Bars to Handlebars

The Effect of Micromobility on DUIs

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Introduction

In general, transportation in the United States is dominated by automobile. However, recent innovations (e.g. rideshare) have provided alternative options that may reduce vehicle dependency. One of the most recent of these innovations is **micromobility**.

- For example: Boston has conventional "docked" bike-share called Bluebike (launched in 2011) and "dockless" bike-share and e-scooters via Lime (launched in 2018 and 2019).

According to the Bureau of Transportation Statistics, micromobility options have been in over 350 cities across the United States.

Literature

The effects of alternative transportation options on impaired driving outcomes is a topic that has received quite a bit of attention (Fell et al. 2020). Rideshare, in particular, accounts for a significant portion of this interest over the past half-decade.

- Most research to date tends to agree that rideshare has marginally reduced alcohol-related driving fatalities (Dills and Mulholland 2018; Anderson and Davis 2021; Peck 2017; Burton 2021)
- Zhou (2020) used BRFSS to measure the effect of rideshare on binge drinking (increase), drinking days (no change), and drunk driving incidents (no change).

Literature

Little research exists about micromobility, however. Button, Frye, and Reaves (2020) is, to our knowledge, the only micromobility paper published in an economics journal.

That said, the two closest papers to our topic are:

- Yang et al. (2020) used media reports and machine learning to perform a descriptive analysis of 169 E-Scooter-involved crashes.
- Jackson and Owens (2011) examined a temporal expansion of train services in Washington DC, and find an increase in alcohol-related arrests but a decrease in DUIs.

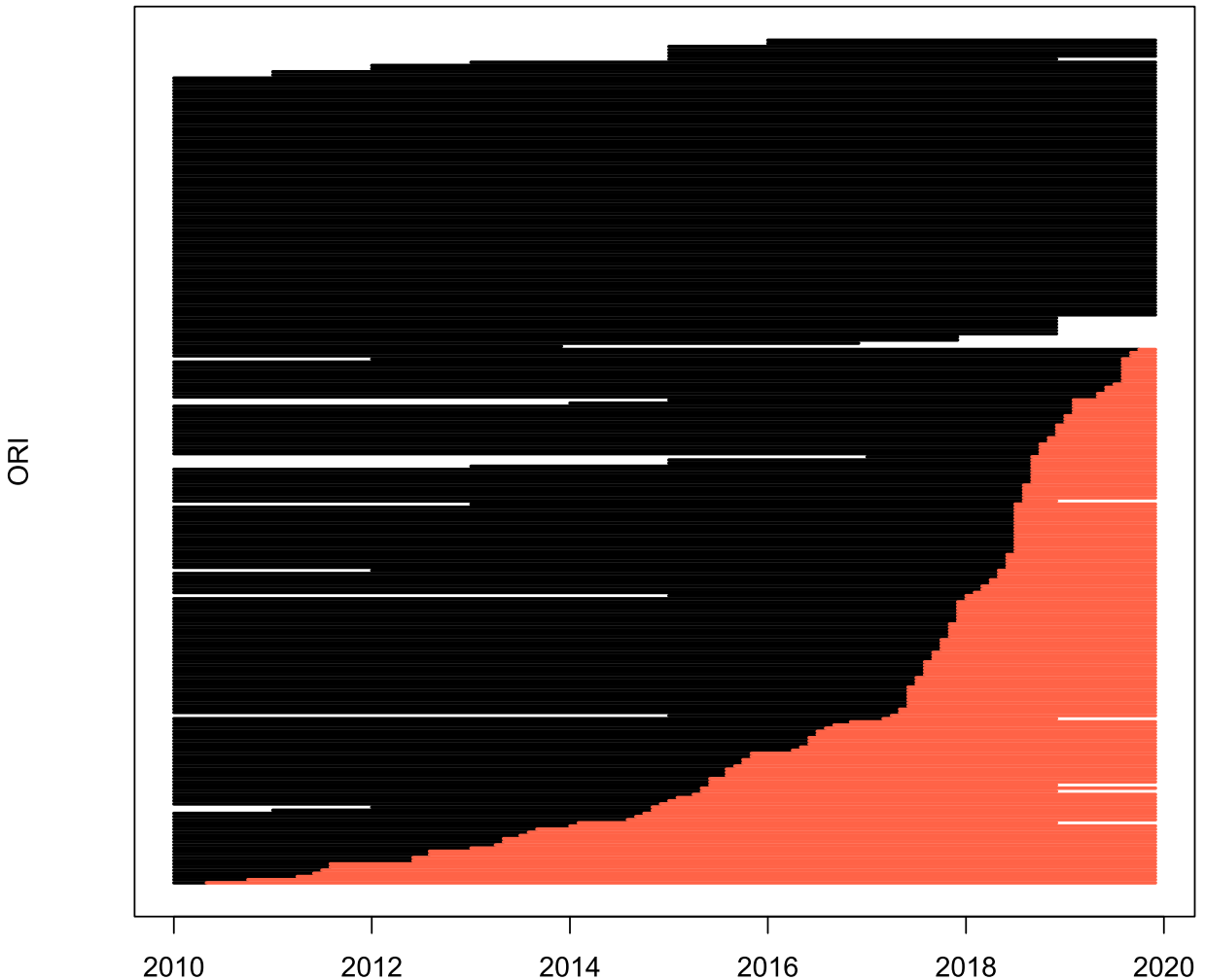
Research Question

In this study, we ask how the introduction of micromobility impacts DUI arrests. We hypothesize that, like rideshare, micromobility could provide an alternative to driving (an automobile) under the influence.

