OLS with Panel Data

Professor Dan Black **PP 414:Applied Regression Analysis: Analysis of Microeconomics Data**

2018

Overview of lecture

- **Panel data**
- Event Study
- Differences-in-Differences
- Example: Black and Nagin
- Example: Heckman and Smith

Panel data

- Panel data follows agents over time. It is sometimes referred to as "longitudinal" data. It is awesome because it allows you to transparently depict the impact of a policy change
- We will explore two possible "designs" for panel data: Event studies (or Difference models) and Differences-in-Differences models
- Event studies are before-and-after analyses
- Finance uses there quite frequently. The look at the returns above normal, or the excess returns after an event
- A classic study is the death of a CEO, separating them into "founders" and non-founding CEOs. This is taken from Alberta Di Giuli (2013)

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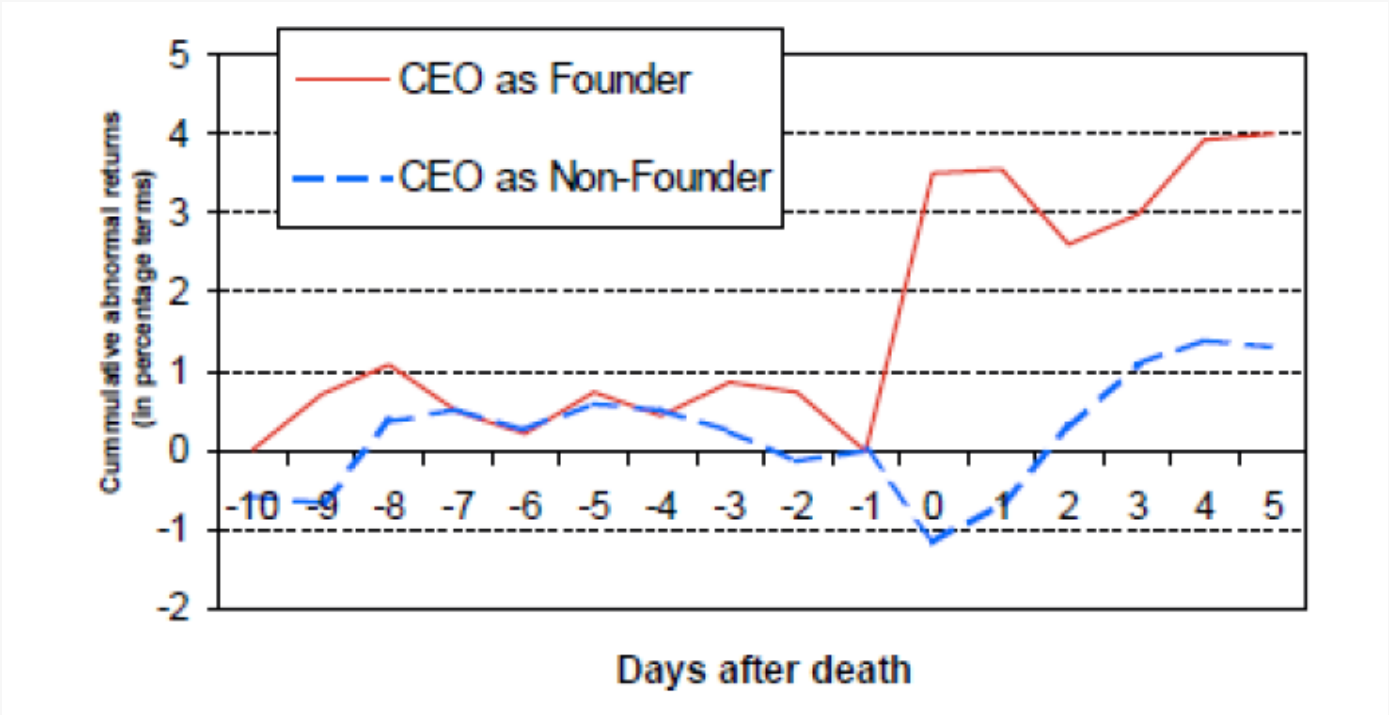
Event study

