

# ARE SUPER SPIKES FASTER?



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**Super Spikes** are a new form of running shoe technology first introduced in 2020.

We conduct a natural experiment exploiting exogenous variation in how super spikes were regulated.

Super Spikes designed for **distance runners** were **allowed** starting in 2020, but shoes designed for **sprinters** were **banned** from competition.

## Basic Assumptions

- > **A.** Track & Field performances can be approximated using a **Gaussian distribution**.
- > **B.** There is one treatment: **access to Super Spikes**. Applies to distance runners (>400 m)
- > **C.** Two periods: before and after treatment (**pre-2020** and **post-2020**)

## Different Spikes

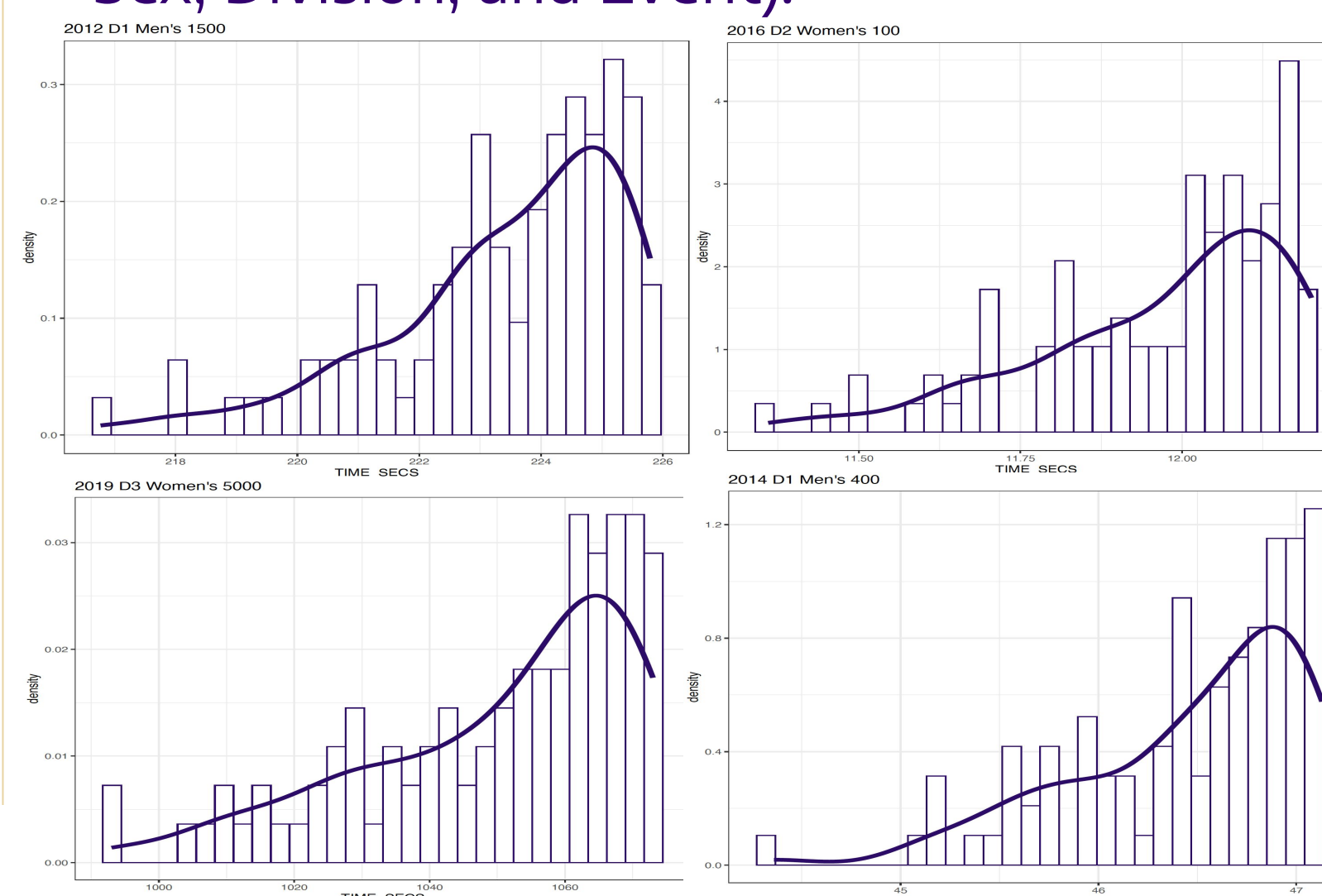
- > **Top left.** PUMA Brush Spikes Tahoe (1968)
- > **Top right.** Nike ZoomX Dragonfly (2021)
- > **Bottom left.** New Balance FuelCell (2021)
- > **Bottom right.** Adidas adizero Avanti (2021)