Data

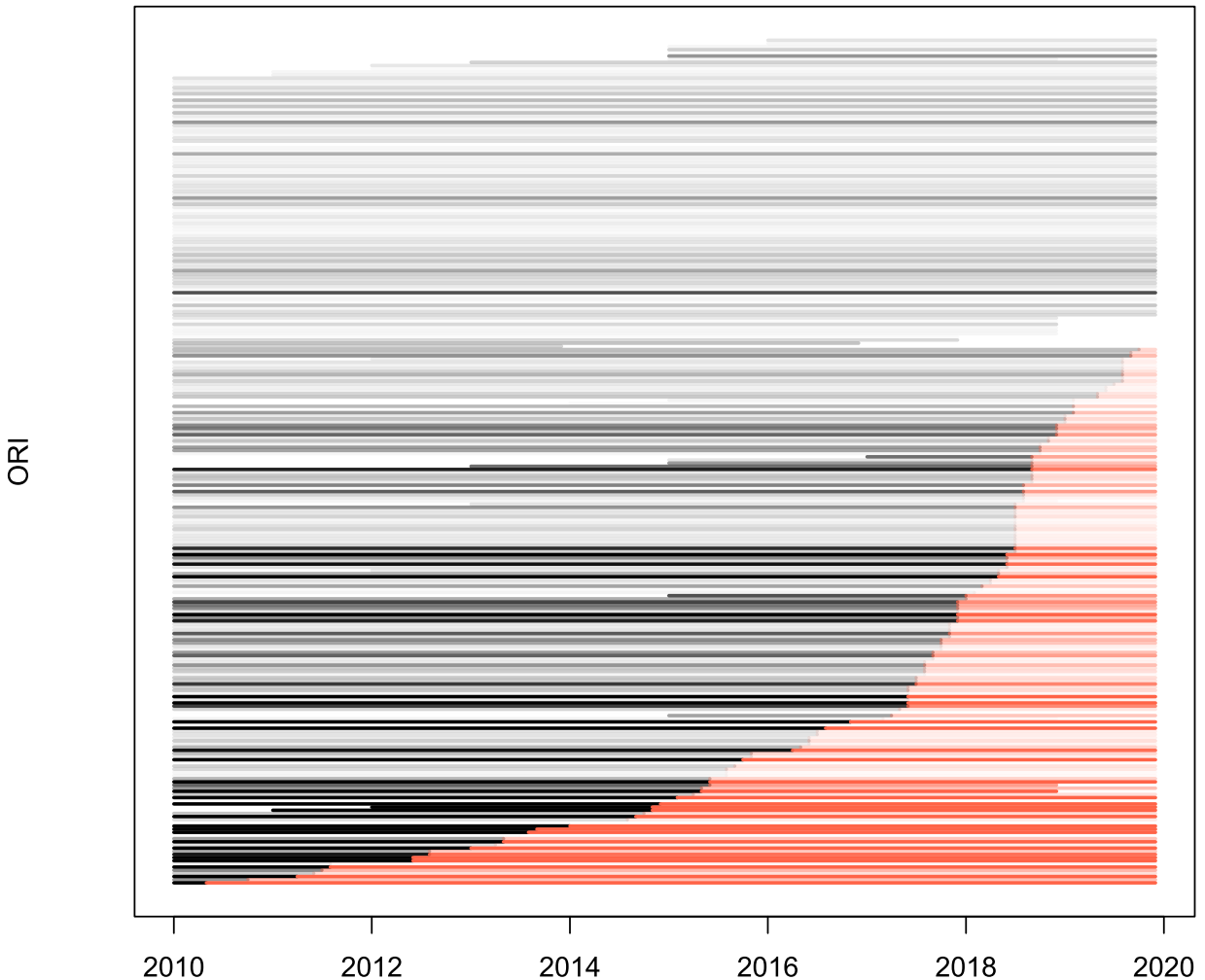
- Bureau of Transportation Statistics
  - City-by-year micromobility information
  - Start/end months for docked, dockless, and e-scooter systems
- Federal Bureau of Investigation, Crime Data Explorer
  - Agency-by-month counts of particular crimes
  - Agencies and BTS cities were then matched to one another
- Final dataset covers 268 agencies from 2010 to 2019
  - Docked Bikeshare: 82 (30.6% of agencies)
  - Dockless Bikeshare: 74 (27.6% of agencies)
  - E-Scooters: 78 (29.1% of agencies)
  - Uber entry dates and ACS information for each agency

Data



Rollout of Micromobility (agency by time; red indicates treatment)

Data



Rollout of Micromobility is Driven by Population (500K)

