxing one (or more) component of the standard model:

1. **Multiple periods and staggered treatment timing**
   → E.g. Borusyak and Jaravel (2018); de Chaisemartin and D'Haultfœuille (2020); Callaway and Sant'Anna (2021); Sun and Abraham (2021); Goodman-Bacon (2021); Borusyak et al. (2021)
2. **Relaxing or allowing PT to be violated**
   → E.g. Roth (2022); Rambachan and Roth (2023); Kahn-Lang and Lang (2020); Bilinski and Hatfield (2018); Freyaldenhoven et al. (2019); Ye et al. (2021); Manski and Pepper (2018)
3. **Inference with a small number of clusters**
   → E.g. Donald and Lang (2007); Conley and Taber (2011); Ferman and Pinto (2019); Hagemann (2020, 2021)

Will focus today on #2. See the DiD Resources page on my website for much more!

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