## Track and Field Spikes



## Data

- > Track & Field Results Reporting Service (TFRRS.org) archives all NCAATF results.
- > **Top 100** regular season performances for **Men** and **Women**, for **Division I, II, and III**, for years **2010-2021**. **n = 79,200**.
- > Performances are distributed similarly for each **cohort** (defined as permutations of Sex, Division, and Event).



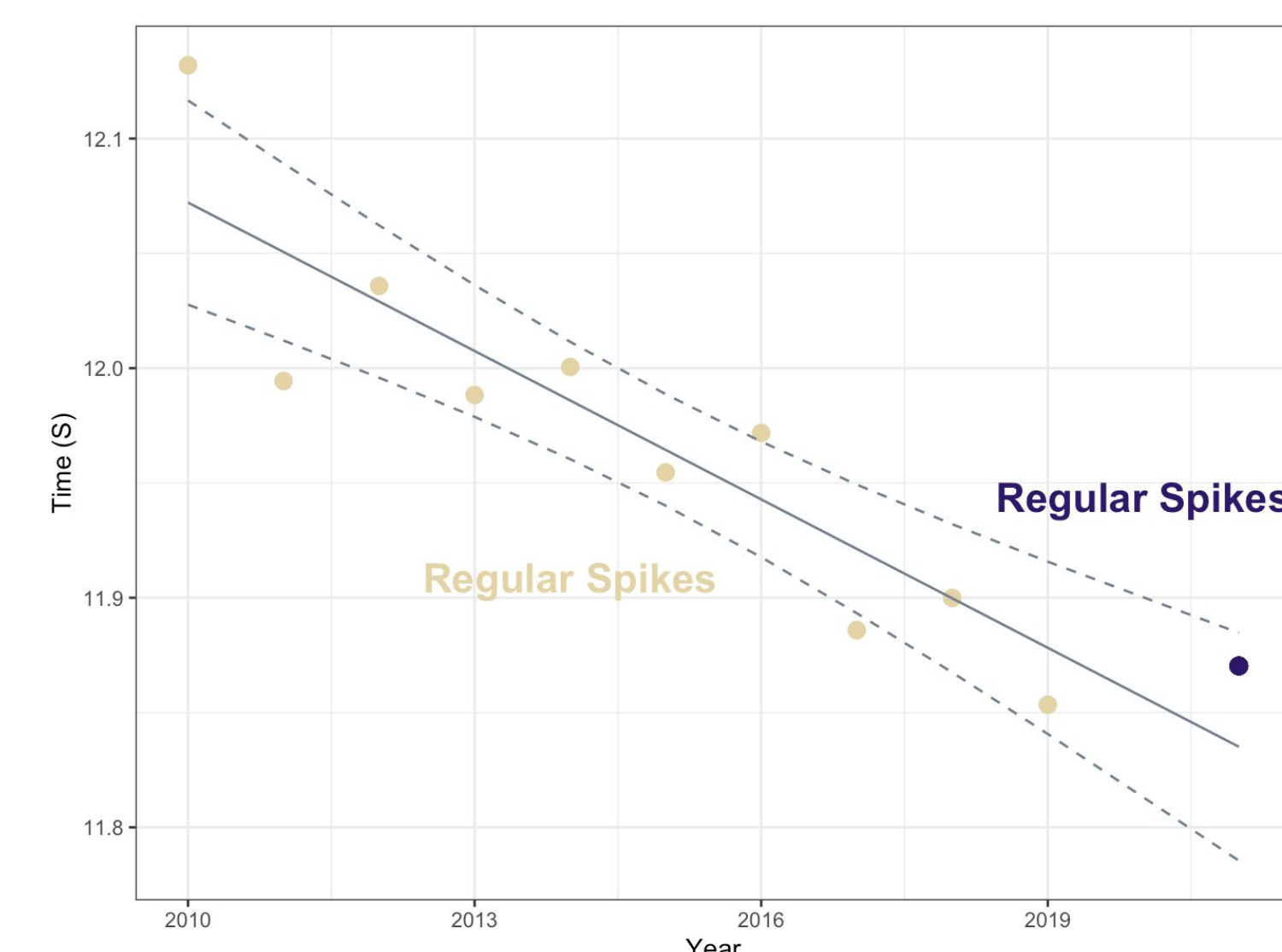
## Model Specification

2x2 difference in differences (DiD)