CEO event study



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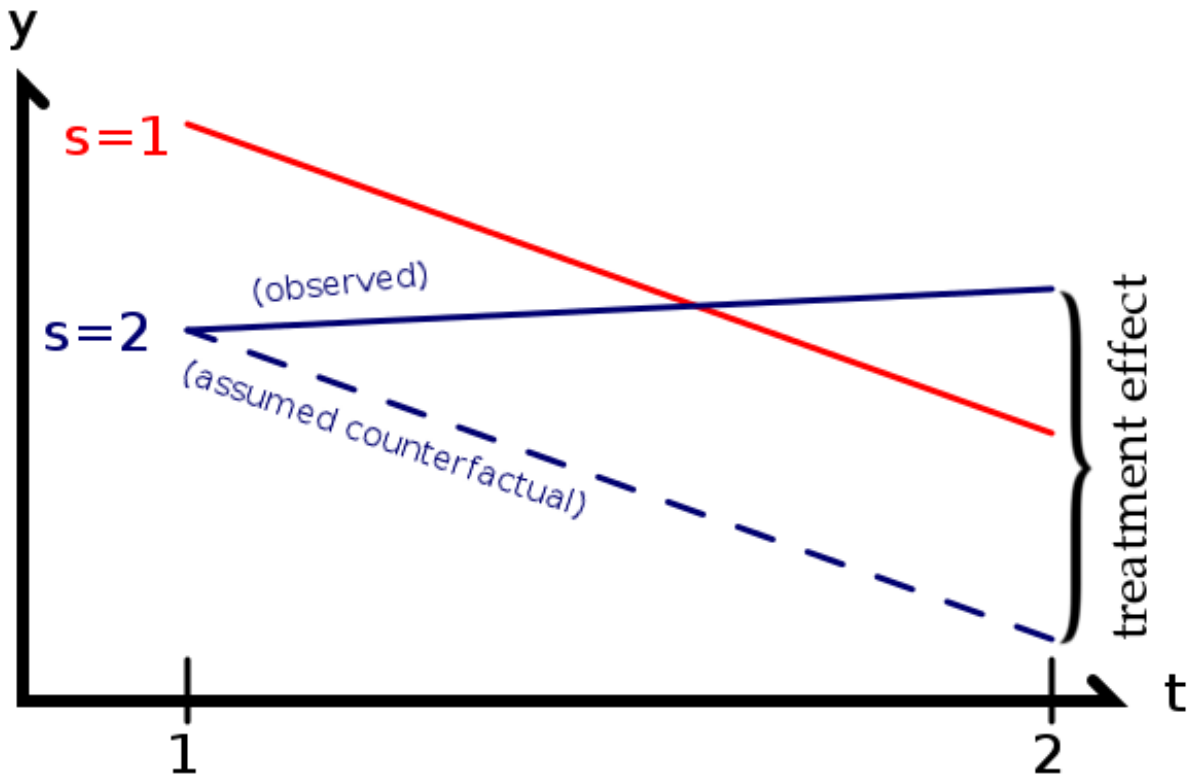
D-in-D

- This design is often very convincing, but problems can arise
- Consider this possibility:

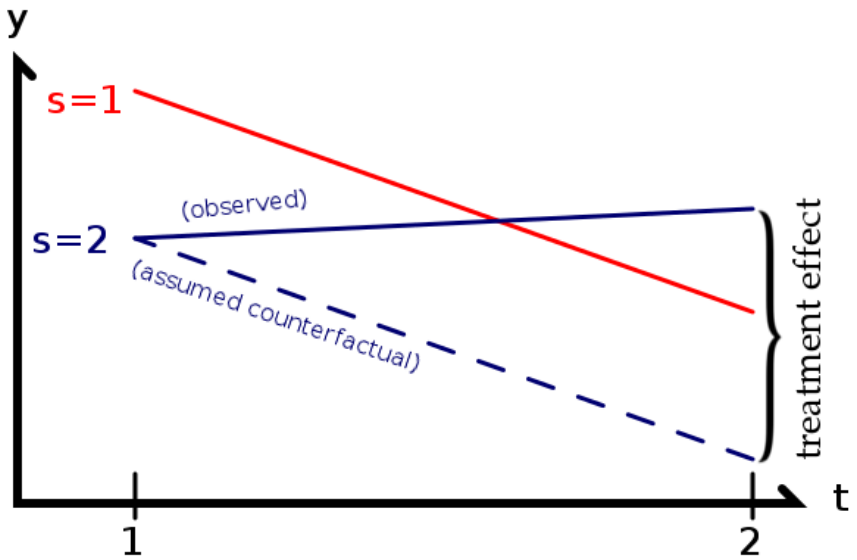


D-in-D

- In this case our presumption of a constant outcome effect is wrong. We could instead specify a Differences-in-Differences model, or

$$Y_{i,t} = \beta_0 + \beta_1 I_{t \geq t^0} + \beta_3 D_i + \delta D_i \times I_{t \geq t^0} + \epsilon_{i,t}$$

- The coefficient δ is our estimate of the treatment effect
- the identify assumption is that the untreated group has similar trends to the the treated group if the treated group was left untreated



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Example: Black and Nagin

- Often we can use to panel data to show studies are simply wrong
- Dan A. Black and Daniel S. Nagin. "Do Right-to-Carry Laws Deter Violent Crime" Journal of Legal Studies January 1998 27(1): 209-10
- John R. Lott and David B. Mustard. "Crime, Deterrence, and Right-to-Carry Concealed Handguns" Journal of Legal Studies January 1997 26(1): 1-63.
- Lott and Mustard estimate this equation

$$y_{i,t} = x_{i,t}\beta + \delta Shall_{i,t} + \eta_t + \alpha_i + \epsilon_{i,t}$$

- I view this as an imminently reasonable model, but is it right?
- Lott and Mustard found substantial reductions in crime