Data

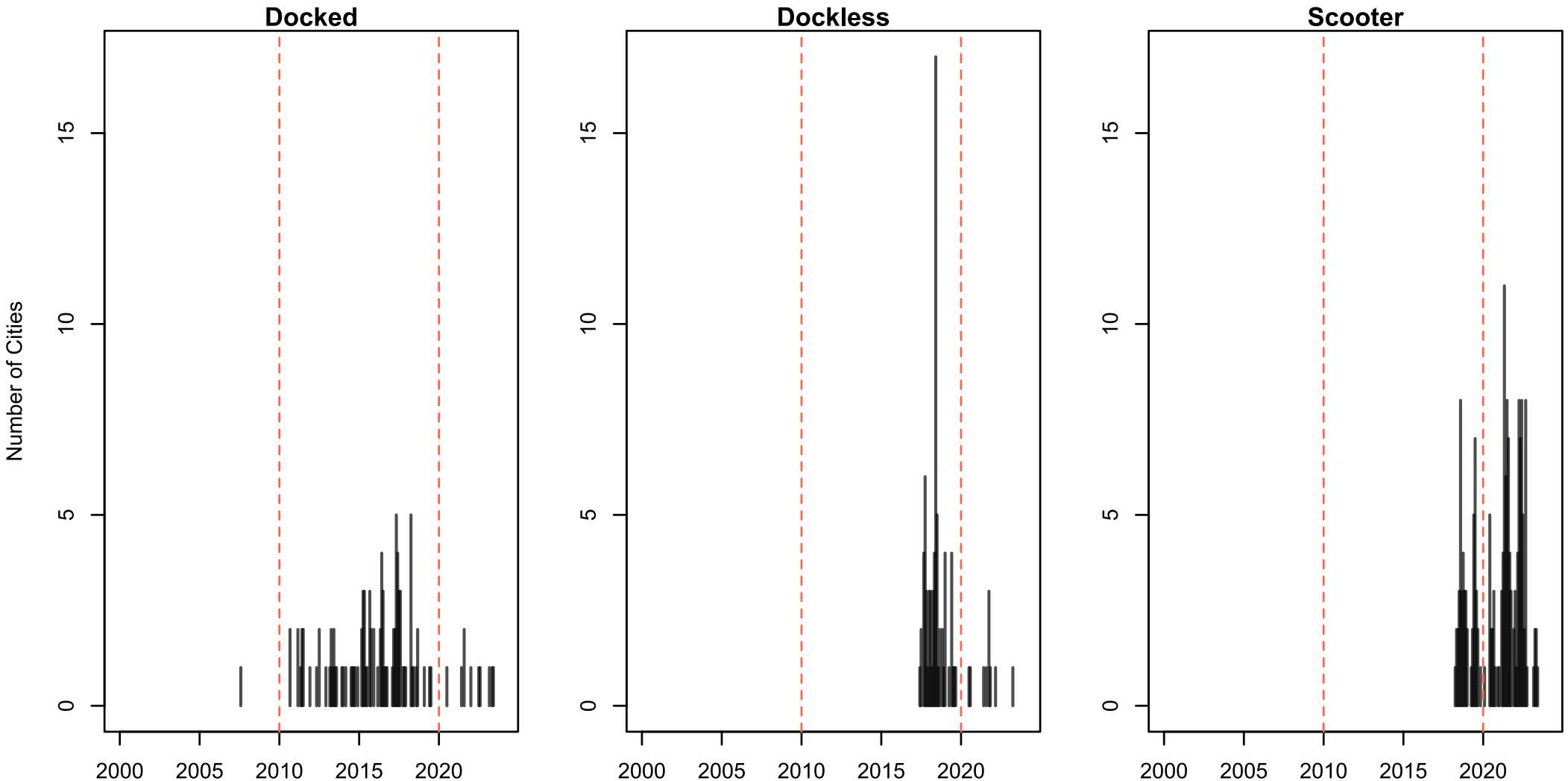
Micromobility Options by 2020

Num. Micromobility Options	**0**	**1**	**2**	**3**
Num. Cities/Agencies	129	174	67	16

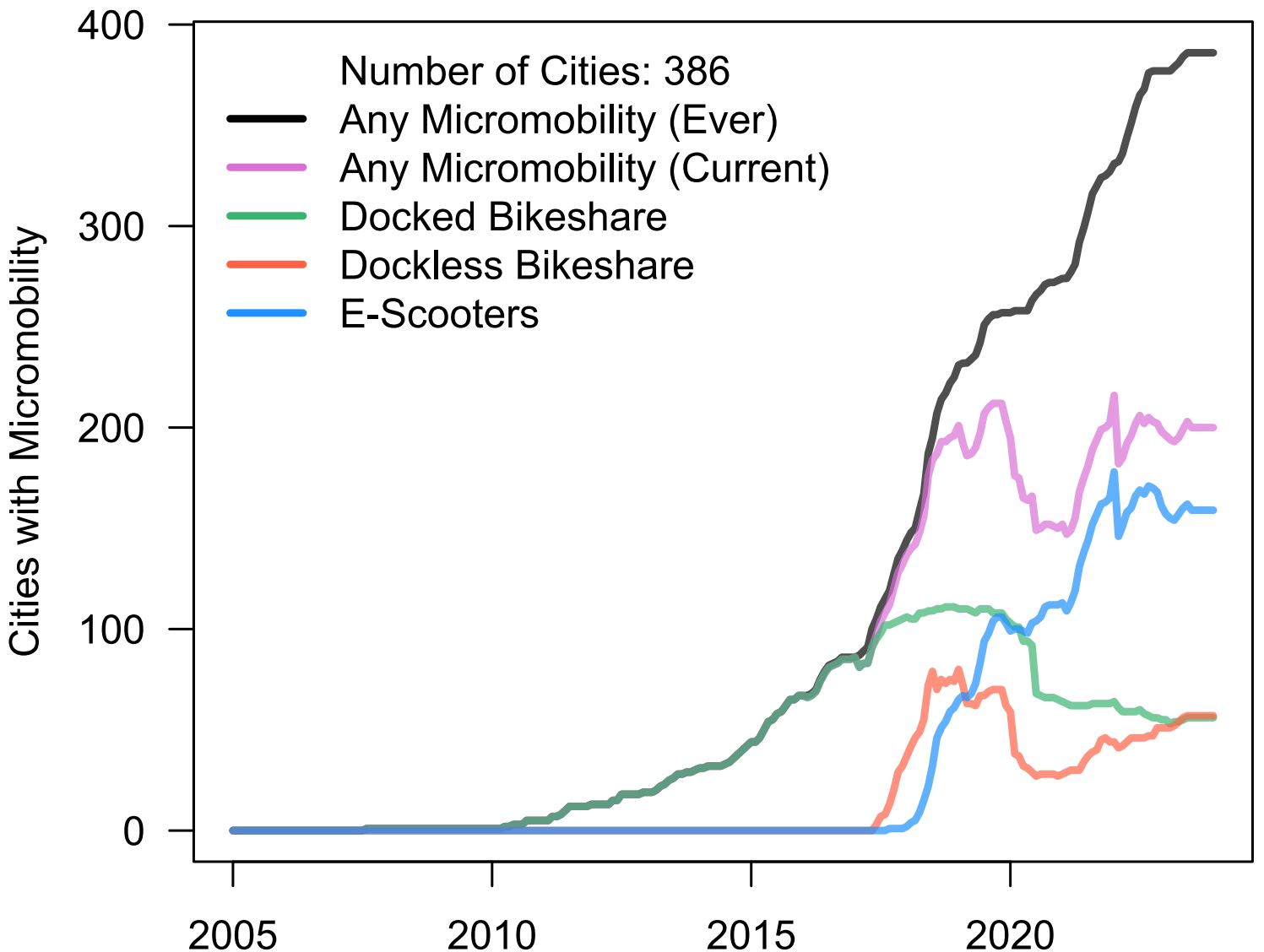
Percent of Cities with a Pre-Existing Micromobility Option on Entry of Another