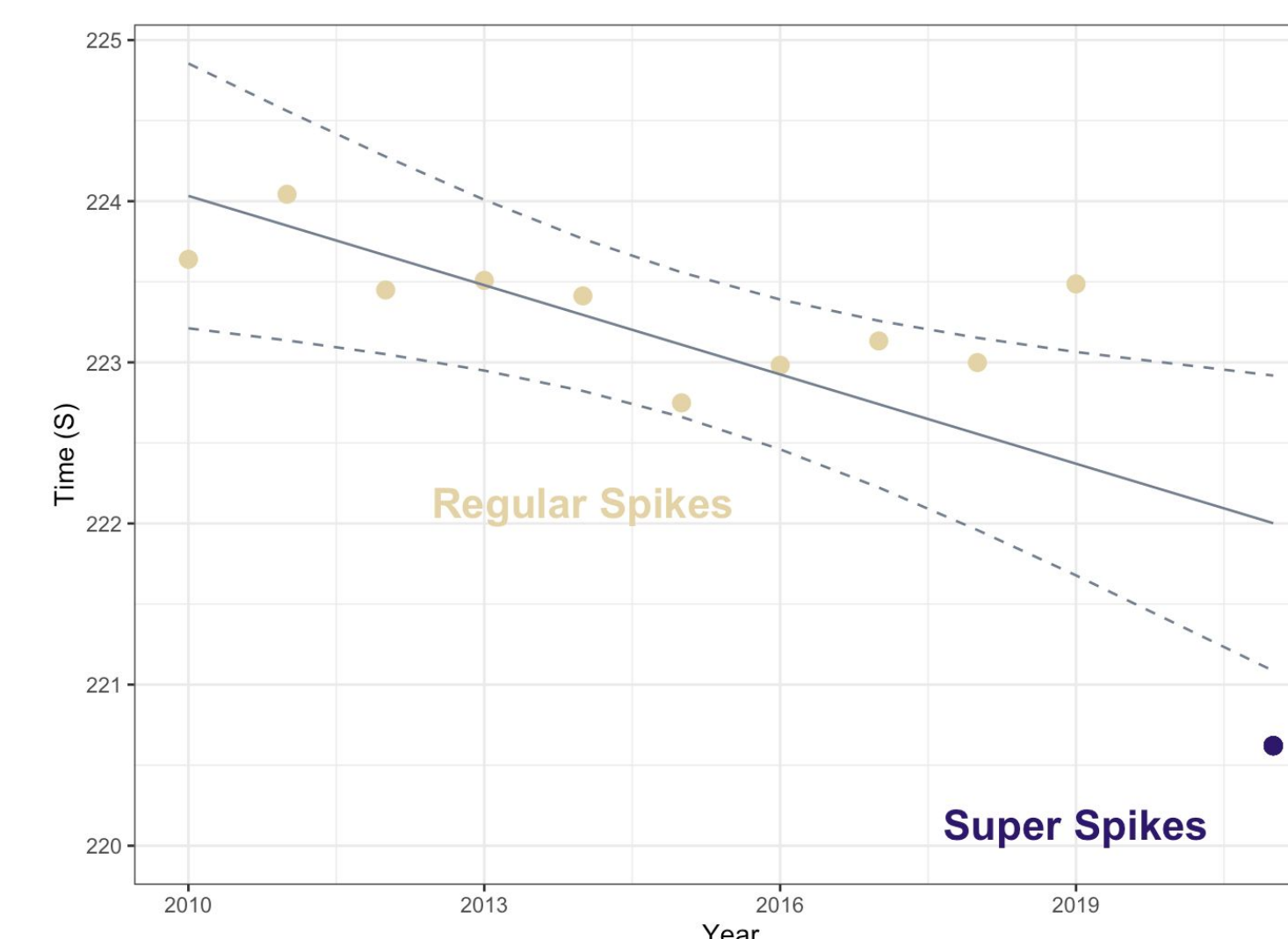
$$\Delta P_{i,t} = \alpha + \beta Treat_{i,t} + \phi Post_{i,t} + \gamma PostTreat_{i,t} + \epsilon_{i,t}$$

for cohort  $i$  in year  $t$  where gamma is the effect of spikes access in 2021.