Example: Black and Nagin

- Here is what they found

Lott and Mustard's results

TABLE 1

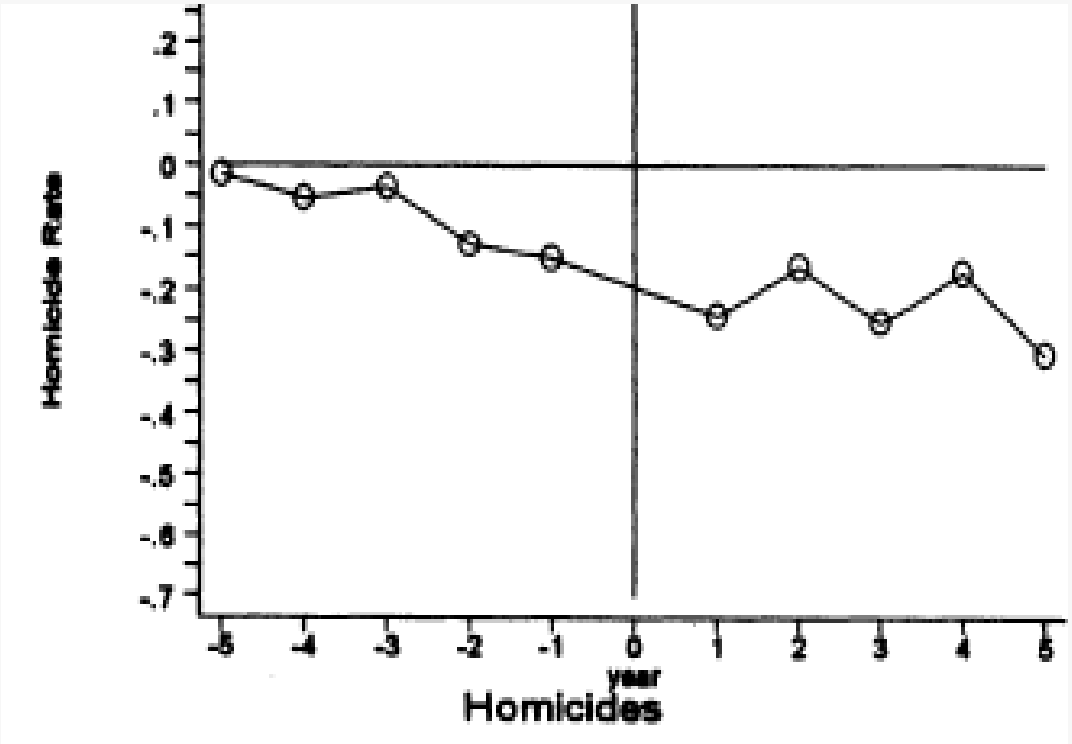
STATE-SPECIFIC IMPACT OF RIGHT-TO-CARRY LAWS, LARGE-COUNTY SAMPLE, 1977–92

	Homicides	Rapes	Assaults	Robberies
Lott and Mustard sample and specification	**−.071***	**−.052***	**−.072***	−.022
	(2.94)	(3.53)	(4.53)	(1.19)
	[26,458]	[33,865]	[43,445]	[34,949]
Large-county, Lott and Mustard specification	**−.090***	−.035	**−.068***	−.029
	(2.78)	(1.81)	(3.06)	(1.13)
	[6,009]	[6,036]	[6,109]	[6,173]

Example: Black and Nagin

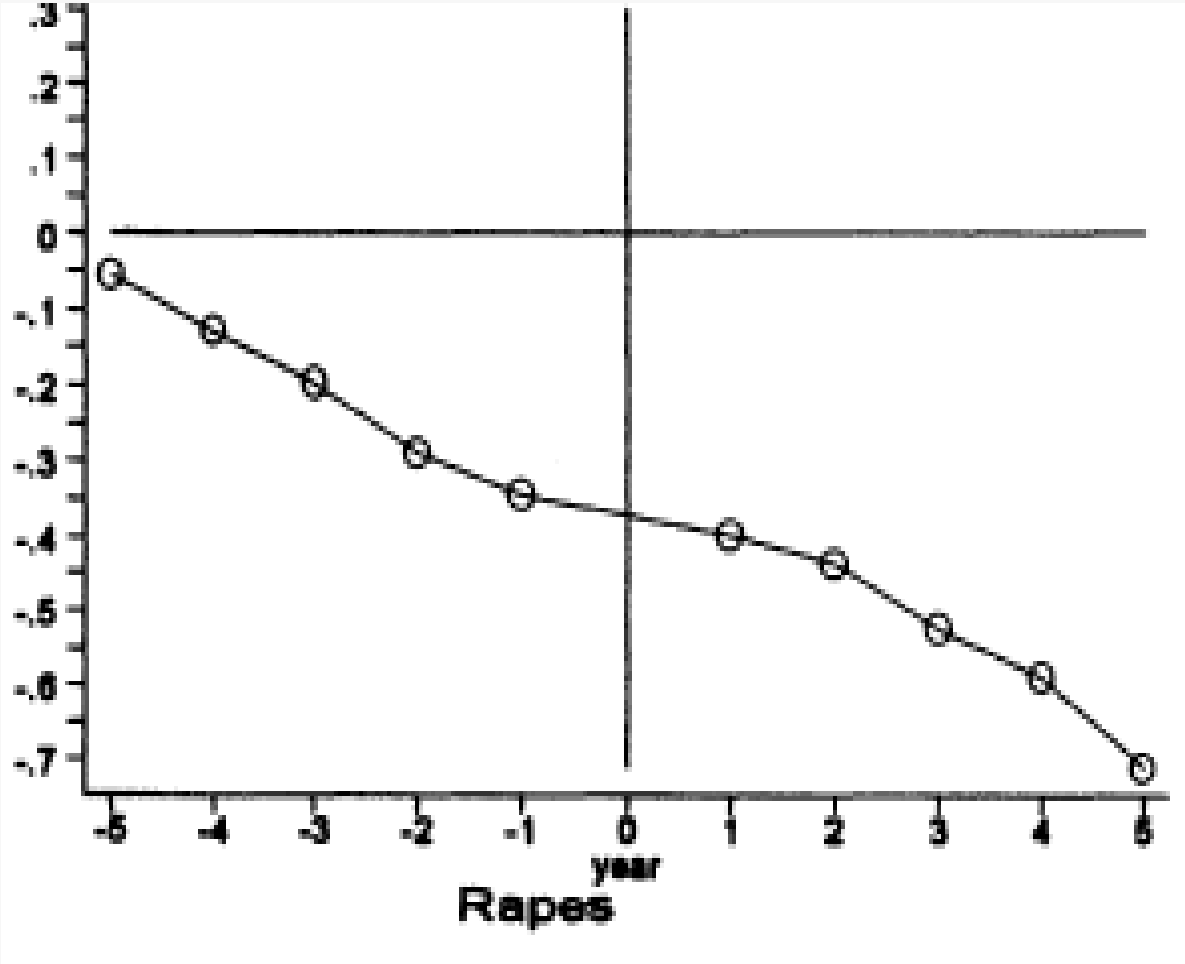
- Nagin and I alter the model just a bit to look at the trends just before and just after treatment. Clearly we wouldn't want to to see crime being reduced before the laws were passed. Here is what we found