	Docked	**Dockless**	**Scooter**
Docked		0.0	1.2
Dockless	17.6		14.9
Scooter	39.7	29.5	

Data


Docked
Dockless
Scooter
Number of Cities
0
5
10
15
2000
2005
2010
2015
2020

Data


Number of Cities: 386
Any Micromobility (Ever)
Any Micromobility (Current)
Docked Bikeshare
Dockless Bikeshare
E-Scooters
Cities with Micromobility
400
300
200
100
0
2005
2010
2015
2020

Method

We begin by estimating a Poisson regression of the form:

$$\text{DUI}_{at} = \color{red}{\delta} M_{at} + X_{at}\beta + \alpha_a + \tau_t + \epsilon_{at}$$

where:

M_{at} is an indicator variable equal to one if the agency operates in an area with micromobility options.

α_a and τ_t represent agency and time (year-month) fixed effects.

X_{at} is a vector of controls including arrests for drunkenness, liquor law violations, Uber entry, and demographic information (income, age, percent white, education).

Outcomes currently include arrests for DUIs and Drug Possession (falsification).

Variations include state-by-year and agency-by-month fixed effects.

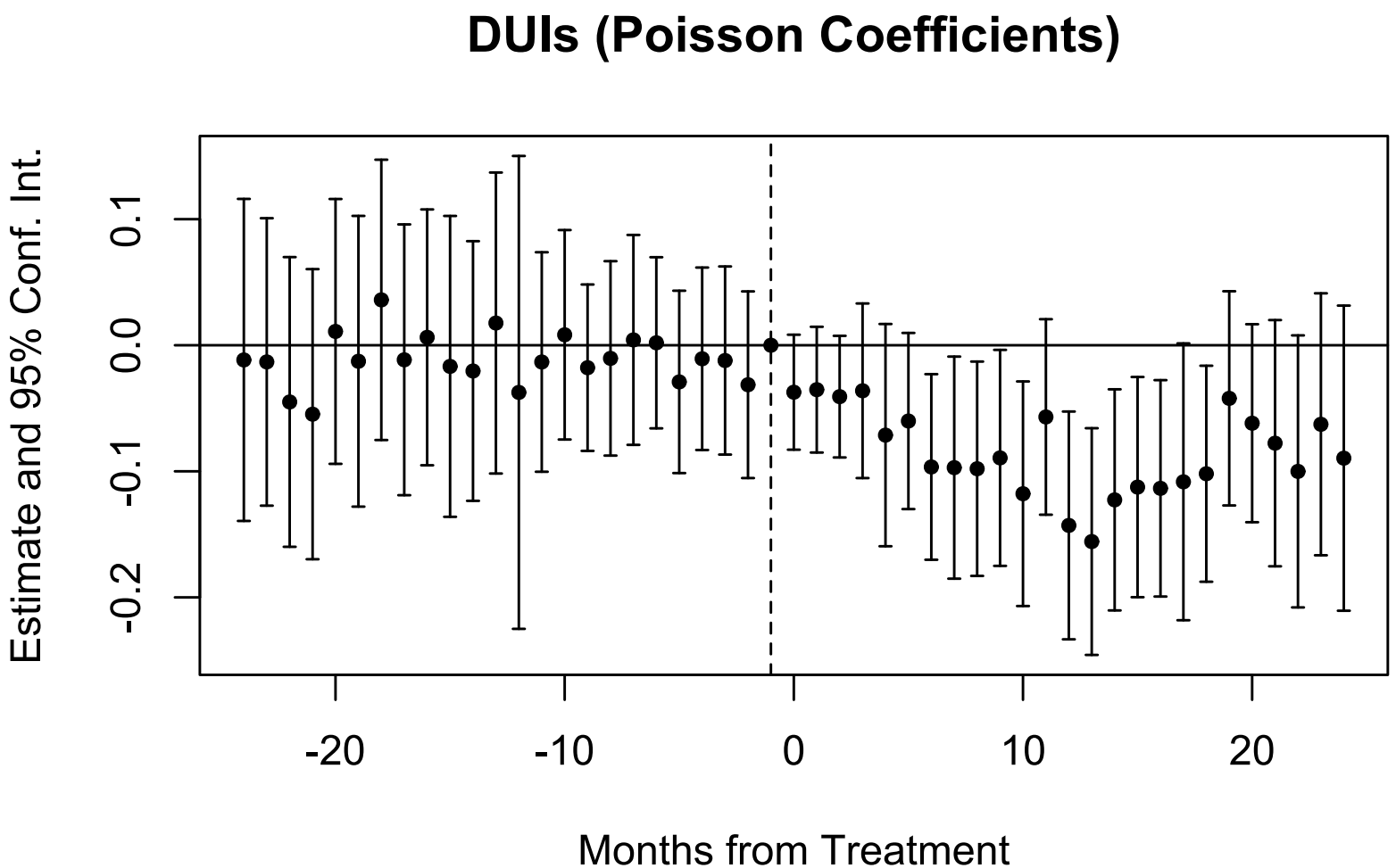
Method

We also use the new *Local Projections Difference-in-Differences* (Dube et al. 2023) estimator to investigate the effects of micromobility.

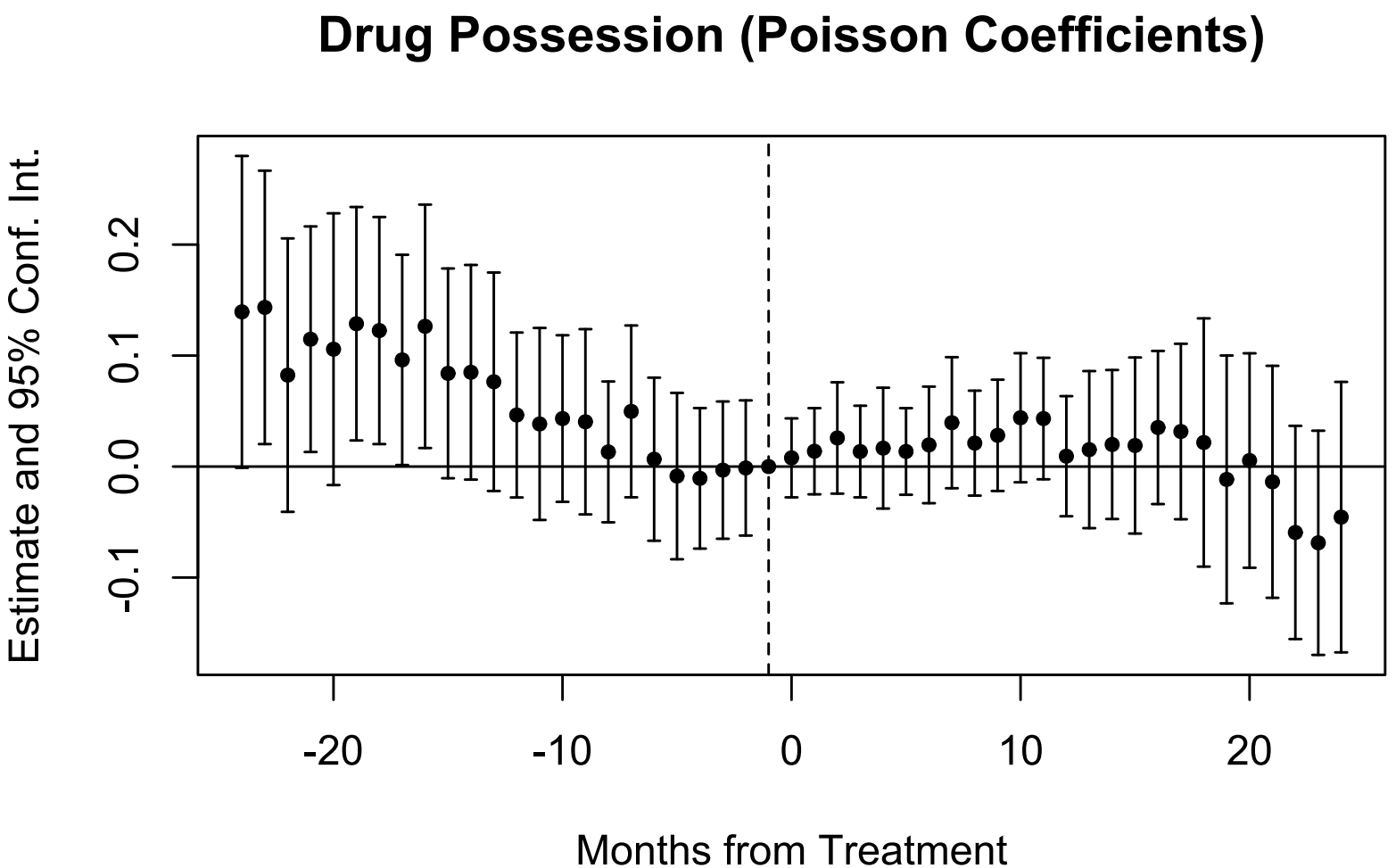
$$\text{DUI}_{a,t+h} - \text{DUI}_{a,t-1} = \color{red}{\delta_h^{LP}}\Delta M_{a,t} + \tau_{t}^{h} + e_{at}^{h}$$

using only observations where $\Delta M_{at} = 1$ (newly treated) or $M_{a,t+h} = 0$ (clean control). This is akin to the "stacking" estimator in Cengiz et al. (2019).