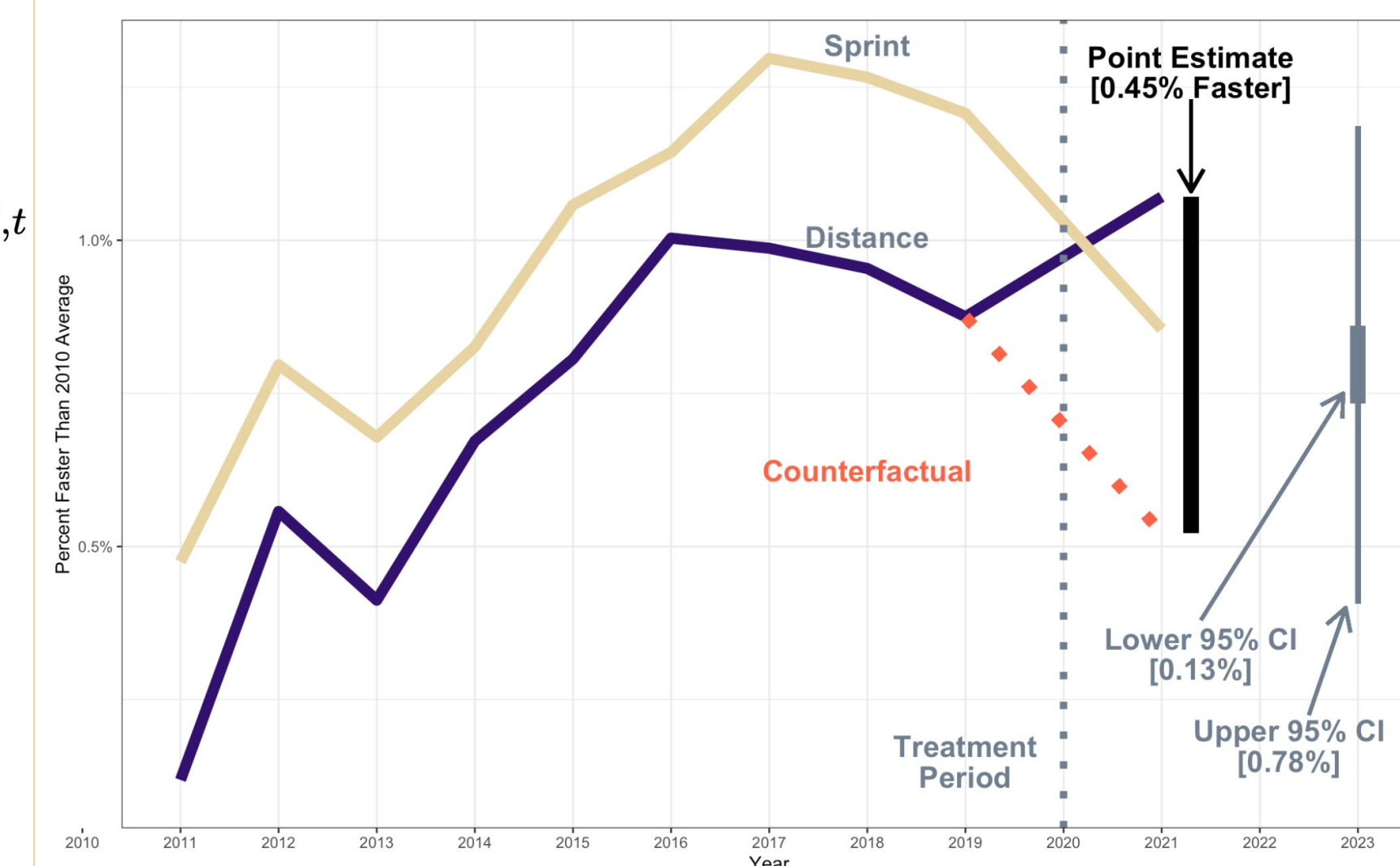
## Sprint (DII Women's 100m)



## Distance (DI Men's 1500m)



## Performances Over Time



## Treatment Effect

- > The trends in performance are **parallel** for distance runners and sprinters **before treatment**.
- > The **treatment effect** is the vertical distance between **counterfactual** and **observed**.
- > This **effect** is big! Between **1.0 and 1.25 seconds** for a metric **mile**.

- > That's the difference between finishing 8th and winning **Olympic Gold!**