Homicides



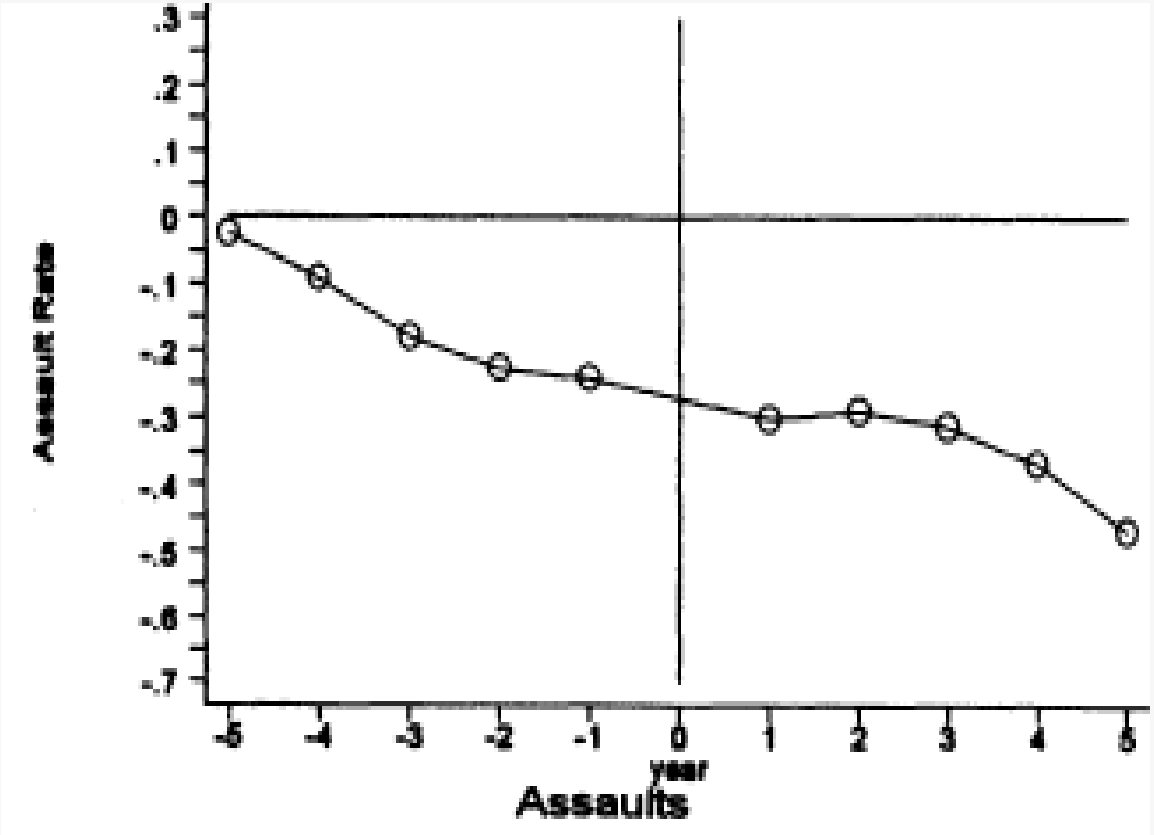
Example: Black and Nagin

Rapes



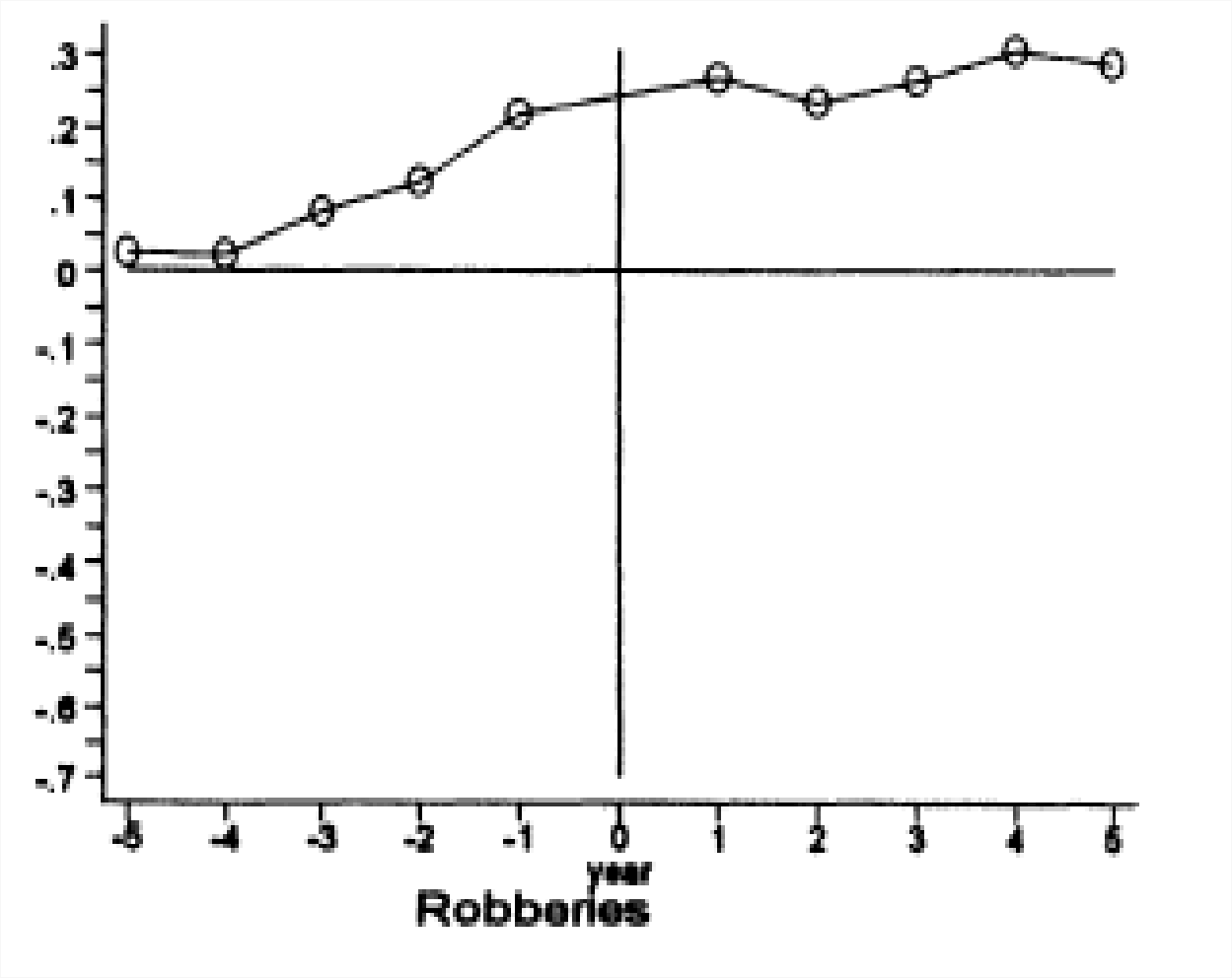
Example: Black and Nagin

Assaults



Example: Black and Nagin

Robberies



Example: Black and Nagin

- Collectively, these results do not seem to indicate much impact of right-to-carry laws on crime
- This has not stopped John Lott from making a set of outlandish assertions about their efficacy
- Anti-gun activist wanted to see if such laws increased accidental shooting or suicides
- We found no evidence that right-to-carry laws have any impact on accidental shootings or suicides