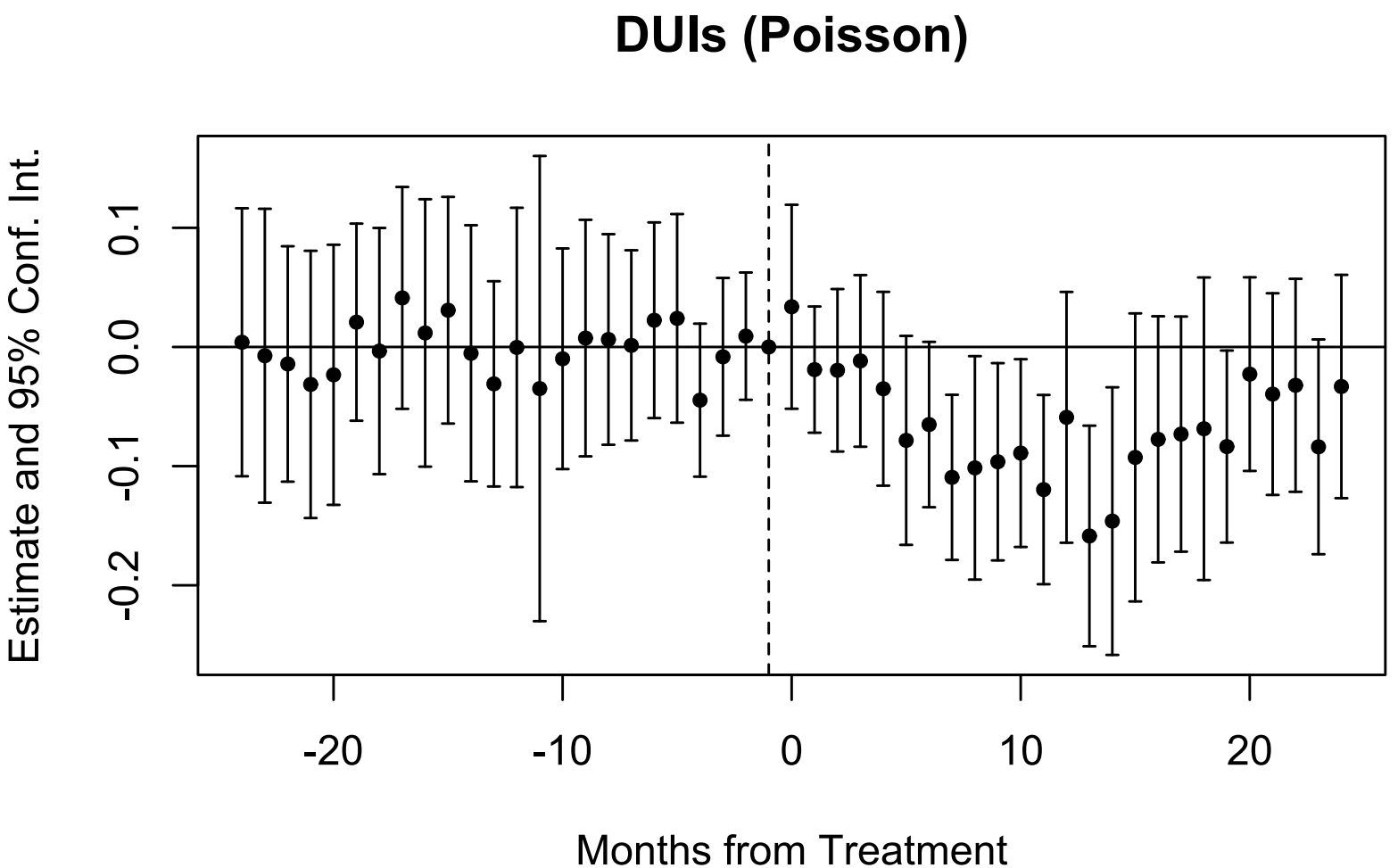
Results - Event Study, Any



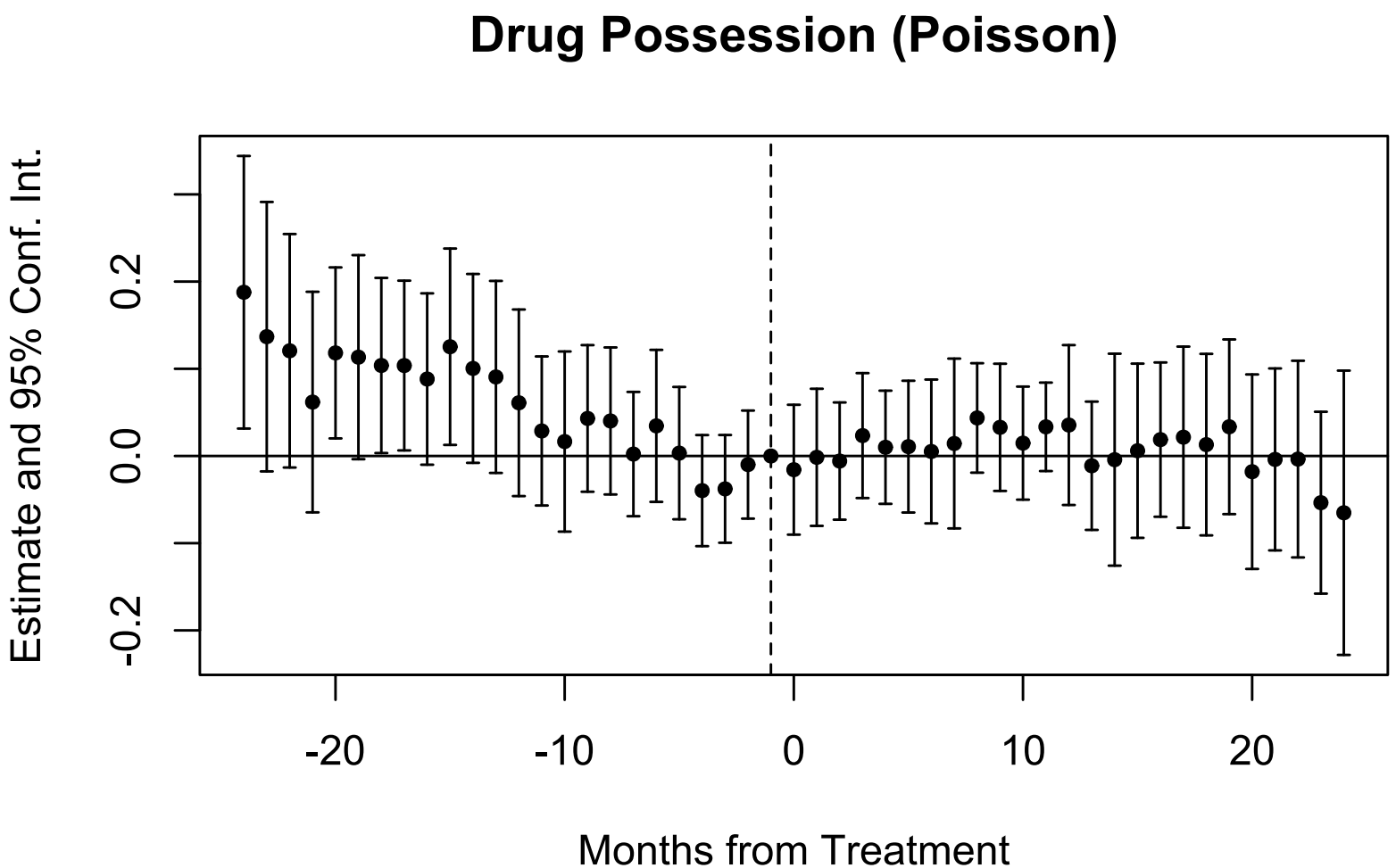
Results - Event Study, Any



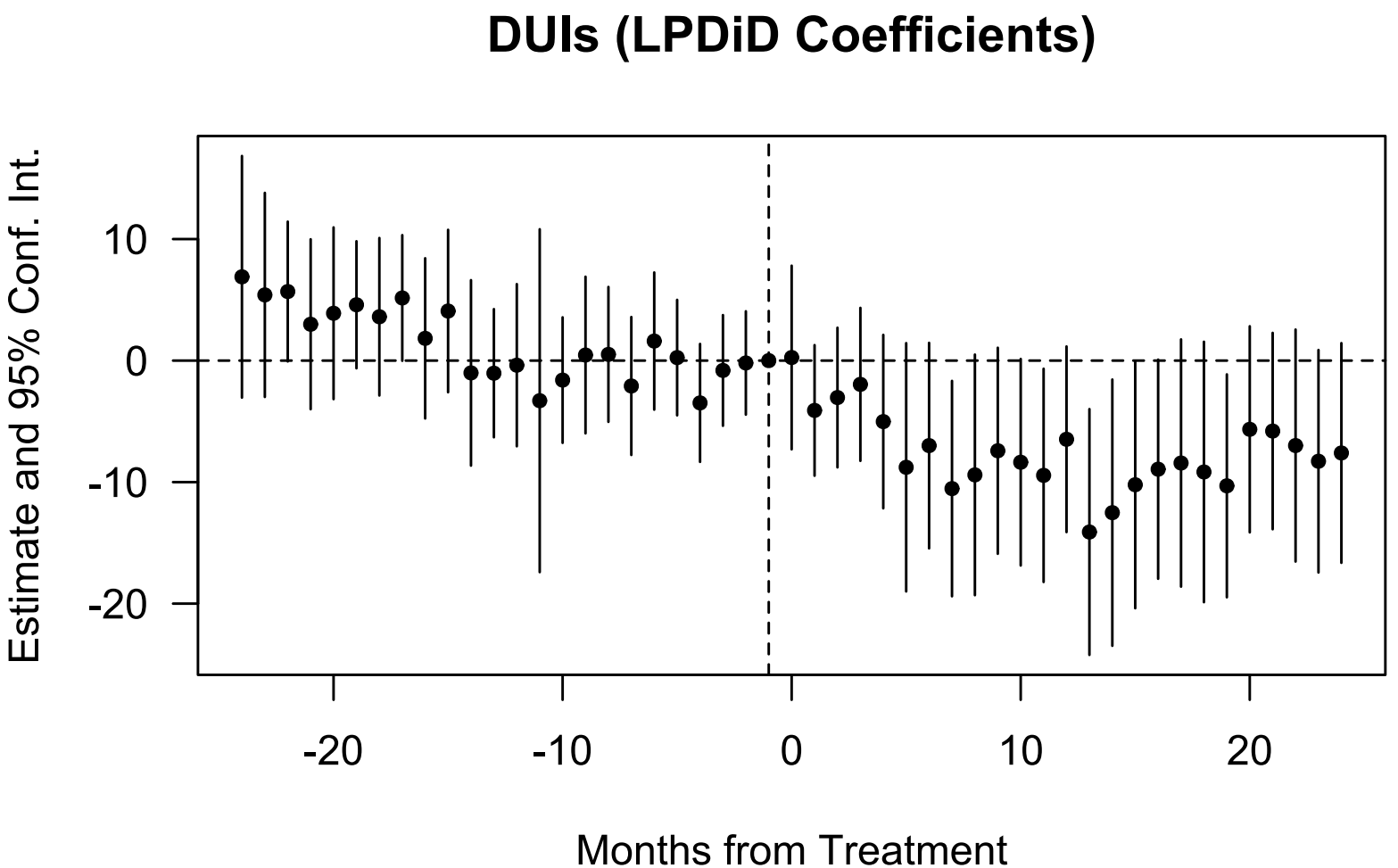
Results - Event Study, Docked



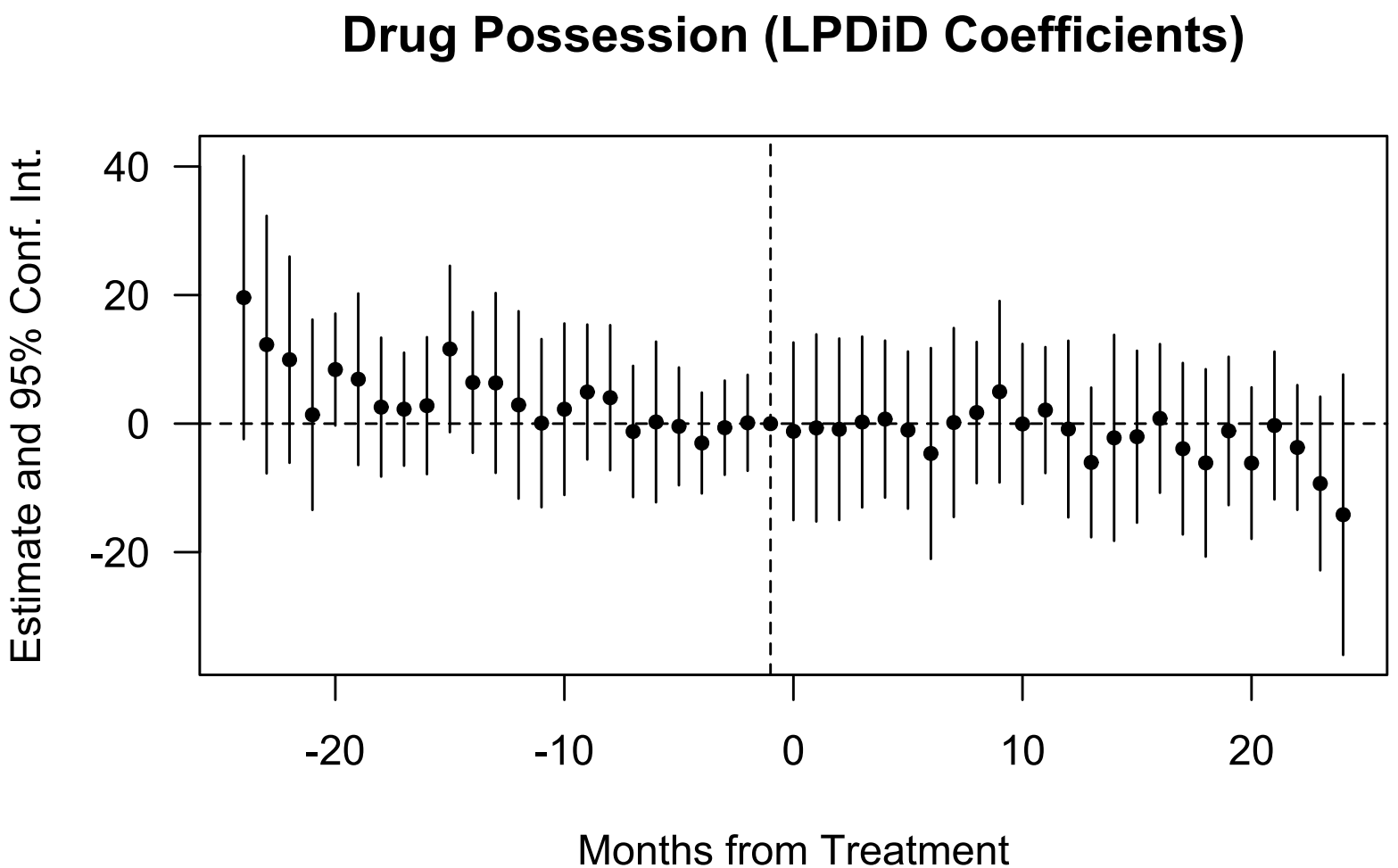
Results - Event Study, Docked



Results - LPDiD, Docked



Results - LPDiD, Docked



Results

We estimate a \(\approx\) **10% reduction in DUIs** per month due to the introduction of micromobility.

While this may seem like an attractive headline, the interpretation is delicate and unlike that of rideshare. A reduction of DUIs indicates less drunk driving, but the actual safety implications are much less clear.

Future Directions

- Coupling these results with those for health outcomes (HCUP, FARS, crashes)
- What happens when micromobility is *removed*?
- Changes in DUI laws? DUI vs RUI? Micromobility laws can be unclear.

Summary

- We supply one of the first papers to examine the effects of micromobility.
- Using TWFE and LPDiD, we find relatively large reductions in DUI arrests.
- Ideally, we could observe *injuries* or non-fatal outcomes.
- There's more work to be done on micromobility!

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