Example: Black and Nagin

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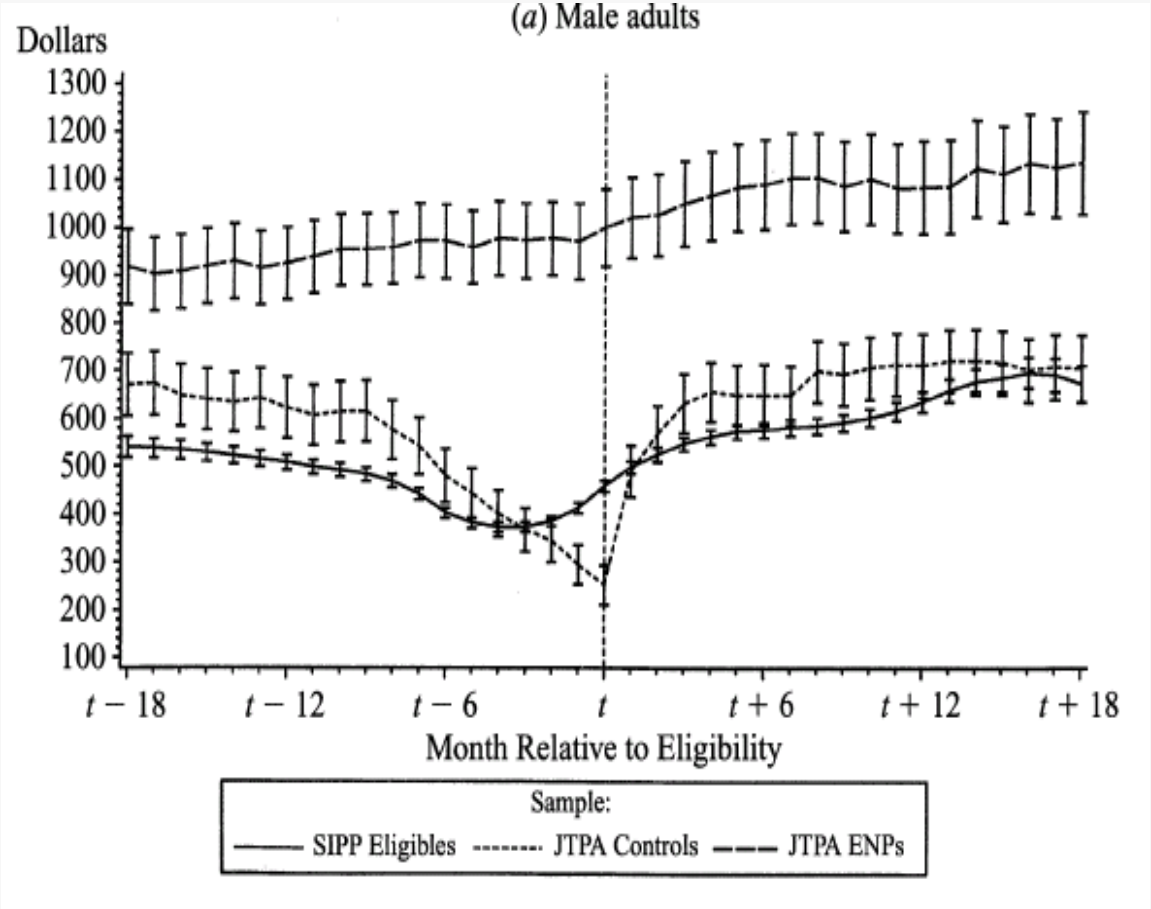
Example: Heckman and Smith

- JTPA evaluation had both an experiment and a comparison group of people eligible for the program
- The control group does not get treated and allows us to see what would have happened to the treatment group if there was no JTPA
- NORC also gathers a set of people eligible for the program that did not sign up
- Heckman and Smith construct a set of people from the SIPP that were eligible for the program. How well did we do?

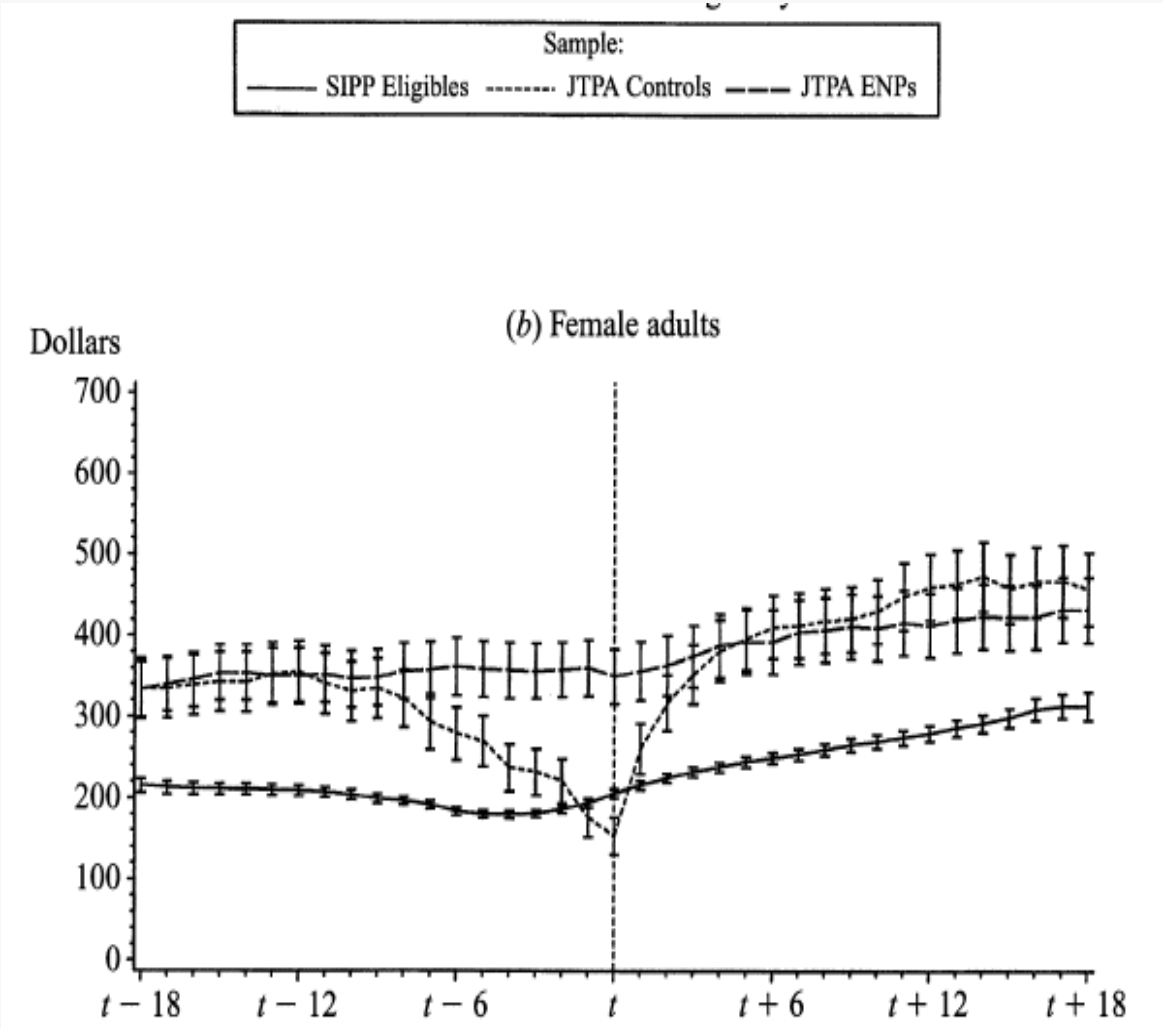
Example: Heckman and Smith: Men

Men



Example: Heckman and Smith: Men

Women



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